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THE IMPACT OF CHANGES IN PURCHASING POWER ON FOOD CONSUMPTION OF AN URBAN POPULATION IN GUATEMALA CITY

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Repeated measures were obtained in a sample of 200 poor urban households in Guatemala to evaluate the impact of changes in their purchasing power on food consumption patterns. The sample was divided into three income level groups, based on their families' total per capita expenditures. Results revealed that the purchasing power of the poorest group was less affected between 1986 and 1987 than that of families with relatively higher income.

Energy and protein intakes improved in the low and medium income groups and did not change in the high income group. This maintenance or improvement of dietary intake was at the expense of reduced expenditures on other items such as recreation, clothing, and health. However, the mean energy intakes and the protein quality were, in general, inadequate relative to recommendations, both in 1986 and 1987.

KEY WORDS: Energy intake, expenditures, Guatemala, households, income groups, protein intake, purchasing power

INTRODUCTION

Food prices and household incomes are two of the key determinants of urban households' purchasing power and of food security. Studies in developing countries have found a positive association of total family income with food consumption, dietary energy intake and specific nutrients, among urban low-income groups (Alderman, 1984; Immink, 1984; Greer and Thorbecke, 1983; Kennedy, 1983; Batrouni et al., 1983). Furthermore, a broad review of case studies among the urban poor in various developing countries has found that, in general, the price elasticity of food demand is negative and high (Alderman, 1984). This implies that a general increase in the price of foods has strong negative impacts on food intake levels.

Although it is generally accepted that changes in real income have an impact on food intake and on the nutritional status of the population, little is known about how urban poor respond to changes in macro-level variables such as inflation and unemployment, or about the survival strategies that they employ during more acute economic crises (Solimano and Jeria, 1980). Moreover, the impact of the economic crisis, and the corresponding survival strategies could be different between different income groups, among the urban poor. For instance, a study conducted in Mexico city between 1983 and 1984 found that the economic crisis

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had a greater impact on the purchasing power of medium income groups as compared to lower income groups (Instituto Nacional del Consumidor. 1988).

The present study was carried out in a low-income population in the city of Guatemala between 1986 and 1987. The objective was to evaluate the impact of changes in the purchasing power on food consumption patterns of low-income urban households.

In Guatemala, socio-economic indicators reveal serious social and economic problems that are mainly expressed by a significant rise in the prices of staple foods and in unemployment, as well as by a drop in real salaries, all of which negatively affect social welfare conditions of the urban poor (Comisión Económica para América Latina, 1988). For instance, urban unemployment in the whole country increased from 9.1 in 1984 to 14.2 in 1986, and 12.2 in 1987. The annual increases in consumer price index were of 3.4 in 1984, 36.9 in 1986, and 12.3 in 1987 (Wilkie, 1990). A survey of a national sample of children under 3 years of age revealed a prevalence of stunting (height-per-age below −2 S.D of the NCHS/WHO reference) of 56%. In 1985, 45% of the population was illiterate. and, at about that time, only 51% of the population had access to water (Instituto de Nutrición de Centro América y Panamá, INCAP, 1989).

We postulate that the economic crisis, in general, and the inflationary process, in particular, affect negatively upon food consumption of these households, deteriorating over time, the quality and quantity of their daily diet.

METHODS

The Sample

The study was carried out in a low-income urban community in the fringes of Guatemala City called "El Milagro". The area had an approximate total estimated population of 27,627 inhabitants in 1986. The reasons for selecting this area were its urban characteristics, the large inmigration movements during recent years, and the poor living conditions of a significant part of its inhabitants (INCAP, 1985).

The sample size was determined so as to investigate statistically significant changes in the daily intake of basic food items. Expected changes in daily intake of basic food were based on price increases similar to those observed in Guatemala between January 1985 and January 1986, and on information of food price elasticities among poor households in Latin America. The standard deviations of mean intakes of staple foods were estimated from food consumption surveys in Guatemala and other Latin America countries. The resulting sample size of 200 allows evaluation of effects of income on food item consumption with a type I error of 5% and a power of 82% (Snedecor and Cochran. 1980)[1].

A two-stage sampling procedure was employed for the sample selection: (a) eight sectors were randomly selected from a total of 51 sectors of approximately 80 households each; and (b) 30 households were randomly selected from within each chosen sector. providing a total sample of 240 households.

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[1]According to unpublished data furnished by the Guatemalan Institute of Statistics. inflation from January 1985 to January 1986 was 19.7%. and from June 1986 to July 1987 (evaluation period of this study) was 10.7%.

Data Collection

The present study reports on the results from two cross-sectional surveys. The first was conducted during the months of June and July 1986, and the second during the same months in 1987. Although 240 households participated originally in the study, only 200 of them remained until the second survey. The drop-outs in the second survey were in most cases due to migration, or to unwillingness to collaborate.

Data were obtained by home interviews. Three different surveys were carried out: an income-expenditure survey, a dietary intake survey, and a demographic survey. In most cases the interviewee was the housewife.

The respondents were asked about the occupation and income of each household member and about household expenditures. Data regarding expenditures on individual food items were obtained. Expenditures on housing, transportation, health, clothing, education, and other expenditures were identified in an aggregated format. Total household expenditures were finally used as a proxy for household income.

Dietary intake was obtained by the 24-hour recall method. Two interviews were conducted in each household within a one week period. In addition, date and place of birth of all household members were obtained, as well as information on whether women were pregnant or lactating.

Data Analysis

Food consumption and energy intake are expressed per adult equivalent units[2]. The energy recommendations employed for the calculation of adult equivalents were the INCAP energy recommendations (INCAP, 1973).

Although the sample studied belongs to a low income population, there was relatively large variability in the income of the group as a whole. Therefore the sample was divided into three income levels. The lowest income group, that includes those households whose per capita income level in 1986 was insufficient to cover the total cost of an adequate minimum-cost diet (Flores et al., 1969). The medium income group, that includes those whose per capita income in 1986 was higher than that of an adequate minimum-cost diet in 1986, but insufficient to cover housing, clothing, health, recreation and transportation expenses (components of an expanded basic basket). The highest income group, includes those with sufficient income in 1986 to cover the cost of the expanded basic basket in 1986.

The results were evaluated in terms of income, budget shares, food groups consumption, as well as caloric and protein intakes. Mean food intake values and standard deviations are presented in all the cases.

In some cases, particularly those related to the consumption of specific foods, the variances were intrinsicaly high, not rendering evidence of significant differences between means. A reason for these high variances was an important number of households which reported zero intakes, and were included in the analysis. Student's t tests for paired samples were used for comparison of means, invoking the Central Limit Theorem, given the large sample sizes. The Wilconson test for median differences was also used as an alternative non-parametric test. The results

[2]See Deaton and Case (1987) for methods concerning adult equivalent units estimation.

TABLE I
GUATEMALA: COLONIA EL MILAGRO
Per capita monthly income (Guatemalan Quetzales) according to income groups in 1986–1987
Mean (Standard Error)

Income relative groups(1)	(n)	1986 Income (a)	1987 Nominal income (b)	1987 Real income(2) (c)	Change Percentage (c-a)'a	Households with decreased real income in 1987	
						number	%
Lowest	59	44.8 (1.4)	50.0 (3.9)	45.2 (3.5)	+ 0.9	34	57.6
Medium	52	68.3 (1.1)	60.8 (3.1)	56.4 (2.8)	−17.4	39	75.0
Highest	89	117.1 (3.5)	89.4 (3.8)	83.0 (3.5)	−29.1	77	86.5

(1) Per capita expenditures are a proxy variable of income (1.00 US. Dollar = 2.5 Quetzales in 1986)
(2) Differences in Real income between 1986 and 1987 were statistically significant ($p < 0.05$) for medium and highest income households.

were basically similar to those found when Student's t tests were used, and are therefore not presented.

Student's t tests for paired data also were used to test statistical differences in energy and protein intakes within income groups from 1986 to 1987. Chi-square tests were used to compare proportions of households meeting the energy and protein recommendations.

RESULTS AND DISCUSSION

Income and Purchasing Power

The changes in the household real income between 1986 and 1987, as a consequence of the general increase in prices and unemployment[3], are presented in Table I. The average real income remained constant in the lowest income households, while in the medium and highest income households there was a reduction of 17.4% and 29.1% respectively. However, in all the three groups, a large proportion of households experienced loss in purchasing power: 58%, 75%, and 87% for the low, medium, and high income groups, respectively.

The smaller decrease in the average purchasing power of the lowest income households, as compared to the households with highest income, is explained by an increase in their nominal income, and a decrease in the nominal income of the two higher income groups.

These increases in the nominal income of the lower income groups was not due to changes in the number of economically active household members between the two periods (Table II).

A possible explanation for the smaller decrease in purchasing power among people in the lowest income group, is that they might have operated more often

[3]The percentage of people in working age who were unemployed increased from 3.9 to 6.1 in the total sample, between 1986 and 1987.

TABLE II
GUATEMALA: COLONIA EL MILAGRO
Percentage of family members who constituted the family labor in 1986 and 1987

	Relative Income Level					
	Lowest		Medium		Highest	
	1986	1987	1986	1987	1986	1987
One	25.1	28.3	49.1	40.4	51.1	50.8
Two	35.0	35.0	26.4	32.7	34.8	30.8
Three	23.3	18.3	11.3	15.4	7.6	11.0
Four	10.0	10.0	5.7	5.8	4.3	4.4
> Four	6.6	8.3	7.5	5.7	2.2	3.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Average household size	7.6	7.0	6.1	6.3	5.0	5.2
Sample size (n)	59	59	52	52	88	88

in the informal economy sector, where there is probably more flexibility for income improvements. Although this study does not provide information about the number of households operating in the informal economy, other studies in Latin America have shown that a large proportion of households of low income level operates in this sector, as compared to households of higher income levels (Garcia, 1982; Pinto, 1984).

It should be noted that, although the average per capita real income among the economically poorest households was constant from 1986 to 1987, their mean income in 1987 was still 60% below that found in better-off households.

Food Consumption Pattern

Between 1986 and 1987 the lowest income households decreased consumption of dairy products and raw maize (used to prepare *tortillas and tamales*), and increased consumption of meats, wheat bread and other cereals, maize derivatives (*tortillas and tamales*), fruits, beans, sugar. Intake levels of other foods did not change substantially in this group (Table III).

Middle income households showed smaller mean food consumption increases of only three foods: bread, beans, and sugar. The highest income households increased their bean and sugar consumption, but on the average decreased the consumption of rice, eggs and vegetables.

In short, in spite of a small decrease in the real income of the middle income group, the average levels of consumption of more than 80% of the evaluated foods remained constant. Similarly, in the highest income group, decreases in consumption of only three food items were documented. However, in the lowest income group, in which the real income remained constant, increases in the consumption of a number of food items were observed[4]. In the next section, an explanation for some of the changes observed are provided by analysis of changes in relative prices.

[4]Comments about food consumption changes are only on those changes which were statistically significant.

TABLE III
GUATEMALA: COLONIA EL MILAGRO
Food consumption per adult equivalent/per day by groups in 1986 and 1987
Means (gr) and (Standard Deviation)

Food	Households with lowest income 1986		Households with lowest income 1987		Households with medium income 1986		Households with medium income 1987		Households with highest income 1986		Households with highest income 1987	
Dairy	46.1 (61.3)	*	35.7 (35.7)		45.6 (51.7)		50.1 (53.9)		112.8 (121.1)		103.0 (114.6)	
Eggs	35.1 (28.3)		35.1 (73.1)		56.1 (37.9)		52.9 (34.3)		69.9 (40.6)	*	61.2 (42.0)	
Meats	38.9 (43.2)	*	72.0 (74.6)		74.1 (72.1)		88.3 (66.7)		128.1 (140.4)		115.1 (98.3)	
Beans	52.7 (28.4)	**	71.4 (33.9)		55.1 (34.7)	**	98.3 (80.7)		46.2 (33.7)	**	77.1 (81.8)	
Vegetables	96:6 (86.6)		94.4 (62.9)		141.8 (93.3)		124.8 (105.5)		160.1 (106.4)	*	133.7 (104.8)	
Fruits	33.4 (42.4)		66.2 (72.2)		53.5 (91.8)		58.8 (67.8)		69.7 (97.4)		90.8 (93.0)	
Musaceous	39.2 (62.9)		35.1 (35.1)		57.1 (88.5)		58.0 (70.4)		70.5 (79.6)		80.7 (104.6)	
Roots and Tubers	36.1 (61.5)		32.0 (53.3)		31.8 (48.9)		37.3 (56.0)		57.5 (84.8)		55.0 (73.2)	
Rice	22.0 (25.6)		24.7 (27.7)		22.1 (28.8)		27.9 (28.9)		30.9 (30.9)	*	23.7 (23.2)	
Maize	176.6 (180.0)	*	115.5 (95.8)		106.2 (161.0)		83.4 (152.0)		77.7 (148.0)		41.4 (98.9)	
Maize derivatives	118.1 (115.0)	**	165.5 (133.3)		186.2 (151.8)		216.5 (144.0)		228.6 (152.8)		215.2 (130.4)	
Other cereals	16.5 (19.2)	**	26.5 (26.3)		26.9 (31.9)		22.1 (98.8)		26.8 (25.2)		26.3 (26.6)	
Wheat breads	70.7 (43.5)	**	106.9 (45.6)		81.9 (53.6)	**	122.6 (62.2)		122.0 (68.7)		129.6 (57.5)	
Sugar	60.3 (31.5)	**	78.0 (31.0)		63.7 (31.2)	**	87.1 (40.6)		75.1 (43.4)	*	88.5 (49.2)	
Fats	12.5 (12.2)		13.0 (11.2)		17.7 (13.7)		18.7 (12.1)		22.4 (17.8)		22.9 (16.9)	
Total	59		59		52		52		89		89	

Note:—The data collection method made it possible to differentiate between the purchase of maize for home cooking and the purchase of "maize derivatives" (mainly tamales and tortillas) which has been indicated in the table.
—Asterises indicate statistical differences (* $p<0.10$ and ** $p<0.05$)

Food Consumption and Relative Prices

The drop in the purchasing power of the studied households produced changes in food intake. These changes can be thought of as a result of a decrease in real income, as well as the substitution of food items, resulting from differential changes in relative prices.

The results suggest that the changes in relative prices favored the demand of some food items over others in the lowest income group. For example, the price increases for meats, beans and maize derivatives were smaller than price increases for all other products. As shown in Table IV, the demand for these three products increased. On the other hand, the demand for dairy products decreased, and demand for eggs remained constant, while their prices increased substantially, in relative terms. Interestingly, the demand for raw maize decreased while the price decreased; this is probably a typical behavior for *Giffen* goods, in which socio-cultural influences are stronger than the pure economic determinant of the preferences (Gould and Ferguson, 1980).

It is important to note that only *substitution effects* between foods could explain the changes in foods consumed in the lowest income group, in which no *income effects*[5] was observed. In contrast, in the middle and highest income groups, in which a decrease in real income was observed, changes in foods consumed can not be explained solely by substitution effects. In these cases compensatory effects between income and substitution might have occurred.

In fact, as income increases (expressed through comparisons among the 3 income groups), the change in mean food intake is, in general, smaller (less elastic), denoting the aforementioned compensatory effect of income and substitution (Table IV). An exception was the demand for beans, which increased in the three income groups despite price increment.

It also is interesting to mention that although the price of sugar increased significatively, its demand increased also significatively, denoting the importance of this product in the Guatemalan diet. Indeed, other studies have shown that as a result of its relatively low price, sugar play an important role as source of calories in the Guatemalan diet (Alarcón and Andrino, 1991).

Expenditure Patterns

Table V presents the budget shares of different expenditure categories for 1986 and 1987. The difference in budget shares between these years are small, probably because of the short duration of the interval studied.

The budget share on food was maintained constant in the two higher income groups between 1986 and 1987 (at constant 1986 prices). In the lowest income group there was a slight decline. The differences in budget shares for each of the non-food categories suggest that these low income urban groups responded to changes in prices and incomes by maintaining food expenditure levels, at the expense of expenditures on other items such as recreation, clothing, and health. These reductions can have negative impact on health and nutrition. Expenditures in housing and education were slightly increased.

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[5]A change in the nominal price of a commodity exerts two influences on quantity demended. First, there is a change in relative price, which leads to a *substitution effect*. Second, there is a change in real income *(income effect)*, or in the size of the bundle of goods and services a consumer can buy (Gould and Ferguson, 1980).

TABLE IV
GUATEMALA: COLONIA EL MILAGRO
Change rate of prices and food mean consumption by income group 1986–1987

Food	% Change in price(1)	% Change in mean food intake(2) Lowest Income	Medium Income	Highest Income
Dairy products	22.4	−22.6	4.5	−8.6
Eggs	20.0	0.0	−5.7	−8.7
Meats	5.5	87.4	14.5	−10.0
Wheat bread	14.3	52.3	42.2	6.2
Rice	0.0	12.8	26.2	−23.3
Maize	−8.0	−34.6	−21.5	−16.7
Maize Derivatives	8.1	40.1	16.2	−5.8
Beans	3.2	35.6	78.4	66.9
Sugar	30.4	29.2	36.7	17.8

(1) Unpublished data furnished by the Guatemalan Institute of Statistics.
(2) These changes rates were estimated as follows:

$$\frac{X87-X86}{X86}, \text{ where } X87 = \text{quantity or price of 1987}$$
$$X86 = \text{quantity or price of 1986}$$

TABLE V
GUATEMALA: COLONIA EL MILAGRO
Budget shares of monthly expenditures by Income group
Mean (Standard deviation)

	Relative Income Levels					
	Lowest(1)		Medium(1)		Highest(1)	
	1986	1987	1986	1987	1986	1987
Food	59.7	56.5	57.3	58.1	53.6	54.3
	(8.7)	(3.3)	(6.9)	(4.6)	(8.3)	(3.7)
Transportation	3.2	4.0	3.3	3.2	2.9	3.1
	(1.2)	(1.3)	(1.4)	(1.0)	(0.9)	(1.2)
Housing	10.1	15.7	12.6	14.1	11.8	13.8
	(6.9)	(7.2)	(6.2)	(6.8)	(8.7)	(8.5)
Health	1.6	1.3	2.4	1.3	3.2	2.2
	(1.5)	(1.4)	(2.5)	(1.2)	(2.8)	(1.8)
Clothing	7.3	6.5	7.7	6.5	8.2	7.0
	(4.7)	(4.2)	(3.3)	(3.1)	(4.2)	(3.4)
Education	1.0	1.3	0.9	1.3	0.7	1.5
	(0.8)	(0.7)	(0.6)	(0.8)	(0.6)	(0.9)
Household goods	10.5	9.2	7.6	8.1	7.0	7.5
	(6.4)	(5.4)	(6.1)	(6.2)	(3.8)	(3.5)
Recreation	6.6	5.5	8.2	7.4	12.6	10.6
	(3.4)	(2.2)	(4.2)	(3.4)	(6.5)	(5.4)
Sample size	59	59	52	52	89	89

(1) Budget shares of 1987 were valued at constant 1986 prices.

Energy and Protein Intake Levels

The lowest and middle income groups improved their average energy and protein intakes during the study period, while these intake levels remained unchanged in the highest income group (Table VI). Likewise, the percentage of households which improved or maintained their per capita energy intake was higher in the lowest and medium income groups than in the highest group. Similar results were observed for protein intake levels, including the fact that a greater percentage of highest income households had inadequate protein intakes in 1987 as compared to 1986.

The results were unexpected for the middle and higher income groups, since both groups experienced a decline of real income. Such decline did not lead, however, to declines in energy and protein intake, suggesting that poor urban households tend to maintain food intake despite increases in purchasing power, probably at the expense of reductions in other expenditures.

It is important to note that, in spite of the increase in the average daily energy intake levels per adult equivalent in the lowest income group between 1986 and 1987, the recommended level of caloric energy for a male adult with moderate activity was not attained. In contrast, the three groups attained recommended protein intake levels. A small proportion of households in each group, ranging

TABLE VI
GUATEMALA: COLONIA EL MILAGRO
Percentage of energy and protein adequacy per adult equivalent according to income group between 1986 and 1987

	Households with lowest income		Households with medium income		Households with highest income	
	1986	1987	1986	1987	1986	1987
Energy Adequacy						
< 100%	91.6	77.9	84.6	69.2	65.1	58.5
>=100%	8.4	22.1	15.4	30.8	34.9	41.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Stat. significance	(p<0.05)		(p<0.10)		(p>0.10)	
Mean intake (Kcal.day)	2140.5	2370.9	2347.1	2731.2	2758.6	2759.5
Standard Deviation	(555.6)	(529.3)	(663.5)	(556.6)	(624.2)	(682.5)
Stat. significance	(p<0.10)		(p<0.05)		(p>0.10)	
Protein Adequacy						
< 100%	54.2	39.0	28.8	11.5	10.1	15.7
>=100%	45.8	61.0	71.2	88.5	89.9	84.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Stat. significance	(p<0.10)		(p<0.05)		(p>0.10)	
Mean intake (gr/day)	62.7	72.4	71.5	86.4	86.9	87.9
Standard error	(20.5)	(23.3)	(20.5)	(25.1)	(20.9)	(27.6)
Stat. significance	(p<0.05)		(p<0.05)		(p>0.10)	
Sample size	59	59	52	52	89	89

Notes:—Chi-squared tests were used for differences in energy and protein adequacy, while Student's t tests were used for differences in mean intake, between years 1986 and 1987.
—Adequacy means the mean intake (energy and protein) expressed as a percentage of the energy and protein recommendations for an adult in moderate activity: 3050 k-cal per day, and 68 gr. of protein per day respectively (Bengoa et al., 1988)

TABLE VII
GUATEMALA; COLONIA EL MILAGRO
Average level of the diet quality indicators by income group
Mean and (Standard deviation)

Ratio	Relative Income Level: Lowest 1986	Lowest 1987	Medium 1986	Medium 1987	Highest 1986	Highest 1987
% of calories from total protein	11.6 (2.2)	12.1 (2.3)	12.3 (1.5)	12.6 (1.9)	12.7 (2.3)	12.9 (2.5)
St. significance	N.S.		N.S.		N.S.	
% of calories from animal protein	2.9 (0.3)	3.1 (0.3)	3.4 (0.3)	3.5 (0.3)	5.0 (0.2)	4.8 (0.3)
St. significance	N.S.		N.S.		N.S.	
Animal protein/ total protein (%)	22.7 (1.7)	24.5 (1.8)	27.5 (1.7)	27.7 (1.9)	38.1 (1.6)	36.2 (1.4)
St. significance	N.S.		N.S.		N.S.	
Households (n)	59	59	52	52	88	88

Note: N.S. means no statistical differences between years (p>.10)

from 15 to 39%, did not meet the recommended protein intakes (Bengoa et al., 1988). Such a small percentage is expected in well nourished populations.

Table VII presents information on the mean percentage of energy which come from proteins. In general the table shows that there is an adequate ratio between calories and total protein intake in all groups, as compared to the ratio of 12% derived from the recommendations for urban areas of Guatemala (Flores et al., 1969). However, the proportion of proteins from animal sources is significantly higher in the highest-income group than in the lowest-income group. This is consistent with results presented in Table IV which indicate that the people in the lowest income group consume less meats, dairy products and eggs and more beans and maize. This situation did not change between 1986 and 1987, indicating the prevailing low levels of nutrition of the poor people of urban areas in Guatemala City.

CONCLUSIONS

The economic crisis of Guatemala between 1986 and 1987 showed trends towards more deterioration in the purchasing power of relatively higher income households as compared to relatively lower income households of marginal urban areas. These trends have the effect of impoverishing more the low middle class and of increasing even more the gap between the poor and the wealthy groups. The results suggest that economic policy should be oriented towards improvement of the purchasing power not only of the lower groups but also of the middle groups which, over time, may have less access to the informal economy in order to maintain their purchasing power.

Despite the significant loss in the purchasing power of the relatively highest income group, the households in this group tended to maintain their dietary intake levels constant. This was achieved by maintaining or increasing budget shares of food and housing but reducing budget shares of other expenditure categories.

Generally, the real income of poorest households did not seem to be affected. But despite this, their intakes of certain food items, and of dietary energy and protein, improved slightly mainly as a consequence of certain advantages derived by changes in relative prices; however, their energy intake level still remained below the intake levels of the highest income group, and of the internationally recommended intake levels.

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REFERENCES

Alarcón J.A. and F. Andrino (1991). Diferencias urbano-rurales en consumo de alimentos de familias pobres de Guatemala. *Archivos Latinoamericanos de Nutrición* **41**, 327–335.

Alderman H. (1984). *The Effect of Income and Food Price Changes on the Acquisition of Food by Low-Income Households.* International Food Policy Research Institute, Washington. D.C. Part 1, Chap. 2 and 4.

Batrouni, L., J. Rivera, S. Pérez, T. González de Cosio, A. Yzunza, A. González, and A. Chávez. (1983). *Situación Nutricional de Barrios Marginados de Teziutlan.* División de Nutrición de la comunidad, Instituto Nacional de Nutrición, México. Chap. 4. pp. 57–60.

Bengoa, J.M., B. Torún, M. Béhar, and N. Scrimshaw (1988). *Guías de Alimentación: Bases para su Desarrollo en América Latina.* Informe de Taller celebrado en Caracas en 1987, Venezuela.

Comisión Económica para América Latina (1988). *Notas para el Estudio Económico de América Latina y El Caribe, 1987, Caso Guatemala.* México. pp. 1–4.

Deaton, A. and A. Case (1987). *Analysis of Household Expenditures.* LSMS, Working Paper Number 28. Development Research Department, The World Bank, Washington. D.C. Chap. 4.

Flores, M., M.T. Menchú, M.Y. Lara, and M. Béhar (1969). *Dieta Adecuada de Costo Mínimo para Guatemala.* Instituto de Nutrición de Centro América y Panamá. Guatemala.

García, N. (1982). Absorcion creciente con subempleo persistente. *Revista CEPAL No. 18.* pp. 47–67.

Gould. J.P., and C.E. Ferguson (1980). *Microeconomic Theory.* Richard D. Irwin, Inc., Homewood. Illinois. Chap. 3, pp. 60–65.

Greer. J., and E. Thorbecke (1983). *Pattern of Food Consumption and Poverty in Kenya and Effects of Food Prices.* Mimeographed. Div. of Nutritional Sciences, Cornell University, New York.

Immink, M.D.C. (1984). *Food and Health Expenditure Patterns in Urban and Rural Ecuador: Analysis of Household Budget Survey Data.* Office of International Cooperation and Development, U.S. Department of Agriculture and the American Health Association. Washington, DC. Chapters 1 and 5.

Instituto de Nutrición de Centro América y Panamá (1985). *Situación de Salud y Nutrición del Distrito de Salud El Milagro Area Guatemala Sur.* Working Paper INCAP, Guatemala. pp. 1–2.

Instituto de Nutrición de Centro América y Panamá (1973). *Recomendaciones Dietéticas Diarias para Centro América y Panamá,* Guatemala.

Instituto de Nutrición de Centro América y Panamá (1989). *Análisis de la Situación de Alimentación y Nutrición de Centro América y Pamamá.* Manuscrito INCAP, Guatemala. Chap. 1 and 2.

Instituto Nacional del Consumidor (1988). *Sequimiento del Gasto Alimentario de la Población de Escasos Recursos en el Area Metropolitana de la Ciudad de México* (Síntesis de Resultados). México.

Kennedy, E. (1983). Determinants of Family and Preschooler Consumption. Paper presented at *XI International Congress of the International Union of Anthropological Sciences, Vancouver.*

Pinto, A. (1984). Metropolización y terciarización: malformaciones estructurales en el desarrollo Latinoamericano. *Revista CEPAL No. 24* pp. 17–38.

Snedecor G., and W.G. Cochran (1980). *Statistical Methods.* Seventh Ed. Iowa. State University Press, Ames, Iowa, pp. 102–105.

Solimano G., and M. Jeria (1980). The effects of changes in real income on nutrition: in G. Solimano and L. Taylor (Eds). *Food Price Policies and Nutrition in Latin America.* The United Nations University, World Hunger Programme. Food and Nutrition Bulletin Supplement 3, pp. 33–34.

Wilkie J.W., Ochoa E.C., and D.E. Lorey (1990). *Statistical Abstract of Latin America.* UCLA Latin America Center Publications. University of California, Los Angeles, Vol. 28, pp. 51, 197, 364, 375, 986.