

**Food Security
in a Marginal Urban Area
El Milagro, Guatemala City
1987 - 1990**

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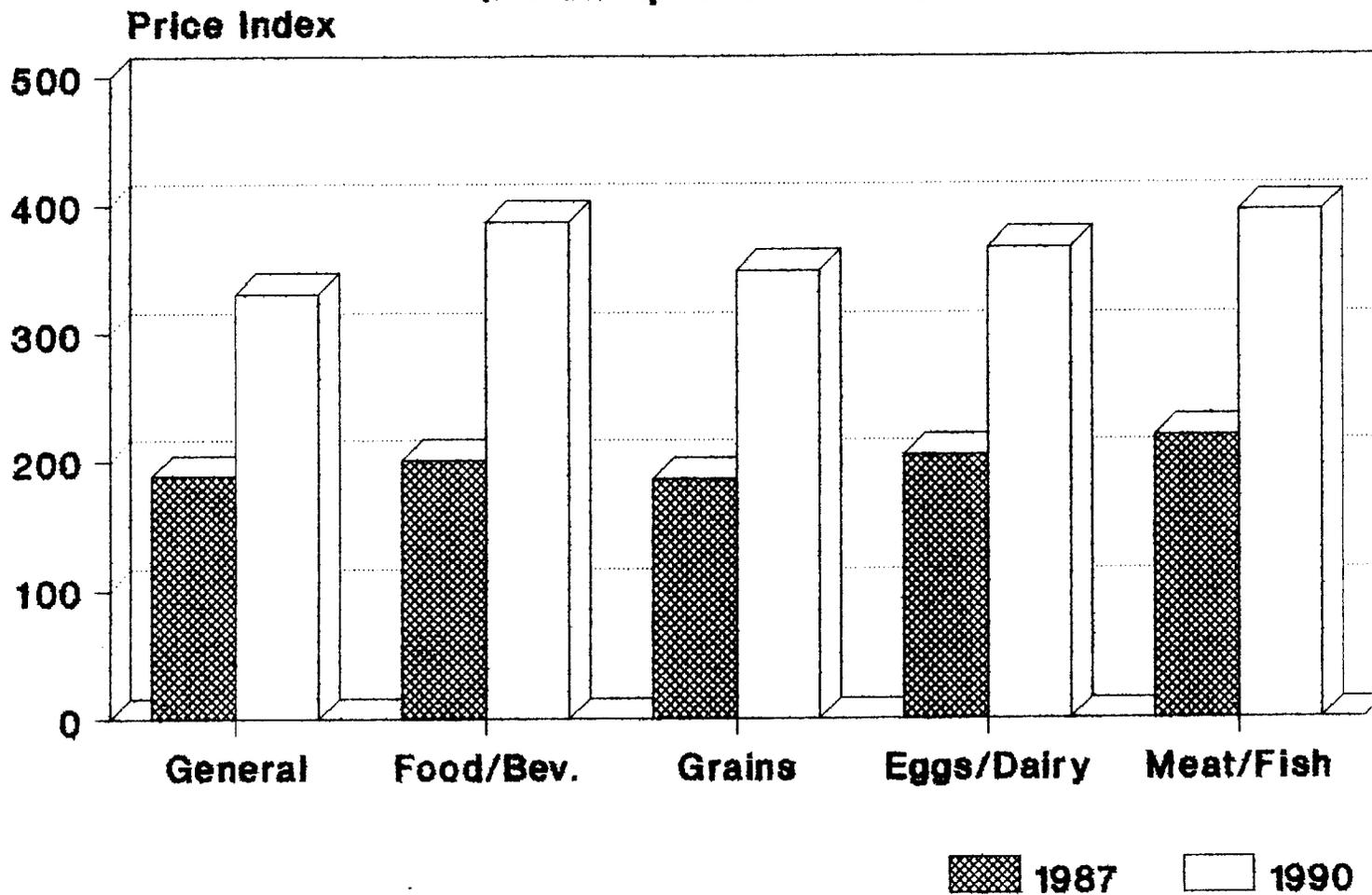
El Milagro, Guatemala City

Summary of Changes in Real Total Expenditure,
Food Expenditure, and Calorie Intake
(March-April 1983 = 100)

Year	Total Expenditure per Adult Equivalent	Food Expenditure per Adult Equivalent	Food Expenditure per Adult Equivalent	Calorie Intake per Adult Equivalent per Day
	Deflated by General CPI	Deflated by General CPI	Deflated by Food Price Index	
1987				
entire sample	61.30	35.44	33.17	2700
highest tercile	96.57	52.67	49.29	3018
lowest tercile	32.82	20.96	19.62	2490
1990				
entire sample	71.75	37.36	31.98	2565
highest tercile	117.57	55.23	47.27	2863
lowest tercile	35.47	21.49	18.39	2205

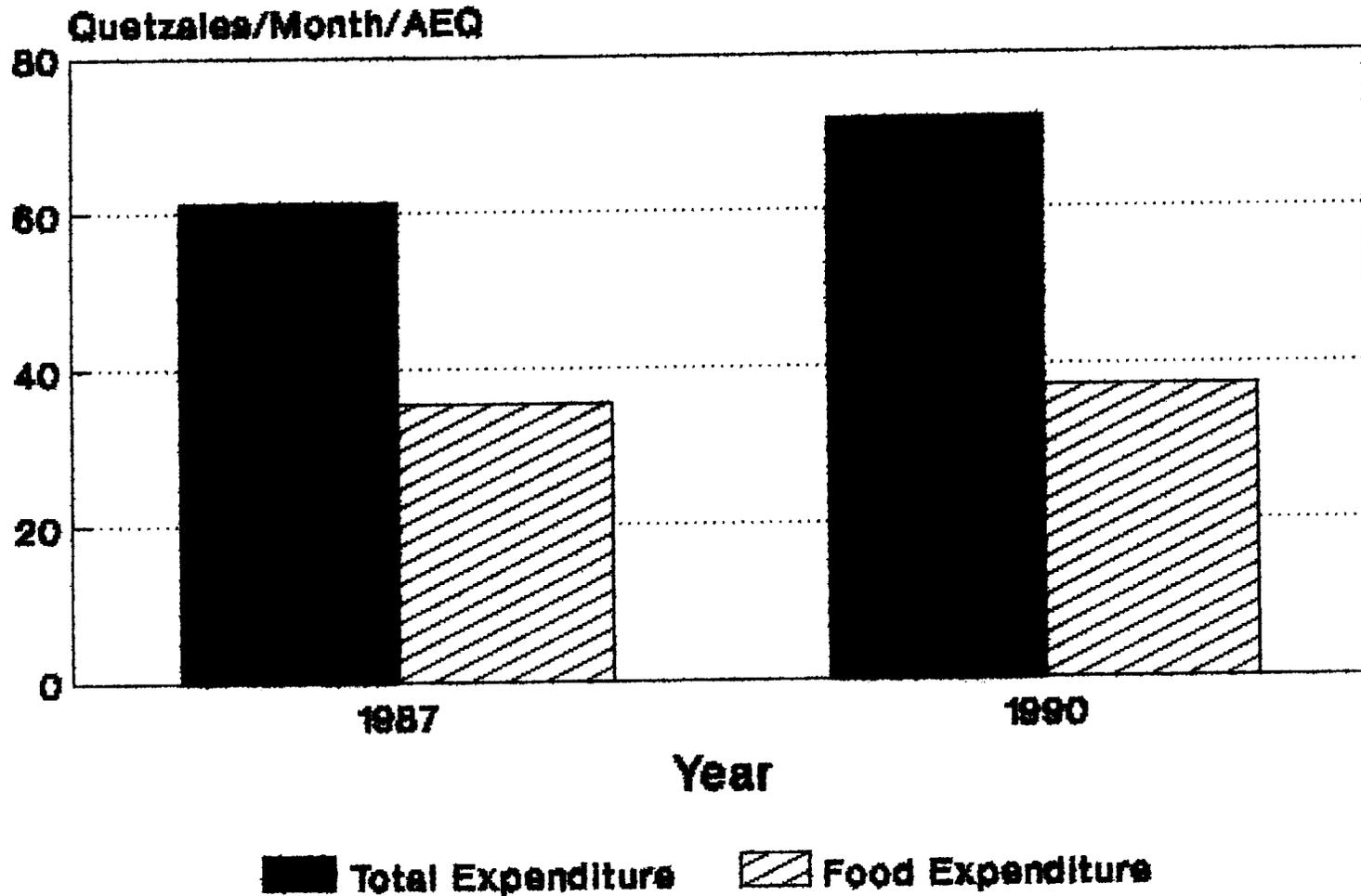
Changes in Price Indices by Category Guatemala City

(March/April 1983 = 100)



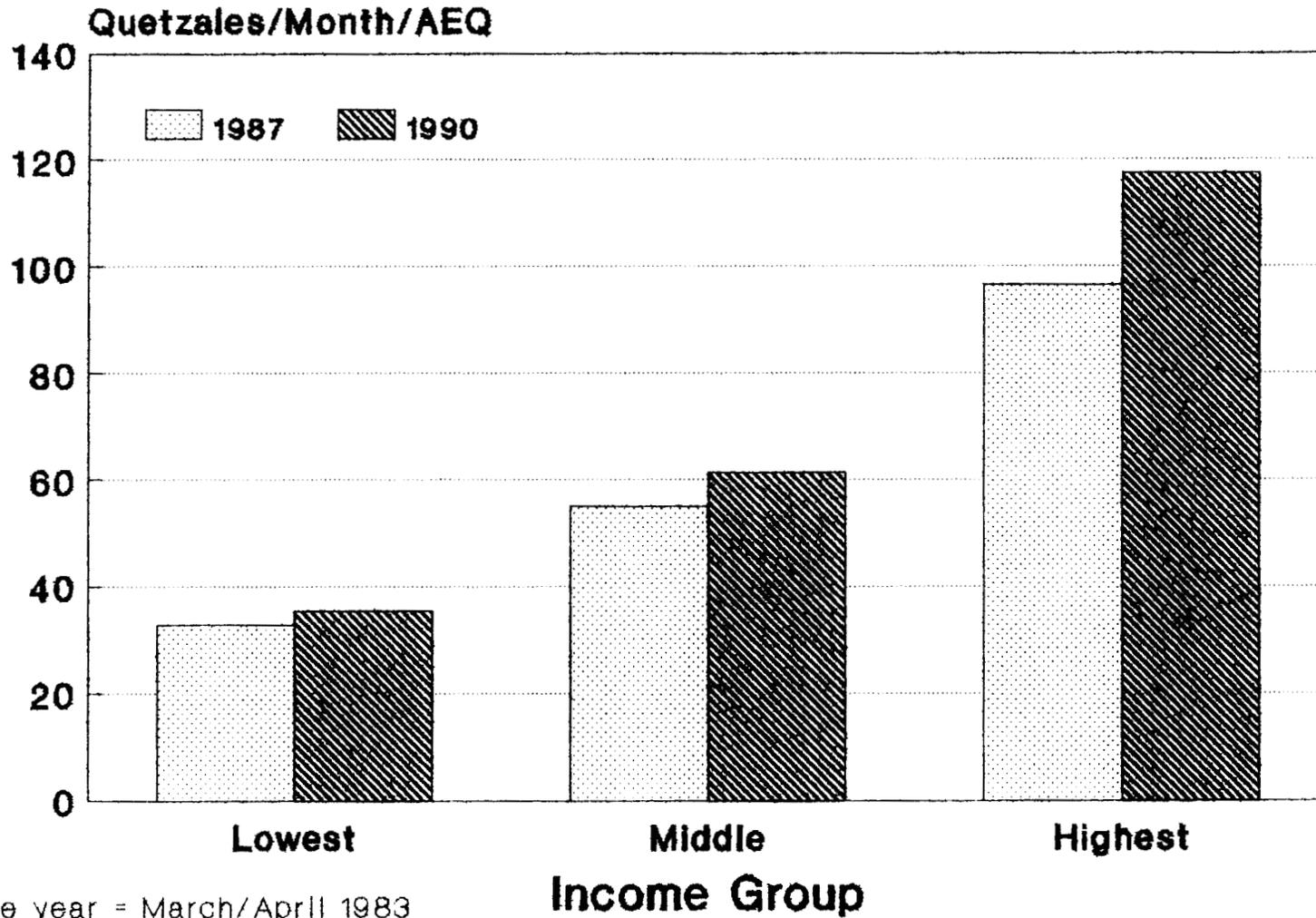
Source: Instituto Nacional de Estadística

Change in Real Expenditure Between 1987 and 1990



*AEQ = adult equivalent

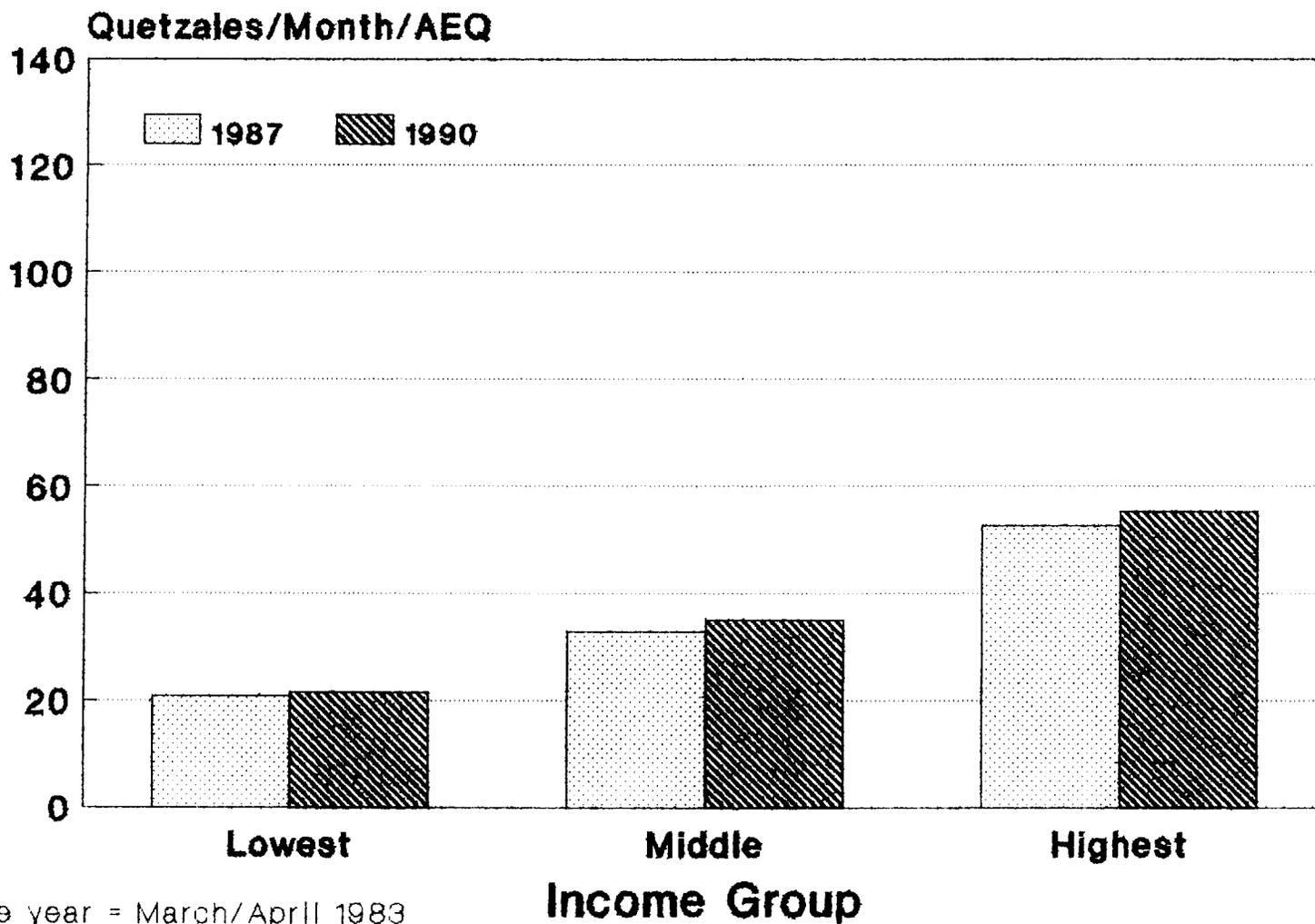
Change in Real Total Expenditure Between 1987 and 1990



Base year = March/April 1983

AEQ = adult equivalent

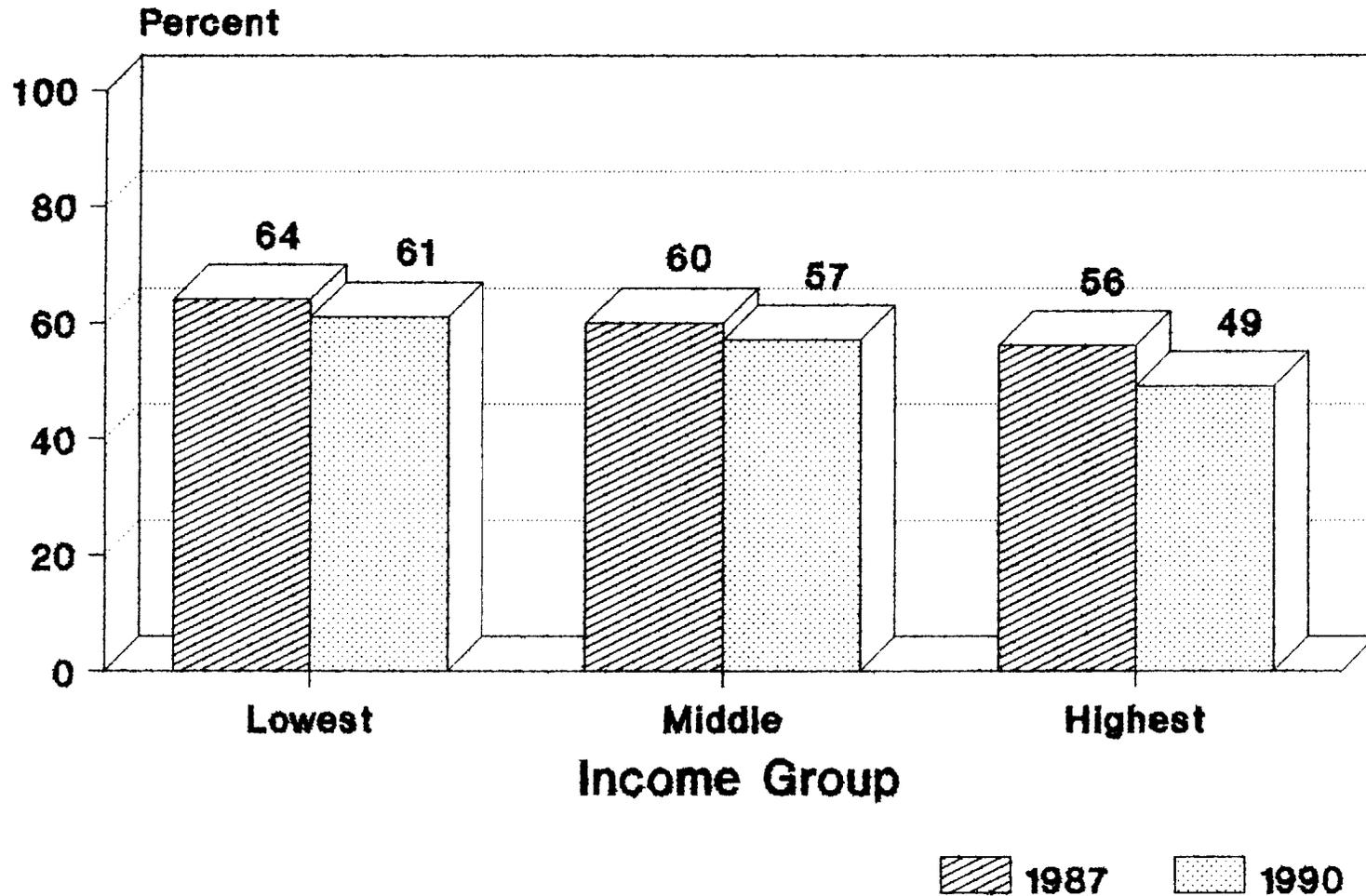
Changes in Real Food Expenditure Between 1987 and 1990



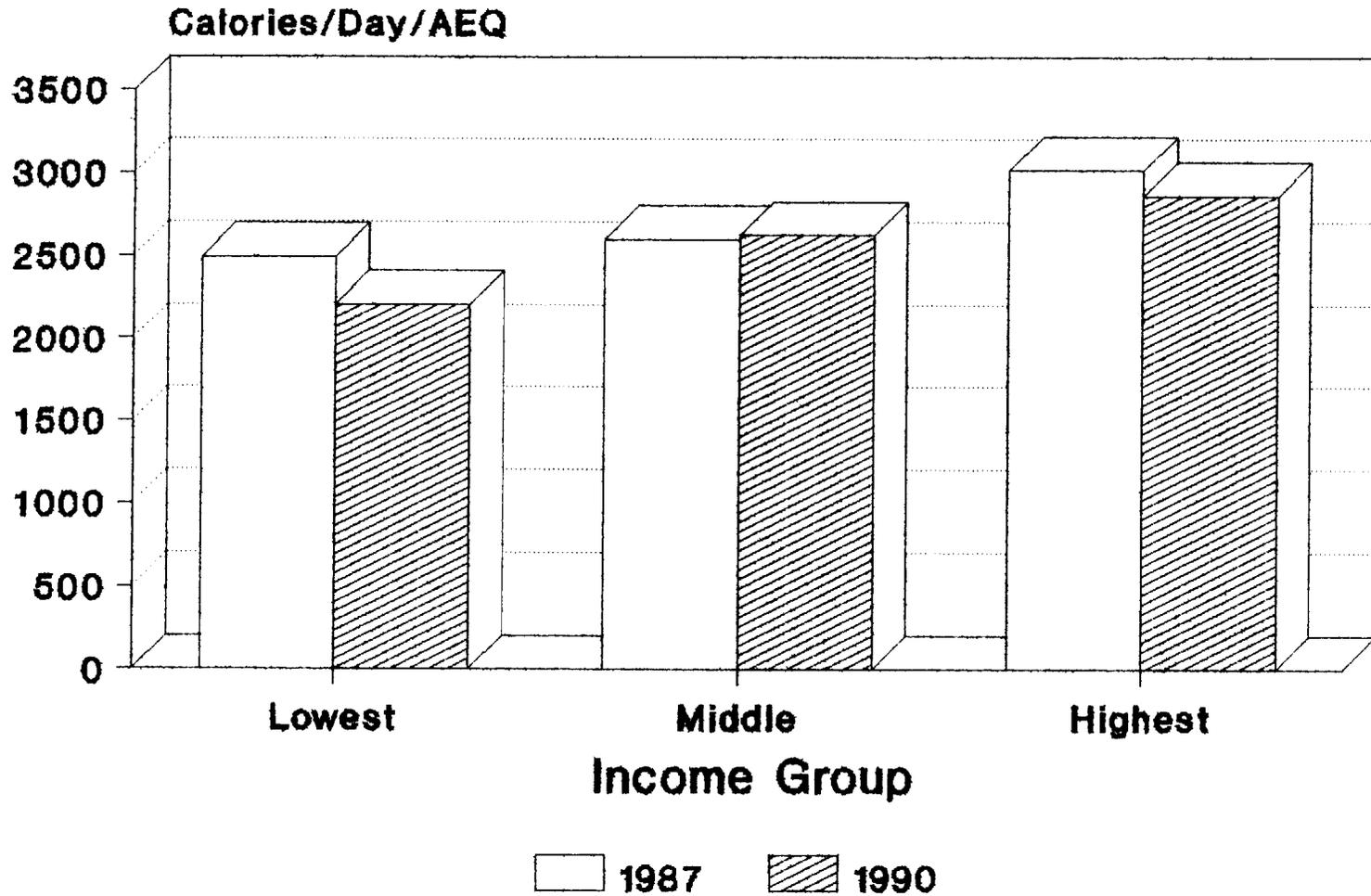
Base year = March/April 1983

AEQ = adult equivalent

Change in Proportion of Total Expenditure Devoted to Food Between 1987 and 1990



Change in Calorie Consumption Between 1987 and 1990 in El Milagro



AEQ = adult equivalent

El Milagro
Income Elasticities of Demand
for Calories and Food Expenditure

Model: Calories/AE = a + b1 ln (Total Expenditure/AEQ)
 Food Exp./AE = a + b1 ln (Total Expenditure/AEQ)

Elasticity = (b1/mean of dependent variable)

Year	Dependent Variable	Entire Sample	Highest Tercile	Middle Tercile	Lowest Tercile	T Stat	R ²
1987	Calories/AEQ	0.19	0.17	0.19	0.20	7.3	0.15
1987	Food Expend./AEQ	0.82	0.55	0.88	1.39	19.0	0.73
1990	Calories/AEQ	0.21	0.19	0.20	0.24	6.0	0.16
1990	Food Expend./AEQ	0.77	0.52	0.82	1.33	23.0	0.74

Methodology

The Foster, Greer, Thorbecke (FGT) method will be used to generate an absolute and a relative measure of food poverty. The absolute measure of food poverty given by the methodology is a statistic reflecting aggregate calorie deprivation. The measure also provides a relative view of poverty because it is additively decomposable, meaning that the sum of the food poverty of subgroups of the population is equal to the total measure of poverty for the population. The measure is decomposable by geographic region or other socioeconomic variables, giving the relative contributions to overall food poverty of each regional or socioeconomic subgroup. ~~For a detailed review of the methodology, see Appendix I.~~

For this study food poverty distribution among households will be examined according to household size and composition, occupation of household head, other characteristics of household head (age, sex, education), education of the mother and level of water and sanitary services. Multivariate regression analysis will also be used to test the significance of those variables associated with human resources and community services.

The methodology involves three steps: (1) Determining regional food poverty lines that are estimated from observed food expenditure. (2) Computing the food poverty measure derived from the aggregate calorie shortfall of a population relative to the empirically estimated regional food poverty lines. 3) Constructing a poverty profile by decomposing the poverty measure by the population subgroups of interest.

Food poverty will be defined as the ability to acquire a nutritionally adequate diet from market participation or own production. For the purposes of this methodology, a nutritionally adequate diet is determined by the Recommended Dietary Allowance (RDA) for calories for a given population. The calorie standard will be reliable if the typical diet is shown to meet all nutrient requirements when calorie requirements are met.

The FGT method bases the food poverty line on the actual observed expenditure level to consume the calorie RDA following local consumption patterns (i.e., tastes and preferences and

local prices). Thus, a minimum cost diet that may be neither palatable nor culturally acceptable is not the cut-off point for food poverty. Rather, the food poverty line is derived from the actual observed food expenditure of households just satisfying their caloric requirements given regional tastes and preferences and local prices.

I. Estimation of Region-Specific Food Poverty Lines

- 1.) Determine subgroups of the total population that can be considered to be relatively homogeneous in terms of food tastes and preferences and the food prices faced by households in the subgroup. Geographic region can usually be assumed to be such a homogeneous group.
- 2.) For each region, estimate a food poverty line. Using observed food expenditure per individual (measured in adult equivalents) and the calorie RDA for the region, estimate the cost of acquiring the calorie RDA.

Estimate the following cost-of-calorie function (an inverse Engel's function):

$$\ln X_i = a + b C_i$$

where,

X_i = food expenditure for individual i

C_i = calorie consumption for individual i

$e^{(a + b C)}$ = cost of acquiring C calories

$e^{(a + b R)}$ = cost of acquiring R calories ($R = \text{RDA}$)

Z_r = food poverty line for region r
= $e^{(a + b R)}$

II. Calculation of Food Poverty Measure

1.) Monetary Shortfall

The difference between an individual's food expenditure and Z_r is the food expenditure gap.

$$G_i = Z_r - X_i$$

The monetary shortfall can be used to compute the poverty measure. But in order to compare food poverty across regions with different monetary food poverty lines, it is necessary to convert the expenditure gap into an implicit calorie deficit.

2.) Calorie Shortfall

Given the food expenditure gap of an individual from a particular region, the calorie shortfall we would expect to observe (the implicit calorie deficit) is calculated using regional income elasticities of demand for calories.

$$\frac{D_j}{R} = E_{rj} \left(\frac{G_{rj}}{Z_r} \right)$$

where,

$\frac{D_j}{R}$ = implicit calorie deficit as a proportion of RDA

E_{rj} = elasticity of demand for calories of individual j in region r

G_{rj} = expenditure gap of individual j in region r

Z_r = food poverty line in region r

3.) Calculation of Food Poverty Measure

From the implicit calorie deficit, calculate the food poverty measure, P. It is important to note here that P will not estimate actual caloric deficiency, but rather the ability to acquire enough food to meet caloric requirements.

$$P = \left[\frac{1}{m} \sum_{r=1}^m n^r \right] \left[\sum_{j=1}^{q_r} \left(\frac{D_j}{R} \right)^2 \right]$$

$$P = \left(\frac{1}{n} \right) \sum_{r=1}^m \sum_{j=1}^{q_r} \left(\frac{E_j^r G_j^r}{Z^r} \right)^2$$

P gives the weighted average of the implied calorie deficit across all individuals, across all regions. There are m regions, with q^r food poor individuals in each region.

III. Construction of Poverty Profile

- 1.) The poverty measure P is decomposable by subgroups of the population formed by any socioeconomic variable. The measure is decomposable with population share weights.

The poverty of subgroup s is:

$$P_s = \frac{1}{n_s} \sum_{r=1}^m \sum_{j=1}^{q_r} \left[E_j^r \left(\frac{Z^r - X_j^r}{Z^r} \right) \right]^2$$

where,

n_s = population subgroup s

$q_{r,s}$ = number of poor in region r and subgroup s

The total food poverty measure P is the weighted average of the contribution to total food poverty by each of the k subgroups.

$$P = \sum_{s=1}^k \frac{n_s}{n} P_s$$

**El Milagro
Food Poverty Lines and Food Poverty Measures**

Poverty Line: The average food expenditure per month per adult equivalent required to purchase a diet just satisfying caloric requirements (according to local tastes, preferences, and prices).

Poverty Lines

Survey	Poverty Line (Quetzales/month/AEQ)	
	2950	2360
1987	64.91	54.26
1990	124.13	103.63

Poverty Measure According to Food Expenditure Gap

Year	RDA	Percent Poor	Poverty Measure
1987	2950	57.5	0.070
1987	2360	40.5	0.042
1990	2950	60.4	0.081
1990	2360	42.7	0.050