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By

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ABSTRACT

INTERNAL MIGRATION AND THE NUTRITIONAL STATUS OF SCHOOL-AGED CHILDREN IN COTOCOLLAO ALTO, QUITO, ECUADOR

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Anthropometric measurements and 24-hour dietary recalls were collected from eighty-five school-aged migrant children 8 to 10 years of age in Cotocollao Alto, Quito, Ecuador. Socioeconomic, food frequency and dietary history data were collected from the food system gatekeeper of each child's family. The relationship between the nutritional status of these children and their families' length of residence in Quito was assessed.

No relationship was found between length of family residence and the children's dietary adequacy as determined by their intake of energy, protein, iron, calcium, thiamine, riboflavin and vitamin A. Mean percents of the 1974 FAO/WHO Recommended Nutrient Intakes adjusted for sex and age were 50% or greater although 30 or more percent of the children were found to consume less than 66% of their dietary recommendation for energy, calcium, vitamin A, riboflavin and thiamin.

Child's weight was found to increase as the length of family residence in Quito increased. Number of parents migrating (one or both) was found to interact with length of family residence in Quito as it affected child's weight. When the sample was stratified by number of parents migrating to examine the interaction of length of family residence and number of parents migrating, length of residence had no effect on child's weight. Age was the only variable linearly related to height. Sex was found to be a predictor variable for weight/height ratio. The weight/height ratio was linearly related to income, showing an increase in weight/height ratio of approximately .04 for every 1000 sucre increase in income.

The reported rural and urban food consumption patterns for the same gatekeeper were significantly different. Migration from rural to urban Equador resulted in changes in the dietary patterns of migrating families and the eventual complete adaptation to the dietary pattern of their urban counterparts. Further interpretive analysis of these data revealed patterns of change which could affect the nutritional status of migrant children. These patterns of change were examined for potentially positive, negative or neutral effects on the nutritional status of migrant children. The relationship between migration related dietary pattern changes and gatekeeper reported satisfaction with life was demonstrated.

DEDICATION

To my daughter,
Marisa Iara Pruitt,
who lit the fire

and

To my mother,
MaryHelen Witcher,
who never let the fire burn out

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I. INTRODUCTION

Research results have indicated that nutritional deficiencies can be considered a major health problem in Ecuador. In 1980, Handleman compared health statistics of Latin American countries and concluded that Ecuador was one of the three or four most malnourished nations in the Western Hemisphere. In 1982, El Comercio, Ecuador's largest daily newspaper, printed a series of articles declaring malnutrition Ecuador's most serious public health problem and a major cause of infant mortality (Torres, 1982). A prevalence of protein-calorie malnutrition and endemic goiter have been observed in the rural areas and the marginal zones of the city, especially within the vulnerable mother and child population (Murgueytio, 1980).

Between 1970 and 1975, 73 million people living in rural areas of developing countries moved to the city (Caliendo, 1979). In Ecuador, the urban population increased from 28.5 percent in the 1950 census to 41.4 percent in the 1974 census: a trend towards urbanization that continues today. A contributing factor to this increase in urban population has been rural-urban migration. Rural-urban migration in Ecuador has decreased the agricultural workforce and accelerated growth of urban slums (Rivadeneira, 1980).

Migration of a family from a rural area to an urban city can be considered among those factors known as determinants of nutritional status (Jelliffe, 1976). Families migrating from rural environments to large urban centers in developing countries undergo changes that can cause both psychological and physical stress (Caliendo, 1979). Changes in the environment related to the acquisition, preparation, storage and intake of food can cause a disturbance in the equilibrium of the family ecosystem resulting in stress. When this disturbance of equilibrium affects the nutritional status of family members it can then be defined as nutritional stress.

Migrant families must adapt in order to cope with all forms of stress. Adaptation is the process of establishing and maintaining a stable, reciprocal relationship with the environment (Melson, 1980). Nutrition adaptation is the process of establishing the portion of this adaptive relationship with the environment involving the acquisition, preparation, storage and intake of food.

There are number of variables which, together, affect the outcome of migrant adaptation to the urban area. Among these are the ethnic and cultural background of the migrant, the place of origin and the destination, the reasons for migration, the political structure of the urban site, the availability of employment and the time factor or length of residence in the city. The time factor is the least researched and least understood of all the determinants

affecting migrant adaptation to the city (Butterworth and Chance, 1981). Few studies have adequately tested this variable and the resulting data has been contradictory.

Researchers studying school-aged children in Equador have identified both undernutrition and malnutrition as a health problem among this population (Interdepartmental Committee on Nutrition for National Defense, 1960; Ortiz-Calvache and Borsotti, 1978; Murgueytio, 1980; Instituto National de Investigaciones Nutricionales y Medico Sociales (ININMS) 1980). Nutrition during childhood is important and undernutrition can have serious consequences for the school-aged child (McWilliams, 1966). Migration, interacting with the socioeconomic and demographic characteristics of a child's family, can be a determinant of the nutritional status of the child.

This research project focused on the relationship between the time in residence and the nutritional adaptation of migrant families in Quito, Ecuador. The effect of this relationship on the nutritional status of new, recent and settled migrant children was studied. A socioeconomic interview schedule was used to collect demographic, socioeconomic and migration data of the children's families. Data on the nutritional status of the child was obtained by height and weight measurements and one 24-hour dietary recall. These data were used to answer the following questions:

- Does the nutritional adequacy of the diet of the school-aged migrant child, 8, 9 and 10 years of age, change with the time in residence in the city of Quito, Ecuador?
- Does the nutritional status of the school-aged migrant child, 8, 9 and 10 years of age, change with the time in residence in the city of Quito, Ecuador?

A food frequency instrument was administered to each family food system gatekeeper and a dietary change instrument was administered to the subsample of migrated gatekeepers. Data from these instruments provided a more profound understanding of the effect of the rural-urban transition on the gatekeepers ability to adequately feed their families.

OPERATIONAL DEFINITIONS

Migration: Leaving the place of origin or the place of residence in rural Ecuador and moving to Quito with the intent of establishing long term residence in the city.

Migrants: Those persons who have changed their place of residence from a rural Sierra area to the city of Quito for a substantial period of time or who intend to remain for a substantial period of time. Based on Jerome's (1980) work on Southern black migrants to Milwaukee, migrants will be divided into three categories of length of time in residence in the city:

New migrants: people who have established their place of residence to Quito within the last five year period.

Recent migrants: people who have changed their place of residence to Quito more than five years ago and up to and including ten years ago.

Settled migrants: people who have changed their place of residence to Quito more than ten years ago.

Nutritional Adequacy of the diet: Nutritional adequacy of the diet is determined by computing each child's intake of energy, protein, calcium, iron, riboflavin, thiamin and vitamin A from a 24-hour dietary recall and comparing intakes to the Recommended Nutrient Intakes of the Food and Agriculture Association (Passmore et al., 1974).

Nutritional Status: Dietary and anthropometric parameters are indicators of nutritional status of migrant children in Quito, Ecuador. Dietary intake has been explained above. Anthropometric measures are weight-for-age, height-for-age and weight-for-height.

Nutritional Stress: Stress, or a disturbance of equilibrium in the system, (Melson, 1980) involving changes in the environment related to the acquisition, preparation, storage and intake of food which can affect nutritional status.

Nutritional Adaptation: The establishment of a stable, reciprocal relationship with the environment involving the acquisition, preparation, storage and intake of food. Nutritional adaptation may result in food habits that can

positively or negatively affect the nutritional status of individuals or can have a neutral effect.

Urban: of, relating to, characteristic of or constituting the city of Quito, Ecuador, (Area = 16,561 km^2; population = 800,000).

Rural: The area of the Sierra region of Ecuador which is agricultural or countryside.

Family: A semi-closed system of individuals characterized by long-term, intimate relationships of blood, marriage or adoption of food and an interacting unit with regard to the preparation, storage and intake of food.

Family's food system gatekeeper: The person responsible for the acquisition, preparation and storage of food and the provision of nutrients for the family who controls the flow of food into the family system and its distribution within the system (Lewin, 1943).

II. REVIEW OF LITERATURE

During 1953 and 1954, the United Nation's Food and Agriculture Organization (FAO) and the Ecuadorian National Institute of Nutritional Research (INNE) collaborated to conduct a food consumption survey in various geographic areas of the country. Findings indicated that the Ecuadorian family had low intakes of kilocalories, calcium and animal protein (Thomason et al., 1957).

The only national nutrition survey for Ecuador was conducted in 1960 by the Interdepartmental Committee on Nutrition for National Defense (ICCND). This study assessed the nutritional status of samples of both military and civilian families to identify major nutrition and feeding problems in Ecuador. The civilian population consisted of 4,876 persons in 15 distinct geographic areas. The most notable clinical abnormality was the high incidence of goiter, as high as 40% in the Sierra. While caloric intake was found to be 95% adequate, intakes of thiamin, riboflavin, calcium and vitamin A were found to be low (ICNND, 1960). Dietary adequacy for this study was reported as percent intake of the 1954 Recommended Dietary Allowances of the United States.

INNE conducted surveys to assess the prevalence of malnutrition. One study, conducted in 1968, sampled 9,000 preschool children in five provinces. The sampled consisted of 7,000 urban children and 2,000 rural children. The results were a 39% prevalence of generalized malnutrition with a 10% higher incidence of malnutrition reported for rural areas (ININMS, 1980). INNE evaluated morbididy data for a sample of 5,913 children under five years of age and again demonstrated a 39% prevalence of malnutrition (ININMS, 1980). These data are reported as Grade I, II or III malnutrition but no explanation of the classification system is given.

A 1973 study by the American Technical Assistance Corporation documented the incidence of malnutrition among preganant and lactating mothers, infants and children, 1-5 years of age. Malnutrition was demonstrated to potentially exist in 1.2 million persons, representing about 10 percent of the population of pregnant and lactating mothers and children under five years of age. Geographic region, income and dietary habits were taken into consideration. Again, the incidence of malnutrition was found to be higher in the rural than in the urban areas (Junta Nacional de Plantification y Coordinacion Economica, 1979).

Ortiz-Calvache and Borsotti (1978) evaluated the relationship between selected socioeconomic factors and the nutritional status of rural and urban children in the Sierran province of Tungurahua. A correlation was found between

the families socioeconomic status and the nutritional status of their children. Cultural variables were found to have a greater impact in the urban area while economic factors had a greater impact in the rural area. A higher percent of Grade I malnutrition was identified among rural children. Once again, no explanation is provided for the classification of malnutrition.

Vitamin and Mineral Deficiencies in Ecuador

Inadequate intakes of calcium, riboflavin, thiamin and vitamin A have been reported identified by researchers in the last 25 years (Thomason et al., 1957; Paredes de Martinez, 1962). A 1979 study by Oleas, G. et al. reported inadequate iron intake but did not report either assessment method or prevalence. Paredes Vasconez (1979) reported insufficient absorption of iron based on biochemical assessment but did not report prevalence. Freire (1982) identified an 80% prevalence of anemia deficiency among school-aged girls, 7-10 years of age, in the costal town of Esmeralds. Cause of anemia was believed to be iron deficiency resulting from low dietary iron.

The most prevalent mineral deficiency found among Ecuadorians has been iodine deficiency. Goiter and endemic cretenism have been prevalent in the Andean or Sierran region of Ecuador. Studies prior to the 1968 iodized salt law recorded 3 to 73 percent goiter and 8% cretenism (Fierro-Benitez et al., 1969; Greene, 1973; Varea Teran, 1976 and Murgueytio, 1980). The prevalence of goiter

appears to have declined since the iodization of salt but still remains a public health problem in Ecuador.

Nutrition of school-aged children

Infants and preschool children or adolescents whose rapid growth makes observable growth rates easy to detect are most frequently studied. However, those researchers who have studied school-aged children in Ecuador have identified undernutrition as a health problem among this population (ICNND, 1960; Ortiz-Calvache and Borsotti, 1978; ININMS, 1980; Murgueytio, 1980). Table 1 summarizes research reporting the prevalence of undernutrition in Ecuadorian school-aged children (Pigott, 1981). The lack of the use of a consistent standard or the lack of reporting a standard results in an inability to make definitive statements about the nutritional status of school-aged children in Ecuador.

Although not a dramatic time of growth, nutrition in the childhood years is important and undernutrition can have serious consequences for the school-aged child (McWilliams, 1966). Undernourished children become easily fatigued and are unable to sustain prolonged physical and mental effort. They are at great risk of infection. The child with limited nutrient reserves can have frequent absences from school (Pipes, 1977). Hopwood and Van Iden (1965) studied the relationship between physical growth and school performance of North American children for a 10 year period and found unacceptable patterns of growth were accompanied by scholastic underacheivement.

TABLE 1. Prevalence of Undernutrition in Ecuadorian School Children[1]

Nutrition Condition	Prevalence %	Standard	Subjects	Date	Reference
fair nutritional status	36.0 boys 34.1 girls	not reported	5-14 years	1959	ICNND, 1960
poor nutritional status	4.3 boys 5.8 girls	not reported	5-14 years	1959	ICNND, 1960
deficient in weight	60	50% weight minus 10%	6577 school children, 6-12 yrs.	1959-60	INNE, 1960
deficient in height	50	50% height minus 10%	6577 school children, 6-12 yrs.	1959-60	INNE, 1960
malnourished	16	weight	38,927 children 5-13 years	1969-70	ININMS, 1980
deficent	34	weight	38,927 children 5-13 years	1969-70	ININMS, 1980
less than expected	48	height	38,927 children 5-13 years	1969-70	ININMS, 1980
deficient in height	50 boys 74.2 girls	height	rural schoolchildren 6.6-13.5 years	1977	Munoz and Gallegos, 1977

Table 1 (Cont.)

Nutrition Condition	Prevalence (%)	Standard	Subjects	Date	Reference
deficient weight	75.0 boys 54.8 girls	weight	rural schoolchildren 6.6-13.5 years	1977	Munoz and Gallegos, 1977
malnourished	0 boys 6.5 girls	weight	rural schoolchildren 6.6-13.4 years	1977	Munoz and Gallegos, 1977
deficient in weight	30.3 boys 39.8 girls	weight	2nd and 3rd graders in public	1978	Silva A., et al., 1978
malnourished	5.6 boys 4.1 girls	weight	2nd and 3rd graders in public	1978	Silva A., et al., 1978
deficient in height	28.7 boys 15.3 girls	height	2nd and 3rd graders in public schools	1978	Silva A., et al., 1978
deficient in weight	21.3 boys 27.0 girls	weight	2nd and 3rd graders in private schools	1978	Silva A., et al., 1978
malnourished	3.3 boys 4.1 girls	weight	2nd and 3rd graders in private schools	1978	Silva A., et al., 1978
grade I nutrition	43	weight	178 schoolchildren	not reported	Ortiz Calvache and Borsotti, 1978
grade II nutrition	11	weight	178 schoolchildren	not reported	Ortiz Calvache and Borsotti, 1978

Table 1 (Cont.)

Nutrition Condition	Prevalence (%)	Standard	Subjects	Date	Reference
grade III nutrition	2	weight	178 schoolchildren	not reported	Ortiz Calvache and Borsotti, 1978
deficient in weight	15.2 boys 19.9 girls	weight	151 schoolchildren	1979	Oleas G., et al., 1979
grade I malnutrition	4.6 boys 2.6 girls	weight	151 schoolchildren	1979	Oleas G., et al., 1979
grade II malnutrition	1.3 boys 6 girls	weight	151 schoolchildren	1979	Oleas G., et al., 1979
grade III malnutrition	1.3 boys 2 girls	weight	151 schoolchildren	1979	Oleas G., et al., 1979
deficient in height	6.6 boys 33.1 girls	height	151 schoolchildren	1979	Oleas G., et al., 1979
grade I malnutrition	4.6 boys 4.0 girls	height	151 schoolchildren	1979	Oleas G., et al., 1979
grade II malnutrition	0.7 boys 0.7 girls	height	151 schoolchildren	1979	Oleas G., et al.,

[1] Pigott, J. (1981) Infant Feeding Practices and Beliefs in the Rural Sierra of Ecuador. Department of Food Science and Human Nutrition, Michigan State University, Unpublished Manuscript.

Food Patterns and Dietary Habits

Corn, wheat, barley, potatoes, rice and vegetables have been reported to be the staples of the Ecuadorian Sierra by authors researching food habits and dietary intake in Ecuador (ICNND, 1960; Manoff International, 1976; Munoz and Gallegos, 1977; Murgueytio, 1980; Rivadeneira, 1980). Milk was used in cooking and to make cheese rather than for drinking (American Public Health Association, 1974). Foods containing animal protein were not eaten frequently due to their cost (Torres S. and Narvaez, 1980). Onions and cabbage were reported to be the most frequently consumed vegetables (Weil et al., 1973; Chauvin, 1983). Fruits were found to be consumed in season, economic conditions of the family permitting (Chauvin, 1983).

Chauvin (1983) reported potatoes, rice, corn, wheat, milk and meats as principle foods of the Sierran diet. Of secondary importance were beans and broad beans, barley, cabbage and onions and bananas and oranges. Barley, broad beans and corn, which were traditionally principle food items, have lost their place due to increased urbanization in Ecuador and decreased production of these items. Most Sierran families follow a three meal a day pattern of breakfast, lunch and dinner. Breakfast is usually coffee made with water or milk and plain bread. Lunch consists of two main courses: a soup and a "dry" course. The soup may be very simple or very complex, depending upon the economic resources of the family. Generally, the soup contains

potatoes and other grains, cereals or vegetables. The second or "dry" course, also called the rice course, consists of a plate of rice and an accompaniment of meat, fish, beans, potatoes or spaghetti. A salad may be added, usually lettuce, tomato, avocado, carrots, beets or cabbage. Carbonated beverages, natural fruit juices or gruels are drunk at the meal. The evening meal consists of one dish, either the soup or the dry course left over from or similar to lunch. A hot gruel or chocolate, coffee or tea and bread is added to the main dish (Chauvin, 1983). This pattern, as described by cited authors, if followed, would provide a nutritionally adequate diet. In reality, meat, milk, mild products and vegetables are frequently eliminated from this traditional dietary pattern for economic reasons resulting in potential nutritional defficiencies of protein, iron, calcium and vitamin A.

Causes of Malnutrition

Lack of adequate production of nutritious foods, lack of food storage and distribution facilities, lack of economic resources to purchase adequate nutrients, lack of nutrition education were considered causes of malnutrition Ecuador by the American Public Health Association (1974). Rivadeneira (1980) stated that Ecuadorians knew which foods were most nutritious but were not consuming them due to limited income.

The National Institute of Nutrition and Medical Sociology Research (ININMS, 1980) reported a multifactorial

origin of malnutrition based on deficiencies in distribution and production of foods and economic, social and cultural factors of the Ecuadorian people. Specifically, for the poor, malnutrition appeared to be due to limited access to profits from production, lack of education and lack of food because of inequitable distribution. Among the more affluent malnutrition was attributed to lack of knowledge about basic nutrition and food composition.

Ecuador has not had problems of famine or endemic starvation such as have been found in Southeast Asia, but a large portion of the Ecuadorian population has suffered from chronic malnutrition, a condition which can interfere with both physical and mental development (Rivadeneira, 1980).

Migration in Latin America

Migration may be defined as a mechanism for the adjustment of a population of regional disparaties in economic development. Internal migration is a fundamental variable of spatial redistribution of the population and of change in the demographic structure of a country (Elizaga, 1972). Migration movements are also an important factor in the socioeconomic development of the country (Kemper, 1971).

Migrations within Latin America have occurred for many reasons. A common interpretation of the causes of international migration is the "push-pull" theory -- a rational process in which individuals weigh and balance positive and negative aspects involved in migration (Elizaga, 1972; Butterworth and Chance, 1981). The push elements involve

rural poverty and a scarcity of rural opportunities. The pull relates to an individual or family's expectations of improving their lot or the "bright lights" of the city. Environmental changes in Latin America that must be considered relevant to migration are movements to sites of new economic development, out-movements from areas of overly dense occupation. out-movements caused by agricultural revolutions, migrations associated with expectations in health, education and recreation and trial-and-error wanderings of surplus populations resulting from the population explosion (Whiteford, 1976; Butterworth and Chance, 1981). The most common explanations for migration given by migrants are those of an economic nature. Sociocultural reasons such as education and family are the second most common reasons for migration. Other reasons are a dissatisfaction with rural life and the attraction of city life (Elizaga, 1972; Butterworth and Chance, 1981).

According to Kemper (1971) Latin America exhibits three distinct patterns of internal migration. The first pattern is that of the migrant moving directly from the countryside to a large metropolis. Most common is a migration in stages, whereby a family moves first to a medium sized city and then to a metropolis. Often, in stage migration, the final stage is completed by the children of the original migrant family. The third pattern is a movement in response to available work. Additional research has continued to

document the existence of these patterns (Perlman, 1975; Lomnitz, 1977; Butterworth and Chance, 1981).

Migrants most commonly relocate in the old-decaying city center, newly developed suburban areas or squatter settlements at the urban fringe. Whatever the choice, the most important determinant of residence is the location of previously arrived family or friends from the migrant's village or region (Perlman, 1975; Lomnitz, 1977; Butterworth and Chance, 1981).

Migration in Ecuador

Quito, as the political-administrative capital of Ecuador, and Guayaquil, as the economic capital, have been major recipients of incoming migrants.

Quito has received mass movements of people from the rural areas. Migrants have come from both the Coast and the Sierra, with the majority being from the Sierra.

Migration to Quito has been a result of both push and pull factors. Agrarian Reform was instituted in Ecuador in 1964, 1973 and 1976 with the goal of attain more equitable land distribution. Results have been negligible and land distribution has remained as it was prior to the reforms. The latifundio-minifundio system (Large land area farms-small land area farms) has prevailed. Hence, many rural families have had small plots of poor quality soil upon which agricultural production has been low. This situation coupled with limited additional opportunities for income in

the rural areas has driven many rural residents to become urban residents (Peek, 1979).

An additional important push factor in Ecuador has been the lack of services in the rural areas. Basics, such as sewage, light and water, have not been available to many communities. Education services have often been nonexistent or of low caliber. Health services have been more frequently non-existent (Calvache Ulloa, et al., 1980).

The pull factors of Quito have been those of any growing industrial city in the developing world. Quito has offered more job opportunities than any other urban center in Equador, with the exception of Guayaquil. A high percentage of these opportunities have been in the informal sector. Hence, non-skilled migrants have come to Quito and found occasional daily work in such jobs as carriers, car watchers, street vendors, washer women, messagers and construction workers (Luzuriaga, 1979).

The provision of services in Quito has traditionally been better than anywhere in the country. The best education is obtained in Quito. Health services, while still inadequate in marginal areas, have been the best available. Transportation, communication and recreational services are readily available (Luzuriaga, 1979).

Quito receives migrants who have migrated in stages and those who have come directly from the countryside. Most migrants are in their early working years of 15-20 years. Kinship and family ties play an important role in the

migration process. Chain migration has been common and marginal neighborhoods are often characterized by a predominance of only a few surnames. Circular migration has existed among those migrants who live closer to Quito. These migrants have stayed in Quito during the week, returning their labor and their earnings to the rural area on the weekends. Circular migrants have been found to make definitive moves to Quito after a few years (Calvache et al., 1980).

The Municipal Planning Division of the city of Quito found 31% of Quito's migrants had migrated within the last 3 years, 37% within the last 4 to 13 years and 32% had migrated more than 14 years ago. A ratio of 65% native residents to 34% migrated residents was reported. Seventy percent of the migrants originated from the Sierran provinces of Cotopaxi, Tungurahua, Chimborazo and Bolivar. Eighty-one percent of these migrations reported moving to Quito in search of work and better incomes. (Anonymous, 1983).

Nutrition and Migration

In developing countries, the population of the cities has grown more than four percent per year and the larger urban centers have grown twice as fast (Caliendo, 1979). This population influx has been too rapid for the people's needs in terms of housing, employment, food and other services to be met (Jelliffe and Jelliffe, 1970; Perlman, 1975; Griffin and Williams, 1980). Basta (1977) cited estimates of 200 million people living in urban areas around the world

under conditions of "absolute poverty," defined as the lack of access to potable water, sewage and adequate nutrition. Twenty-four percent of these people were located in South America.

Ghettos and slums have often provided an environment worse than the areas from which people have migrated (Caliendo, 1979). Migrants have usually been among those at the lower socioeconomic levels, living in overcrowded housing with unsanitary conditions. Population density has favored the transmission of diseases such as tuberculosis, infectious diarrheas, measles, whooping cough, venereal disease, worm infestations and pneumonia. The need for potable water has put a demand on the cities to provide this service (Costa, 1975).

Migrants face new problems related to the change from a subsistent, food-growing economy of a rural environment with the support of a closely knit pattern of relatives and family to a cash economy and the sense of alienation and individual impotency of the city (Caliendo, 1979). They must purchase rather than produce their own food. This can mean a substantial decrease in their ability to acquire food despite equivalent or increased monetary incomes (Jerome, 1980). They may be thrust into a situation where they can no longer rely on traditional food habits, and where they buy food based only on their ability to pay. Food purchased is usually the cheapest, most easily transported and not necessarily the most nutritious. A lack of adequate home

cooking and storage facilities can cause further feeding difficulties (Caliendo, 1979).

Chassy et al. (1967) supported the hypothesis that in the process of industrialization or urbanization, food habits and food patterns change progressively, becoming increasingly more complex or varied, and that such changes are related to other similar changes in the social and economic environment. Family food patterns were fitted into a Guttman scale, indicating a sequence of changes in food patterns and a trend toward increasing complexity of the diet. The scale correlated with other indices of urbanization in Mexico, in particular, education and occupational history.

Few researchers have look at the effect of migration on the nutritional status of the migrant. Costa (1971) stated that there appeared to be a tendency for malnutrition to increase for individuals who migrated from rural zones into the city. Basta (1977) used existing data from food consumption surveys in developing countries to examine nutrition and health statistics in low income urban areas of the Third World. City health statistics indicated higher health status for urban residents than for rural residents either because squatters and slum inhabitants were not included in the statistics or because their inclusion was obscured by the enormous difference between their status and the few middle to high income inhabitants of the city. When these data were disaggregated, disease was found to be about fifty

percent higher in squatter settlements than in the city as a whole. Food energy intakes of those in squatter settlements and slums were usually half to two-thirds lower than those persons in other areas of the city. Access to health care was sometimes two to ten times worse. When urban data were compared to rural data, the nutrient availability for the low or very low socioeconomic groups was lower in the urban groups than for corresponding rural groups. Ward and Sanders (1980) compared the diets of rural and urban populations in Ceara, Brazil and concluded that rural-urban migration appeared to aggravate nutrition problems for low-income groups.

Not all researchers, however, agree that migrants suffer nutritionally as they move to the city. One study of anthropometric and dietary differences between rural and urban children in Costa Rica found dietary intakes to be lower in the rural areas. The height-for-age data showed only 16% of the rural children classified as normal (Valverde and Rawson, 1976). These data did not include information on the socioeconomic status of the families of the sampled children. Rivadeneira (1980) referred to Ecuadorian studies that compared the nutritional status of rural and urban children. The rural children consistently showed higher incidence of malnutrition. Careful examination of some of these data showed that the comparison was between low-income farm families and middle to upper class urban residents.

The gravity of the migrant's nutritional dilemma was summarized by Dr. Egbert deVries in a discussion at the International Conference on Nutrition, National Development and Planning (Nour, 1973):

> . . . there are a few hundred cities absorbing millions and millions of people. I have a feeling that even worse than the famine conditions and the crop failures of the seasonal undernutrition in the rural areas is the plight of the hundreds and hundreds of millions of people living in the shadowland between rural areas and the urbanized, industrialized society, where the nutritional standards are deplorable and where it is most difficult to do anything because their productivity is almost nil and the old resources of the countryside and even the forest are gone for these people. They have no productive income. How do we deal with perhaps 300 million people. They have no productive income. How do we deal with perhaps 300 million people in the world who are in that status? From the point of view of human welfare perhaps that is the greatest nutrition problem.

Determinants of Nutritional Status

Many socioeconomic, cultural and demographic factors have been identified as determinants of the nutritional status of children. These factors interact with migration for those families who have recently urbanized by rural to urban migration. Variables examined as interacting with migration were sex of the child, size and economic level of the family, education and occupation of the child's mother and the presence or absence of the child's father. All of these variables have been listed as "risk factors in protein calorie malnutrition" (Jelliffe, 1976).

Sex of the child. Research findings have shown that girls have a lower nutritional status than boys (DeChavez et

al., 1974; Levinson, 1974; Greiner and Latham, 1981). Cassidy (1980) cited research results that indicated preferential treatment of male infants by providing them with earlier supplementation and later weaning. Luzuriaga (1979) stated that, within the Ecuadorian nuclear family, boys were given preferential treatment because the man, as the provider, deserved certain privilages. Scrimshaw (1978) felt that neglect of female children in highland Ecuador went beyond malnutrition, possibly leading to female infanticide.

Family Size. A relationship between the size of the child's family and the nutritional status of the child has been shown to exist. Rao and Goplan (1969) found that 61 percent of all cases which they identified as having protein-calorie malnutrition were children with 3 or more siblings. In the Philippines, Florencio (1980) found that the intake of energy, protein and vitamin A decreased as family size, both rural and urban, increased. Greiner and Latham (1981) found that the more live siblings the child had the lower the child's weight-for-age.

Economic Level. Numerous studies have shown that nutritional status is lower among families at a lower economic level of living (Wray and Aguirre, 1969; Kanawati and McLaren, 1974; Levinson, 1974; Marchione, 1978). Greiner and Latham (1981) found that the index of economic living had the greatest average magnitude of effect on the nutritional status of St. Vincent children. Smith et al. (1983) found that food money available had the greatest impact on

preschool Haitian children's current nutritional status as measured by weight-for-age. Rivadeneira (1980) stated that income was the single most important determinant of nutritional status in Ecuador.

Mother's Education. The level of formal education of the homemaker has been positively associated with improvement in family food consumption patterns. Moench (1983) reported that nutritional studies in Colombia had found mother's educational level to be an important indicator of nutritional status. In Mosley's study in Kenya (1983), mother's education was shown to be the single most important variable in determining the child survival. Dietary data collected from a sample of Bolivian boys showed that increased dietary diversity and quality were positively correlated with mother's education (Moreno-Black, 1983).

Mother's employment. Data resulting from the examination of the relationship of mother's employment and nutritional status are variable. Lees (1966) found maternal employment in St. Lucia to be associated with lower nutritional status of infants. Wray and Aquirre (1969) in Colombia found a trend toward higher levels of malnutrition among children of mothers who worked part time and lower levels when the mother worked full time. Popkin and Solon (1976) suggested that the higher malnutrition associated with maternal employment in the Philippines and elsewhere may result from the mother's poverty rather than from their working status. Florencio (1980) found that mother's

participation in the labor force in rural Philippines had a positive effect while urban mother's participation in the labor force negatively affected nutrient intake of her children. Greiner and Latham (1981) found no significant association between nutritional status and mother's employment. Moreno-Black (1983) found a negative relationship between dietary diversity and dietary quality of Bolivian boys and the mother's employment outside the home.

Father's presence. While female headed households have been shown to have lower incomes than male headed households, the effect of the father's absence on the nutritional status of the children is unclear. In New York state (Sanjur et al., 1979) urban female-headed households were found to have purchased more adequate diets than their male-headed counterparts. In St. Vincent, the child's nutritional status was found to be slightly lower, at a marginal level of statistical significance, if the father was present in the home (Greiner and Latham, 1981). In Haiti, no relationship was found between the presence or absence of the father in the home and the nutritional status of the children (Smith et al., 1983).

Assessment of Nutritional Status

Nutritional status is an operational term relating the condition of health to the intake of foods and the utilization of nutrients. Two basic methods utilized for assessing nutritional status are anthropometric measurements and dietary data (Christakis, 1973). Dietary intake data provide

information on low, excessive or unbalanced nutrient intake whereas anthropometric measures show the effect of nutrition on physical growth (McLaren, 1976).

Anthropometric Measurements. Measurements of the body are quantitative, practical techniques to aid in evaluating nutritional status. Measurements must be made correctly with inter-rater reliability and findings must be consistently reported (Krick, 1982).

Weight is a measure which is subject to great variation both within and between individuals. Weight-for-age informs you if a child is over or under his expected weight. This parameter does not allow the researcher to determine if this measurement reflects current dietary intake or past nutritional history (Seone and Latham, 1971). When serial determinations are used, weight-for-age is a useful guide to a child's growth progress (Griffiths, 1982).

Height is essentially the measure of linear growth of the skeleton. The tissue between the vertebrae and long bones do not make significant contributions to this measure (Beal, 1980). Height-for-age measures chronic nutritional status but does not provide any indication of present dietary intake or the status of the child (McLaren, 1976).

Height-for-weight looks at the ideal weight for the child's height, independent of age. This measure provides an index of acute current nutritional status of the child. Low weight-for-height is an indicator of current or recently past malnutrition or chronic malnutrition (Seone and Latham,

1971). Current recommendations are that weight-for-height and height-for-age be used jointly as primary anthropometric indicators for child growth (Waterlow et al., 1977).

Anthropometric data are then compared to reference data as a means of selecting those children who are outside a predetermined level of growth. The use of reference data also allows international comparisons of health and nutritional status (Neumann, 1979). The World Health Organization expert committee on nutritional surveillance currently recommends the use of the 1976 United States National Center for Health Statistics reference data as an international standard (Waterlow et al., 1977).

Dietary data. Four methods are generally used to determine individual food consumption: estimation by recall, dietary history, the weighed intake and the food record. Each method has both strengths and limitations (Young and Trulson, 1960).

The recall procedure is usually used for a twenty-four hour period. All food consumed the previous day is recalled and quantities are estimated in ordinary household measures or serving (Marr, 1971). Researchers have found the 24-hour dietary recall a valid and reliable method for estimating mean nutrient intake for population groups (Lechtig et al., 1976 and Carter et al., 1981). The limitations of using the 24-hour dietary are in ranking individuals or in estimating individual nutrient intake. Each 24-hour dietary recall can only be considered as good as the subject's memory. Current

recommendations are that a minimum of four 24-hour dietary recalls must be collected from each person for the dietary intake information to represent usual intake and account for daily variation (Food and Nutrition Board, 1982).

The diet history is designed to discover usual food intake patterns over a relatively long period of time and is most often obtained by interview. A diet history is utilized to gather information on dietary customs over an extended period of time, to obtain data on changes in dietary patterns and to examine food habit trends (Burke, 1952; Marr, 1971). This method includes the recording of the frequency with which various foods are consumed. The food frequency is best utilized to measure the cultural aspects of the diet rather than to assess dimensions of nutrient intake (Campbell et al., 1982).

The most accurate record of food consumption is obtained by having the subject weigh all food consumed during a specific period of time. This method is costly, time consuming and intrusive but useful for metabolic studies (Marr, 1971).

The food record method has the subject keep a record of food eaten for a given period of time. Quantities of food are estimated in common household measures. This method is less dependent on subject memory but demands a high level of subject cooperation (Caliendo, 1979).

Dietary data can be used to calculate specific quantities of nutrients. Quantitative evaluations are based on

the calculation of nutrients as derived from food composition tables. The use of food composition tables only gives approximate results due to the limitations of variations in nutrient content of foods, number of sample analyzed and methods of analysis (Pike and Brown, 1975).

Standards of adequacy of nutrients have been formulated to assure that essential nutrients are included in the diet and are consumed in sufficient amounts for good nutrition (Goodhart, 1980). The general aim of these standards is to prescribe a level of nutrition that will maintain good health for substantial numbers of the population. These standards are a recommendation for the amount of nutrients that should be included in the daily diet (Hegsted, 1975). Dietary standards are determined from experimental data on human nutrient requirements. The United States and many other countries, as well as the Food Agriculture Organization of the United Nations have formulated dietary standards which can be used for making quantitative estimates and for measuring the adequacy of the diet (Caliendo, 1979).

III. METHODS AND PROCEDURES

Introduction to Methods and Procedures

The relationship of time in residence in Quito, Ecuador and the nutritional status of school-aged children of migrant families was the focus of this study. Other factors studied in relationship to nutritional status were child's sex, family size, family income, age, education and occupation of the child's parents and whether either parent was absent.

In the prefield portion of this study, bibliographic research was conducted and preliminary instruments were developed in English. These instruments were translated into Spanish, refined and pretested in Ecuador. Spanish versions of all six instruments are in Appendices A, B & C, accompanied by English translations. All forms were submitted and approved by the University Committee on Research Involving Human Subjects (UCRIHS). Subjects rights of refusal to participate, privacy and anonymity were maintained throughout the study by using coded numbers on all written material and retaining information collected in confidential files at Michigan State University.

Upon arrival in Ecuador, the researcher selected the research community with the guidance of staff of the Ecuadorian National Institute for Nutrition and Medical

Sociology Research (ININMS). Initially, four areas of Quito were identified as receiving areas for in-coming migrants. Further investigation of each area led to the elimination of three areas on the basis of not meeting the design criteria, not being safe for the researcher and not being easily accessible by public transportation and resulted in the selection of Cotocollao Alto as the research community. Initial visits to this community enabled the researcher to determine that the community was open and willing to participate in the study.

The field work portion of this study, which was completed over fourteen months, was divided into three phases: participant observation, sampling and interviews and measurements. Participant observation was conducted by the researcher for a three month period in Cotocollao Alto (CA), the research community. Sampling of the children to participate in the study was completed in four public elementary schools serving the research community. Instruments administered to the sampled children were a three day dietary record and a 24-hour dietary recall. Anthropometric measurements taken of the sampled child were weight and height. A socioeconomic interview schedule, a food frequency and a dietary change form were the three instruments administered to the mother of the sampled child on two home visits.

These data were collected by the author, hereafter called the researcher, with a paraprofessional assistant from the research community, hereafter called the RA.

Participant Observation

The initial participant observation phase (Wilson, 1978) lasted three months in CA. Informal interviews were conducted with local clergy, school personnel, community leaders, health personnel and homemakers to investigate the following: number of families in the community, their length of residence and places of origin, elementary schools attended by community children and potential problems inherent to working in the community.

When acceptable to the interviewee, observations were recorded in a field notebook during the informal interviews. All contacts and interviews, as well as objective and subjective observations, were recorded in the field notebook (Bass et al., 1979). A research assistant (Spradley and McCurdy, 1972) was identified and selected during this period.

Research Assistant Selection

The research assistant (RA) was identified with the guidance of the clergy and school personnel. Mrs. Mercedes Solano, a CA resident was employed as the RA from May, 1982 to May, 1983. The criteria established for selection of the RA were that this person be well acquainted with the community, be respected in the community and be impartial in community politics. A female was preferred as those being interviewed were mothers of the sampled children.

Research Assistant Training

The project was explained in detail to the RA before she was asked to participate. Training for the home visits and instrument administration to the mothers involved detailed explanation by the researcher of the home visit's purpose. All instruments were reviewed with the RA as they would be administered. The RA was asked each question, gave her own personal response and discussed the intent of each question with the researcher. The RA was also trained to measure children's heights and weight under supervision.

Role of the Research Assistant

In the first phase of the field work portion of this project, the RA's role was to select key community persons and arrange interviews for the researcher. In the second phase, the RA made the initial contacts with the public schools from which the sample was drawn, explained the project and set up appointments for the researcher with each school principal.

In the final part, the RA conducted the two home visits and assisted in the administration of the socioeconomic interview schedule, the food frequency and dietary change instruments and the anthropometric measurements of children.

The RA's time commitment to the project varied from five to twenty hours per week, depending upon the demand of the particular project phase. These hours were worked at her convenience so as not to interfere with her own work.

Sampling

The universe was defined as all children 8, 9 and 10 years of age residing in CA and attending schools. Gladhart (1981) reported a 78 percent school enrollment of boys and girls six to eleven years old in Ecuador. Luzuriaga (1979) stated that 100 percent of the six to eleven year olds in urban areas of Ecuador were enrolled in school. Sampling from the schools was also done because of the availability of school records for each child which included birthplace and birth data (Gladhart & Gladhart, 1981).

During participant observation, those public schools attended by children in CA were identified. Class lists obtained of the second, third and fourth grades in the four public schools totaled 838 students. From this original number of 838, all children not residing in CA or not 8, 9 or 10 years of age were eliminated, leaving 225 eligible children. A sample of 100 was drawn using a random numbers table (Johnson, 1976).

The mothers of the sampled children or the family's food system gatekeeper became a second sample to whom the socioeconomic interview schedule and the food frequency instrument were administered. Of this second sample, those who had migrated formed a further subsample who were asked to respond to the food frequency instrument in a dual time framework. The dietary change instrument was administered only to this subsample.

Participant observation in CA was done from April to June, 1982. Drawing the sample of children took place in July and August, 1982. Initial contacts with the child's family were made from September to December, 1982. Interviews with the mothers were held from January, 1983 to May, 1983. The children were measured and 24-hour dietary recalls were taken in April and May, 1983.

Dietary Data Collection

Dietary data from the children were proposed to be collected via a series of 24-hour dietary recalls as recommended by the Food and Nutrition Board (1982). That plan was changed after discussions with school personnel. A three-day dietary record administered to school children as a homework assignment was thought to be the best way to collect dietary data.

The form used for the three-day dietary record was developed by the researcher in Ecuador in consultation with public school personnel and the staff of ININMS. Two, 45-minute class periods were used by the researcher to administer the three-day dietary record. The first class period was used to present second, third and fourth graders basic food group concepts utilizing a 24-hour dietary recall as a teaching tool and to prepare them for the forthcoming homework assignment. The second class period was used to give students the three-day dietary record forms, to verbally review, in detail, all instructions and to answer questions.

Instructions for estimating quantities of food eaten using cups and spoons were also given. The assistance of the teachers was solicited to collect the assignments upon completion. The researcher returned to each school to pick up the completed assignments.

The three-day dietary records were returned incomplete and directions for reporting food quantities had not been followed. For these reasons the data collected with the three-day dietary record were unsatisfactory for useful data analysis. Subsequently, a 24-hour dietary recall was verbally administered to each child individually (Marr, 1971). The form was developed in East Lansing, Michigan and modified in Ecuador in consultation with the ININMS staff and the RA. The 24-hour dietary recalls were conducted at the schools in the principal's office. The method of starting with the most recent food eaten and working backwards for the 24-hour period were utilized. Food models were used for estimation of serving sizes (Christakis, 1973). Food models were constructed at Michigan State University and consisted of plain rounded foam shapes painted in appropriate colors to represent a wide variety of foods.

Anthropometric Data Collection

Anthropometric data collected were height and weight of the children. Weighing and measuring of the children was done in the school principal's office to provide maximum privacy so children could remove all outer clothing. The

children weighed in pounds on a Hanson spring-type floor model bathroom scale, Model Number W503-62. Height was measured with a centimeter tape measure leveled with the floor and taped to the wall. WHO guidelines for the measurement of height and weight were utilized (Jelliffee, 1966). National Center for Health Statistics (NCHS, 1976) growth charts were used as the standard recommended by WHO for use as an international standard and recognized by ININMS as an acceptable standard for Ecuador.

Socioeconomic Interview Schedule

The preliminary socioeconomic interview schedule was further developed in Spanish in Ecuador in consultation with the staff of ININMS, the staff of the Ecuadorian AID mission and the RA. The socioeconomic interview schedule had 33 forced choice questions to obtain information on income, housing, occupation and migration. The interview schedule included two open-ended questions dealing with migration. A family data sheet was utilized to record the composition of the child's family including relationship to the child, age, educational level and birthplace of each family member.

The demographic questions yielded information for a profile of the families in which the sample children resided. The socioeconomic variables were examined as possible indicators of nutritional status (Jelliffe, 1966). Housing information was collected to create a housing profile. Place of origin, length of residence in Quito, length

of residence in the community and residence with kin upon arrival in Quito were examined as they related to the nutritional status of the migrant children, 8-10 years of age (Butterworth and Chance, 1981).

Pretesting the Socioeconomic Interview Schedule

Pretesting of the socioeconomic interview schedule was conducted in CA with four homemakers not related to the sampled children who were selected by the RA. Minor revisions were made of some questions for clarity.

Administration of the Socioeconomic Interview Schedule

The socioeconomic interview schedule was administered to each mother of the sampled children. When the child's mother was not present in the home, the family's food system gatekeeper (gatekeeper) was interviewed. All interviews were conducted in their homes on the second visit and required about one hour to complete. All interviews were conducted by either the researcher or the RA.

Food Frequency and Dietary Change Instruments

A Food Frequency Instrument (Young, 1982) was developed by the researcher for use by ININMS in a health status study conducted in Cayambe, Pichincha, Ecuador. This instrument was adapted by the researcher for this project by adding food items, reducing the response scale from seven to four

choices and using the instrument in a dual time framework of pre- and post-migration.

The Dietary Change Instrument (Burke, 1952; Marr, 1971) consisted of six open-ended questions developed by the researcher to describe changes in food acquisition, preparation, storage and intake that might have resulted from rural-urban migration. This instrument was administered in conjunction with the food frequency instrument to provide more descriptive and in-depth dietary change data from the subsample of those mothers who had migrated.

Pretesting Food Frequency and Dietary Change Instruments

Pretesting of the food frequency and dietary change instruments was conducted in CA with four homemakers not related to the sampled children who were selected by the RA. These interviews were conducted jointly by the researcher and the RA. Minor revisions were made after pretesting to clarify instructions.

Administration of Food Frequency and Dietary Change Instruments

On the second visit, the food frequency and dietary change instruments were administered to the gatekeeper, usually the mother, in which the sampled child resided. These interviews were completed within an hour. These instruments were administered after the completion of the socioeconomic interview schedule. All gatekeepers were

asked the frequency of consumption for each food item within the last month. If the gatekeeper had migrated, she was asked the frequency of consumption for each food item at the present time and before migration. Only those mothers who had migrated were asked to respond to the dietary change instrument. All interviews were conducted by either the researcher or the RA.

Data Analysis

The 24-hour dietary recall data were used to calculate intake of the following: energy, protein, calcium, iron, vitamin A, thiamine, riboflavin and vitamin C. Energy and the seven nutrients were calculated utilizing the Latin American Food Composition Table (Lueng and Flores, 1961) and Food Values of Portions Commonly Used (Pennington and Church, 1980). The nutrient values were calculated utilizing standard recipes from a popular Ecuadorian cookbook (Juanita, 1983). A total daily intake was tabulated for energy and each nutrient and percents of the FAO/WHO Recommended Intakes of Nutrients (1974) adjusted for age and sex were computed. The percents of the FAO/WHO standards were used as dependent variables.

Weight-for-age, height-for-age and weight-for-height for each child was plotted on separate NCHS growth charts (1976) for boys and girls, as a means of comparing this sample to an internationally accepted standard.

It is possible to express the distance between an observed value and the mean of the curve in standard deviations from the mean. The result is the Z-score (Snedecor and Cochran, 1980). Individual Z scores for weight and height were calculated for each child based on age and sex specific means for weight and height calculated from the research population. A weight-for-height ratio was also calculated for each child (weight/height) (Cole et al., 1981). The raw weight expressed in kilograms, raw height expressed in centimeters and weight-for-height ratio for each case were used as dependent variables.

Frequencies were calculated for all foods on the food frequency instrument. Responses on the food frequency instrument referred to a one month period and, therefore, were coded as follows: Never = 0; Sometimes = 1; Weekly = 4; Daily = 30. Frequencies were reported in both the present urban time framework and the pre-migration rural time framework. A paired t-test was used to determine significant differences in food consumption between the urban present and the rural past for each migrated gatekeeper. A student's t-test was used to determine significant differences in present food consumption between those gatekeepers who had never migrated and those gatekeepers who had migrated.

Computer analysis was done utilizing the Statistical Package for Social Sciences (Nie et al., 1975) and the Michigan State University Computer Cyber 750 CDC. Sub-programs

utilized were Frequencies, Pearson Correlation and Regression.

Pearson Correlation Coefficients were calculated for each of the 11 dependent variables and per capita food expense (estimated family food expenditure divided by family size), per capita income (estimated family income divided by family size), family size, mother's age and father's age. Multiple regression was done for each dependent variable to determine the best combination of variables to predict that dependent variable. Variables included in the original regression equation were length of residence in Quito, length of residence in the community, the existence of migration, home ownership, gatekeeper's education, gatekeeper's occupation, presence or absence of the father in the home, per capita income, per capita food expenditure, urban agricultural production, family size, and the sex, age and migration of the child.

The open-ended questions on the socioeconomic interview schedule about migration and the dietary change instrument were analyzed descriptively. Field notes from the participant observation phase were analyzed descriptively and interpretively.

IV. THE RESEARCH SITE

Ecuador, one of the smallest countries in South America, is approximately the size of the state of Colorado. It is crossed by the Equator and is bounded by Peru, Colombia and the Pacific Ocean. Its territory included the Galapagos Islands, some 600 miles west of the mainland (Weil et al., 1973).

The country is divided into three regions: The "Costa" or lowlands along the Pacific Ocean; the highlands or "Sierra", a mountainous area over 4,000 feet in altitude; and the eastern region or "Oriente", a sparsely populated tropical forest (Figure 1).

Quito, the capital city, is located in the Sierra at an altitude of over 9,000 feet. The temperature in the Sierra varies more during the 24-hour day than from season to season. The rainy season is from November to May; the dry season is from June to October (Weil et al., 1973).

Ecuador has approximately eight million inhabitants with an annual population increase of 3.1 percent (Population Reference Bureau, 1980).

The white, the Indian and the mestizo (Indian and white mixed) make up the ethnic composition of Ecuador. Spanish is the national language but Quechua is the common language

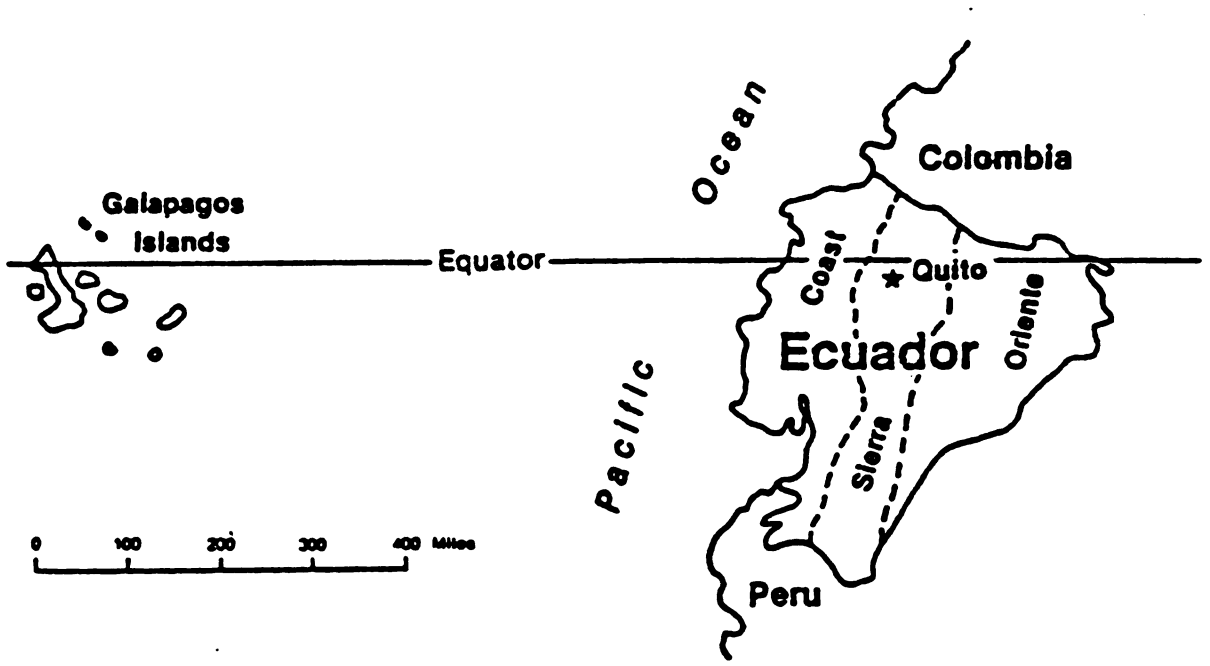


Figure 1. Ecuador

of most of the Indian groups. The predominant religion is Roman Catholic (Weil et al., 1973).

This description of the research site is based on field notes taken during participant observation. This information is based on researcher observation only. No attempt is made to quantify these data.

The Community

The research site, Cotocollao Alto (CA), is located at the extreme north of Quito, capital city of Ecuador. Cotocollao Alto is bordered by the Avenida Occidental on the east and rises up the Pichincha volcano on the west. This community was selected because the area has developed in the last fifteen years and contains settled sections, recently developed sections and sections under construction. Initial visits by the researcher involved informal interviews with local personnel who confirmed that the area received many incoming migrants from rural areas of the Sierra.

At the extreme north of Quito, CA was once rural, a few hours ride from the city. During this period, the area was a large, privately owned farm. During the Agricultural Reforms of 1964 and 1973, the hacienda was taken from its private owners and partitioned among those laborers working the land. Therefore, many current residents are descendants of families who had lived on that land for many generations. The remainder of the residents are persons who have migrated from the rural areas of Ecuador to find work in the capital city.

The entire community is divided into small neighborhoods which have their own leaders and neighborhood committees. These committees work together to solicit better services for the area, to handle problems and to plan social events. Parent committees exist for each school and are an important part of community life.

The People

The residents are primarily Indians or meztizos. A small number of black families also reside in CA. It is not possible to distinguish between the Indians and the meztizos because indigenous dress is no longer worn and there is no other visible means of differentiation. All residents dressed in a manner typical to Sierran city residents of a lower socioeconomic status.

Living Conditions

The roads in CA are all unpaved resulting in dangerous mud during the rainy season and dust in the dry season. Electricity was installed in the area in 1976 and most homes are served. There is no sewage system in CA. Most families have latrines, although some families use the open areas in the community. There is no source of potable water. The water supply for CA is piped water distributed through hand pumps located at various points in the neighborhood. CA is divided by a large ravine. The ravine creek provides a water source for some families and is where most families

wash their clothing. Garbage collection is erratic and not utilized by most residents.

Housing construction is varied. Many houses have been constructed until the money ran out, at which point the family moved into the house. Many of these homes are never finished. Most families live in one or two rooms with a separate room for cooking and a latrine.

Transportation

Small bus cooperatives provided public transportation to CA. The bus line ran from CA to a major bus stop in the central section of Quito. This bus service was initiated in 1981 and connected CA to the rest of Quito. The bus service is erratic and when road conditions become extremely bad, the buses cannot go up into CA. While a few families own vehicles for business purposes, they do not own cars for personal use. Hence, the bus system is vital to the residents of CA. The fare is five sucres ($1 = S. 95) which is the standard small bus fare in Quito.

Religion

The majority of the families in CA are Catholic. There is a chapel in CA where many families attend mass on Sunday morning. Those families who consider themselves to be upwardly mobile attend mass in a church in San Carlos, the neighboring community. Saint days are causes for much festivity which traditionally involves church services, parades and a great deal of food and drink.

Health Services

CA is officially serviced by the Ministry of Health Center #8 which is down the mountain and across the Avenida Occidental in Cotocollao, approximately 45 minutes to an hour away by public transportation. The distance to the health center is such that it provides minimal services to the residents of CA. CA has a small drug store whose proprietor sells medications. An Ecuadorian doctor has a private office behind the botica where she sees patients every afternoon between 4:00-7:00 PM, charging 100 sucres per visit (approximately one dollar). The woman who runs the botica is a self-appointed health care worker who attends to most of the medical problems of the community. People come to her with health problems and she prescribes both treatment and medications. Nutrition advise is often included in her prescribed treatments. When she cannot treat a particular health problem, she requests that the patient consult the doctor.

In the spring, 1983, four cases of typhoid fever were reported in CA. In the spring, 1983, two cases of rabid dogs were reported. The most frequently reported health problems in the community are parasites and respiratory ailments.

Families

Families are large, cohesive units which are the center of social life. Young men and women live with their parents

until they marry and set up their own homes. Many young adults in their twenties are still living at home. Some of them are studying, in which case the family provides total support. Some of them are working, in which case the youth contributes some of his/her earnings to the family. Young women tend to marry in their mid-teens, therefore are less frequently found residing with their parents. Young men marry anywhere from their late teens to late twenties and, therefore, are more frequently found residing with their parents. Parents play a primary role in the lives of their children until they leave home.

Schooling

Education is valued by the residents of CA and most children attend school. Most children attend public school; however, a few families send their children to private schools. Private schools abound in Quito and there is status associated with sending your children to private school. There is one elementary school in the community and others in nearby communities. Children residing in CA attend the elementary school in the community and three others located within the two nearest neighborhoods, San Carlos and Cotocollao. Secondary school students attend public and private schools throughout the city. The number of eligible youths attending secondary school was 50% less than those attending primary school. Boys go to work as soon as they can and many girls marry shortly after finishing primary school or stay home to care for younger children.

Marketing

Like all of Quito, CA has many small neighborhood stores which sell the most frequently purchased dry goods, vegetables, canned goods and alcoholic beverages. The market utilized by CA residents is located in the neighboring community of San Carlos and is a Saturday market. Those buses which go to CA stop directly in front of the market, making it easily accessible to CA residents.

Work

Because Quito is on the equator, the sun rises at 6:00 AM and sets at 6:00 PM. The life of the city follows a similar pattern. People rise at 5:00 AM and the work day begins by 7:00 AM ending at 6:00 PM when the sun sets.

Male residents work in construction, service occupations or skilled trades. These men spend their entire day away from home. Women workers are housewives, domestic servants, market women or owners and operators of small stores. Most of the women are housewives who spend their time tending children, preparing food and washing clothes. Many of them deliver the mid-day meal to their husbands at their work site. Teenage boys frequently work as day laborers in construction. Teenage girls may work as domestic servants. Young children make a contribution by caring for very young children, helping with food preparation and collecting wood in the wooded areas of the volcano.

Alcoholism

Alcoholism is defined by CA residents as a major problem in the community. Drinking is a major weekend activity, continuing until the drinkers are no longer conscious. According to CA residents, the main street itself has 14 bars. Problems reported resulting from alcoholism were fighting between cantina patrons, beating of wives and children, abandoned children and money drained from the family budget. Drug use and drug sales were also reported to be a problem among the young adult population of CA.

V. RESULTS

Demographic and socioeconomic data were obtained from the socioeconomic interview schedule. Dietary data were obtained form 24-hour dietary recalls of the children, from food frequency instruments administered to all family food system gatekeepers and from a dietary change instrument administered to the subsample of migrated gatekeepers. The children's weight and height were measured.

Descriptive results for all variables will be reported. The relationship between migration and nutritional adaptation of migrants from the rural Sierra to Quito specifically will be examined. The effect of migration on the nutritional status of school-aged migrant children will be analyzed.

Sample

From the originally sampled 100 cases, 88 children and their gatekeepers participated in the study. Twelve children did not participate for the following reasons: two were black and did not fit criteria for selection, two refused and eight had moved away from the neighborhood and could no longer be located. Three additional cases were omitted after data collection due to incomplete data and 85 cases were used for analysis.

A randomly selected sample was utilized to examine the relationship of length of time in residence and the nutritional status of school-aged migrant children. Because the sampling was random, the distribution of new, recent and settled migrants was uneven with only a small number of both new and recent migrants (10% each). Future examination of length of time in residence as an independent variable should utilize samples stratified by length of residence to provide comparable groups.

Eighty-eight socioeconomic interview schedules and food frequency instruments were completed. Eighty-two of these were completed by the child's mother, one by the child's father, two by the child's aunt and three by the child's grandmother. Forty-one dietary change instruments were completed by those homemakers who had migrated. Height and weight were measured for 88 children. A 24-hour dietary recall was taken from 86 children.

Demographic data of the Children

Data describing the sampled children are found in Table 2. Demographics collected for each child were age, sex, and birthplace.

Children's age was recorded twice: once during sampling and once during measurement. At the time of sampling, the children ranged from 8 years to 10 years and 7 months. At the time of measurement, the children ranged from 8 years 10 months to 11 years 5 months.

Table 2. Profile of children (8-11 years) in Cotocollao Alto, Quito Ecuador, June, 1983 (n = 85)

Characteristic	Number	Percent
Child's Age		
8.5 - 9.5 years	22	26
9.6 - 10.5 years	29	34
10.6 - 11.5 years	34	40
Child's sex		
Males	46	54
Females	39	46
Child's Birthplace		
Quito	70	82
Pichincha	8	9
Cotopaxi	3	4
Chimborazo	2	2
Imbabura	1	1
Carchi	1	1

Due to rounding, some totals may not equal 100%

Families of the sampled children ranged in size from 2 to 11 members. The average family size in CA was 6.9 compared with 6.1 for the Ecuadorian Sierra (Junta Nacional de Planificacion, 1974b). Those families in this sample which were small were either grandparents living with a child or a family with younger parents. Families which were extended were primarily families where the father was absent. In two families the child of the mother's sister was taken into the family. One child was an orphan and the other child's mother was a cretin still living with her parents.

Fifty-four percent of the sample were male and 46% were female. Seventy (82%) of the children were born in Quito. The remaining 15 (18%) were born in the provinces. The reported children's birthplaces provided information indicating that 18% of the children themselves had migrated in their lifetime.

Fourteen of the children were kin to another child in the sample. There were two sets of siblings, four sets of cousins and one uncle-nephew pair, involving seven families. This subsample of related children was not analyzed further because it was so small. Indepth family data would need to be collected via interviews and observations to examine kinship relationships and nutritional status.

Profile of Families

Data describing the families are in Tables 3, 4, 5 & 6. Demographics collected about each family were family size,

Table 3. Profile of Families in Cotocollao Alto, Quito, Ecuador, June, 1983 (n=85)

Family Characteristics	Number	Percent
Family size		
2 - 4 members	8	9
5 - 7 members	45	53
6 - 11 members	31	32
Not reported	1	1
Head of family		
Father	74	87
Mother	4	5
Grandmother	4	5
Grandfather	1	1
Uncles	2	2
Paternal Presence		
Father present	74	87
Father absent	11	13
Maternal Presence		
Mother present	81	95
Mother absent	4	5
Neighborhood Residence		
Santa Anita	38	44
Bellavista	14	16
El Bosque	14	16
El Triunfo	8	9
San Jose	6	7
San Rafael	4	5
Santa Ana	1	1

Due to rounding, some totals may not equal 100%

family head and presence or absence of either parent and local family residency (Table 2). Descriptive characteristics of the mother and father are age, education and occupation (Tables 4, 5, 6).

Seventy-four gatekeepers reported that the father of the child was the head of the family. In the 11 remaining families where the father was absent from the home, the head-of-family was reported as follows: four mothers (5%), four grandmothers (5%), two uncles (2%) and one grandfather (1%). In these 11 families, the father was dead in two cases, unknown mates of cretin mothers in two cases and known but not residing with the mother in seven cases. The child's mother was found to be present in 81 families (96%) and absent in four families (4%). In those families where the mother was absent, she had abandoned the child in two cases, died in one case and was a cretin living separately in one case.

The community of CA was divided into distinct small neighborhoods. Based on observation, these small neighborhoods had different characteristics which could have made neighborhood residency a predictor variable for the nutritional status of the children. Some of the small neighborhoods were settled longer than others, others were located closer to the main road, others were on better (more level) land. After data collection, it was found that neighborhood divisions left numbers too small for analysis. Because there was not logical way to group these small

neighborhoods, this variable was not further analyzed. To examine the relationship of spatial distribution within a neighborhood and the nutritional status of children, a representative sample from each distinct area would have to have been collected.

Age distribution of the mothers and fathers of the sampled child appears in Table 4. The age range of the children's mothers was from early twenties to early fifties. The mean mother's age was 33 years. The age range of the children's fathers was from late twenties to early sixties. The mean father's age was 36 years.

Twenty-two mothers reported that they could not read or write. One mother reported that she had no formal education but that she could read and write. Thirty-nine mothers (46%) had some primary education while 14 mothers (11%) had completed primary school. Four mothers (5%) had some secondary education. The mean years of education for the children's mothers was 2.8 years. Three fathers (4%) could not read or write and two (2%) had no formal education but could read and write. Twenty-six fathers (31%) had some primary education and 33 fathers (39%) had completed primary school. Four fathers (5%) had some secondary education while 3 fathers (4%) had completed secondary education. One father had university training. The mean years of education for the children's fathers was 5 years.

Occupational data of the children's mothers are summarized in Table 5. Fifty-four mothers (64%) reported that

Table 4. Age and Education of Children's Parents in Cotocollao Alto, Quito, Ecuador, June, 1983 (n=85)

Characteristics	MOTHERS Number	MOTHERS Percent	FATHERS Number	FATHERS Percent
Age				
20-29 years of age	9	11	4	5
30-39	39	46	26	31
40-41	29	34	36	42
50-51	2	2	5	6
60-69	0	0	1	1
Not reported	6	7	13	15
Education				
Illiterate	21	25	3	4
Literate-no formal education	1	1	2	2
Some primary	39	46	26	31
Completed secondary	14	16	33	39
Some secondary	4	5	4	5
Completed secondary	0	0	3	4
University	0	0	1	1
Not reported	6	7	13	15

Due to rounding, some totals may not equal 100%

Table 5. Occupation of children's mothers in Cotocollao Alto, Quito, Ecuador, June, 1983 (n = 81)

Occupation	Number	Percent
Housewife	54	64
Washer woman	10	12
Market woman	7	8
Small store owner	5	6
Domestic servant	2	2
Brick maker	2	2
Private Business	1	1

Due to rounding, some totals may not equal 100%

they were housewives with no outside of the home employment. Of those women who worked outside the home, 10 (11%) were washer women, seven (8%) were women who sold food at local markets, five (6%) owned small neighborhood grocery stores and two each (2% each) were domestic servants or brickmakers and one was involved in a food transportation business with her husband. No difference in per capita income or in per capita food expenditure based on whether or not the woman worked outside the home (t-test, $p>.05$). For further analysis, mother's occupation was collapsed into two groups: mothers who were home during the day and mothers who were away from home during the day.

Occupational data of the children's fathers are summarized in Table 6. Father's occupation is frequently used

Table 6. Occupation of the children's fathers in Cotocollao Alto, Quito, Ecuador, June, 1983 (n=85)

Occupation	Number	Percent
Managers and administrators	9	11
Professionals & technical workers	4	5
Employees in offices	7	8
Craftsman and artisans	10	12
Drivers	6	7
Personal service	4	5
Workmen and day workers	31	36
No work	3	4
Not reported	11	13

Due to rounding, some totals may not equal 100%

as a socioeconomic indicator with income data. The fathers of the sampled children were employed in 24 distinct jobs. These jobs were divided into categories based on those categories utilized by the Ecuadorian Census Institute (INEC) in the 1974 census. Occupation of the father distributed as follows: nine managers and administrators (10%), five professionals and technical workers (6%), seven office employees (8%), ten craftsmen and artisans (11%), six drivers (7%), four personal servants (5%) and 31 (36%) workmen and dayworkers. Three fathers were unemployed.

Economic Profile

Income data were collected from CA homemakers. These data were used to compute a per capita income by dividing income by family size. Estimated monthly food expenditure was also collected and a per capita food expenditure was computed by dividing estimated food expenditure by family size. Information on additional sources of economic activity of the family was also collected.

Per capita monthly income ranged from 0 to 6,000 sources (U.S.A. 1$=95 sucres; June, 1983). The mean per capita income was 1,039 sucres and the reported mode was 1,000 sucres. In 1976, the average family income based on an average family of 5.4 for urban areas of Ecuador was $139.00 (Luzuriaga, 1979). At that time, $139.00 was equal to 3,475 sucres. In June, 1983, the same $139.00 was worth 13,205 sucres and the minimum wage was still 4,000 sucres per month.

Per capita food expenditure ranged from 150 to 1,500 sucres per month. The mean monthly per capita food expenditure was 614 sucres.

Families were asked what other sources besides their principle economic activity contributed to the family income. Nine families (10%) received income from the rental of a house which they owned. Twenty-six families (30%) used agricultural products from their own land. Families who had small plots of land beside their homes usually grew corn, potatoes, and onions. A few families also grew lupine

beans. Three families (3%) received money from other family members. Twenty families (23%) received gifts of goods and food from friends and other family members. These were mainly families from nearby rural areas who relatives brought them food grown on their land.

Housing

Housing characteristics are described in Table 7. Home ownership data were reported. Housing characteristics reported were wall materials, floor materials, roof materials and the number of rooms. Data were also collected on fuel sources, food storage facilities and refrigeration. Information on water source, garbage disposal and human waste disposal was collected.

Sixty-three families (74%) owned their own homes. Of those who did not own their homes, 18 families (21%) rented their homes and three families (3%) were non-paying caretakers in their homes. The houses ranged from one to six rooms. This room count excluded the kitchen and the latrine which were both usually separate from the house. Construction materials for walls, floors and roofs varied and this distribution is summarized in Table 6.

The people in CA secured electricity for the community in 1976 and all homes in the sample had electricity. Although water was not potable, most families (97%) obtained their water from hand pumps located throughout the neighborhood. Erratic garbage collection was available and was

Table 7. Housing in Cotocollao Alto, Quito, Ecuador, June, 1983 (n=85)

Housing characteristic	Number	Percent
Home ownership		
Homeowners	63	74
Home renters	18	21
Home caretakers	3	4
Number of rooms		
1 room	18	21
2 rooms	32	38
3 rooms	16	19
4 rooms	9	11
5 rooms	6	7
6 rooms	4	5
Wall Construction		
Cement block	34	40
Adobe	21	25
Brick	21	25
Mixed construction	8	9
Wood	2	2
Roof construction		
Eternit	28	33
Tiles	21	25
Cement	22	26
Zinc	13	15

Table 7. (Cont.)

Housing characteristic	Number	Percent
Floor construction		
Wood planks	51	60
Dirt	12	14
Cement	13	15
Brick	4	5
Parquet	3	4
Mixed construction	1	1
Water Source		
Hand pumps	82	97
Ravine creek	2	2
Water tank truck	1	1
Garbage disposal		
Garbage collection service	26	31
Burned garbage	21	25
Garbage thrown in ravine	19	22
Garbage thrown in own yard	12	14
Garbage buried	7	8
Human Waste Disposal Facilities		
Latrines	73	86
Open countryside	12	14

Table 7. (Cont.)

Housing characteristic	Number	Percent
Fuel Sources		
Gas	50	59
Wood	14	16
Both gas and wood	10	12
Gasoline	4	5
Kerex	4	5
Electricity	3	3
Food Storage Facilities		
Open shelves	47	55
Closed shelves	11	13
Boxes	20	24
Closed containers	5	6
Barrels	3	3
Refrigeration		
Refrigeration present	24	28
Refrigeration absent	61	72

utilized by 26 (31%) of the families. Garbage scattered throughout the neighborhood was viewed as a sanitation problem. Seventy-three families (86%) had latrines for disposing of human waste.

The most frequent source of fuel was tanked gas used in 50 homes (59%). Twenty-six homes had and used refrigeration. Food storage facilities were varied and ranged from boxes and barrels to closed shelves.

Those data which describe the research population have been reported. Selected variables will be further analyzed as they effect or interact with the relationship between migration and the nutritional status of migrant children.

Migration

Information on place of origin, the length of residence in Quito, the length of residence in CA and the existence of migration within the family was collected and is summarized in Table 8. Place of origin and residence with kin upon arrival were reported by those families who had migrated. Responses to open-ended questions on the reasons for migration and the satisfaction with life in Quito were recorded.

Migration of these families all took place from the Ecuadorian Sierra, some from rural areas and some from secondary urban centers. Because place of origin was defined as province of origin, a distinction between these two groups was not possible, resulting in all migrants being treated as one group for analysis. Those rural areas

Table 8. Family migration data, Cotocollao Alto, Quito, Ecuador, June, 1983 (n=85)

Migration characteristic	Number	Percent
Place of Origin		
Quito	31	36
Pichincha	19	22
Cotopaxi	9	11
Chimborazo	8	9
Imbabura	5	6
Carchi	5	6
Bolivar	3	4
Azuay	3	4
Tungurahua	1	1
Loja	1	1
Length of Residence in Quito		
0-5 years	9	11
6-10 years	9	11
11-15 years	10	12
16-20 years	7	8
more than 20 years	50	59
Length of residence on the Community		
0-5 years	29	34
6-10 years	30	35
11-15 years	6	7
16-20 years	1	1
more than 20 years	19	22

Table 8. (Cont.)

Migration characteristic	Number	Percent
Existence of Migration		
No Migration	21	25
Both parent migration	35	42
Mother only migrated	13	15
Father only migrated	13	15
He-of-family (not parent) migrated	2	2
Residence with Kin upon Arrival		
Not applicable	31	36
No one	28	33
Grandparents of the child	6	7
Aunts and uncles of the child	7	8
Aunts and uncles of the parents	5	6
Friends	6	7
Cousins	2	2

Due to rounding, some totals may not equal 100%

closest to Quito attracted the most migrants and Cotopaxi, the neighboring province, attracted the second largest group. After that, proximity no longer explains migration to Quito. The third largest number of migrants came from Chimborazo, one of the furthest provinces.

Length of residence in Quito ranged from 2 to 52 years. The mean length of residence on Quito was 25.5 years. The reported mode was 42 years and the median was 25 years.

Length of residence in CA ranged from 1 to 49 years. The mean length of residence in CA was 14.8 years. The reported mode was 5 years and the median was 9 years.

In 21 families (25%) there was no migration at all during the generation of the child's parents. In 35 families each (15% each) only the mother or only the father had migrated. Migration in two families took place by the head-of-family where that person was neither mother nor father of the child. This variable was collapsed as no parent migration, one parent migration and two parent migration for further analysis.

Twenty-eight families (33%) reported that they had not stayed with a relative or friend upon their arrival in Quito. Fifty percent of those families who migrated stayed with a friend or family member upon arriving in the city. Because most of the families who had migrated were settled migrants residing in Quito for more than 10 years, kinship ties at the time of arrival were not examined in relationship to nutritional status.

Responses to open-ended questions related to reasons for migration and satisfaction with life in Quito were answered by 45 mothers or gatekeepers. These results are presented in Table 9.

Eighty percent of those respondents who had migrated reported coming to Quito for reasons related to work. Ten respondents that gave work as the reason for migration were women who had migrated to Quito at an early age to work as

Table 9. Motive for and satisfaction with migration of migrants in Cotocollao Alto, Quito, Ecuador, June, 1983 (n=45)

Migration Characteristic	Number	Percent
Reasons for migration		
Work	36	80
To live with relatives	8	18
Health	1	2
Satisfaction with Migration		
Satisfied with life in Quito	43	96
Unsatisfied with life in Quito	2	4

domestic servants. Most of these respondents simply answered "work" as their motive for migrating. Three respondents specified already secured work for the father of the family in Quito.

Of 45 respondents answering the question on how they felt about migrating to quito, only two felt unhappy in Quito. One stated that life was too much of a battle and the other had been abandoned by her husband. Most of the respondents felt that their life had improved by moving to Quito and expressed either satisfaction or happiness with their lives. Among those who gave more specific answers for their satisfaction, 11 respondents mentioned the availability of work, 6 mentioned the education of their children and 5 were pleased at being able to own their own home.

Nutrition and Migration

Nutritional status is an operational term relating the condition of health to the intake of foods and the utilization of nutrients. The four basic methods utilized for assessing nutritional status are anthropometric, biochemical or laboratory studies, clinical evaluation and dietary data (Christakis, 1973). In this study, dietary intake and anthropometric measurements were utilized to assess the nutritional status of school-aged migrant children.

Multiple regression analysis was used to examine the relationship of migration and the nutritional status of migrant children. A candidate list of variables considered in the initial regression equation appears in Table 10. From this initial list utilized for all dependent variables, individual regression equations were determined. Regression results for each dependent variable used to assess nutritional status will be presented.

Dietary Data. Dietary data for this study was collected via a 3-day food record and a 24-hour dietary recall. Calculations for energy and six nutrients were done from the 24-hour dietary recalls. Those nutrients calculated were protein, calcium, iron, thiamin, riboflavin and vitamin A. Mean percents for males and females of the FAO/WHO Recommended intake of Nutrients and the percent standard deviation are reported for energy and each of the six nutrients (Table 11). The distribution of males and females not meeting and those meeting more than 100 percent of the

Table 10. Table of candidate list of explanatory variables used for each dependent variable.

Variable	Explanation
Quito time	Length of residence in Quito
Community time	Length of residence in the community
Migration	No parent, one parent or two parent migration
Sex	Sex of the sampled child
Age	Age of the sampled child
Family	Family Size
Per capita Income	Income divided by family size
Per capita food expenditure	Food expenditure divided by family size
Father	Presence or absence of the father in the home
Education	Education of the child's mother or gatekeeper
Occupation	Occupation of the child's mother based on whether or not the mother was home during the day
Home	Ownership or not of the family's home
Farming	The use or not of agricultural products from the family's own source of land
S1	Quito time squared
S2	Community time squared
S3	Migration squared
S4	Family squared

Table 10. (Cont.)

Variable	Explanation
S5	Per capita income squared
S6	Per capita food expenditure squared
I1	Interaction of Quito time and migration
I2	Interaction of migration and family size
I3	Interaction of migration and per capita income
I4	Interaction of migration and mother's education
I5	Interaction of family size and per capita income
I6	Interaction of family size and per capita food expenditure
I7	Interaction of farming and per capita food expenditure

Table 11. Male and female children's mean percent FAO/WHO Recommended Nutrient Intakes for one total day for energy and six nutrients, Cotocollao Alto, Quito, Ecuador, June, 1983 (n=85)

NUTRIENT	MEAN % FAO/WHO ± SD	
	MALES	FEMALES
ENERGY	78 ± 31	89 ± 33
PROTEIN	140 ± 53	175 ± 89*
CALCIUM	77 ± 49	92 ± 64
IRON	84 ± 31	112 ± 62*
THIAMIN	74 ± 34	107 ± 54*
RIBOFLAVIN	63 ± 32	95 ± 54*
VITAMIN A	50 ± 47	59 ± 58

*Significant difference in intake between male and female children ($p \leq .01$).

FAO/WHO standards for energy and six nutrients is reported in Table 12.

Energy. The children in CA consumed from 30 percent to 182 percent of their recommended energy intake. The mean percent intake of energy was 83 percent and the mode was 61 percent. Mean energy intake for females was higher than for males; however this difference was not significant. Mother's education showed a weak correlation with the child's energy intake ($r=.31$, $p \leq .01$). There was a significant difference in energy intake between those children whose mothers had had no formal education and those mothers who had formal education ($p \leq .05$). Mean percent energy

Table 12. Number of children not meeting and those meeting more than 100% of FAO/WHO Recommended Nutrient Intakes for energy and six nutrients. Cotocollao Alto, Quito, Ecuador; June 1983 (n=85)

	Children Meeting FAO/WHO Recommend Nutrient Intakes							
Nutrient	0-33%	34-66%	67-100%	101-133%	134-166%	167-200	201-330%	300%
Energy	2	28	34	15	3	3	0	0
Protein	0	4	14	18	24	12	10	5
Calcium	23	14	17	14	11	3	3	0
Iron	1	19	38	13	7	3	5	0
Vitamin A	39	20	14	5	3	3	0	1
Thiamin	3	27	34	14	1	2	4	0
Riboflavin	10	31	25	15	6	0	2	0

intake was higher for those children whose mothers had attended school. When mother's education was examined in conjunction with other variables possibly impacting energy intake, this effect was eliminated. No relationship was found between the energy intake of the children and length of residence in Quito or the migration of the parents.

Protein. The children consumed from 47 percent to 424 percent of their recommended protein intake. The mean percent of intake for protein was 156 percent and the mode was 96 percent. Mean percent protein intake was significantly higher for females than for males ($p \leq .01$). Mean percent protein intake was higher for those children whose mothers attended school than for those children of mothers who had never attended school ($p = \leq .01$). No relationship was found between length of residence in Quito or the migration of the parents and the protein intake of the children.

Iron. The children consumed from 24 percent to 282 percent of their recommended iron intake. The mean percent intake of iron was 97 percent and the mode was 68 percent. The mean percent iron intake was higher for females than for males ($p \leq .05$). Mean percent iron intake was significantly higher for those children whose mothers had attended school than for those children whose mothers had never attended school ($p \leq .05$). Length of residence in Quito and the existence of migration within the family was not found to be related to the iron intake of the child. The relationship of the sex of the child and iron intake was confirmed by

regression analysis. Home ownership was also found to be related to the iron intake of the child. Per capita food expenditure was significantly related to iron intake but, in a non-linear manner. Sex of the child, home ownership and per capita food expenditure explained 20 percent of the variation in the children's iron intake. The linear and quadratic terms for food expenditure accounted for 93 percent of the explained variance (Table 13).

Calcium. The children consumed from 8 percent to 266 percent of their recommended calcium intake. The mean percent calcium intake was 84 percent and the mode was 23 percent. Mean percent calcium intake for females was higher than for males, however, this difference was not significant. No relationship was found between calcium intake and those variables included in the regression analysis.

Thiamin. The children consumed from 24 percent to 263 percent of their recommended thiamin intake. The mean percent thiamin intake was 89 percent and the mode was 82 percent. The mean percent thiamin intake was higher for females than for males when other variables were ignored ($p \leq .01$). However, no relationship was found between thiamin intake and those variables included in the regression analysis.

Riboflavin. The children consumed from 9 percent to 288 percent of their recommended thiamin intake. The mean percent riboflavin intake was 78 percent and the mode was 48 percent. The mean percent riboflavin intake was higher for

Table 13: Summary of regression results examining the interaction of selected independent variables and those dependent variables reflecting nutritional status

Dependent Variable	Independent Variable	Regression Equation	Adjusted r^2
IRON	S=sex of child H=home ownership P=per capita food expense	$I=113 + 37.965 + 39.88H$ $-.205P + .15^{-3}$	.21
RIBOVLAVIN Both parent migration*	S=sex of child I=per capita income P=per capita food expense	$B=93.1 + 42.85 + .033I$ $-.29P + .22^{-3}P^2$	.45
WEIGHT-FOR-AGE	A=age of child L=length of residence in Quito M=parental migration ML=interaction of M and L	$W=190 + 97.86L + 12.765$ $+ 524.62M - 51.37$ ML	.28
HEIGHT-FOR-AGE	A=age	$H=930 + 3.31A$	.18
WEIGHT/HEIGHT INDEX	I=per capita income F=family size S=sex of child	$WH=1.27 + .409^{-3}I$ $-.826^{-7}I^2$ $+.0486F + .185S$	.16

*Not significant for no parent or 1 parent migration

females than for males ($p \leq .01$). Intake of riboflavin had an inverse and linear relationship with the number of parents migrating and with per capita income and there was an interaction between these two variables. Per capita food expenditure was found to have an inverse and non-linear relationship with riboflavin intake. When the data were divided into three groups according to the number of parents migrating (none, one or both), sex of the child, per capita income and per capita food expenditure were significantly related to riboflavin intake only for children with two parents migrating. In that case, 45 percent of the variation in riboflavin intake was explained, with most of that related to the linear and quadratic terms for food expenditure (Table 13).

Vitamin A. The children consumed from 0 percent to 330 percent of their recommended intake of Vitamin A. The mean percent intake of vitamin A was 54 percent and the mode was 32 percent. Mean percent vitamin A intake was higher for children in homes where the father was present ($p \leq .05$) when other variables were ignored. No relationship was found between vitamin A intake and those variables included in the regression analysis.

Anthropometric data. Height and weight were collected. Weight-for-age, height-for-age and weight-for-height ratio were used as indicators of growth. Comparisons of these anthropometric measurements for the sampled children are in Table 14.

Table 14: Distribution of weight-for-age, height-for-age, and weight-for-height for male and female children 8 to 11 years of age in Colocollao Alto, Quito, Ecuador as compared to the 1976 NCHS standards, June, 1983 (n = 85)

Percentile range of NCHS standard	Weight-for-age		Height-for-age		Weight-for-height	
	Number	Percentage	Number	Percentage	Number	Percentage
0- 5	43	51	52	61	6	7
6-10	21	25	12	14	4	5
11-25	10	12	10	12	13	15
26-50	6	7	6	7	24	27
51-75	3	4	2	2	21	25
76-90	0	0	0	0	11	13
91-95	0	0	1	1	3	3
96-100	0	0	0	0	3	3

Due to rounding, some totals may not equal 100%

Weight-for-age. Weight-for-age of the CA children distributed between the 0-5 percentile range to the 50-75 percentile range of the NCHS growth charts (1976) (Figure 2). The 10 percentile point was the mean percentile weight-for-age for these children. Most children (51%) fell into the 0-5 percentile range. Because this resulted in a distribution that placed most of the sample in the same range, individual z-scores were computed for each child's weight-for-age. This method produced a positively skewed distribution ranging from -2.39 to +2.58 with a mean z-score for weight of +.86 and a standard deviation of ± .98 (Figure 3). A significant difference was found in weight-for-age z-scores between those children living in a home where the father was present and those children living in a home where the father was absent ($p \leq .05$). Children living in homes where the father was absent had a higher mean z-score for weight than the children living in homes where the fathers were present.

Weight was linearly related to age as would be expected showing an increase in weight corresponding to an increase in the child's age. Overall, a linear relationship was found between length of residence in Quito and the weight of the child. The interaction of length of residence in Quito and the number of parents migrating was also related to the child's weight. To examine this interaction, the data were divided into three groups according to the number of parents

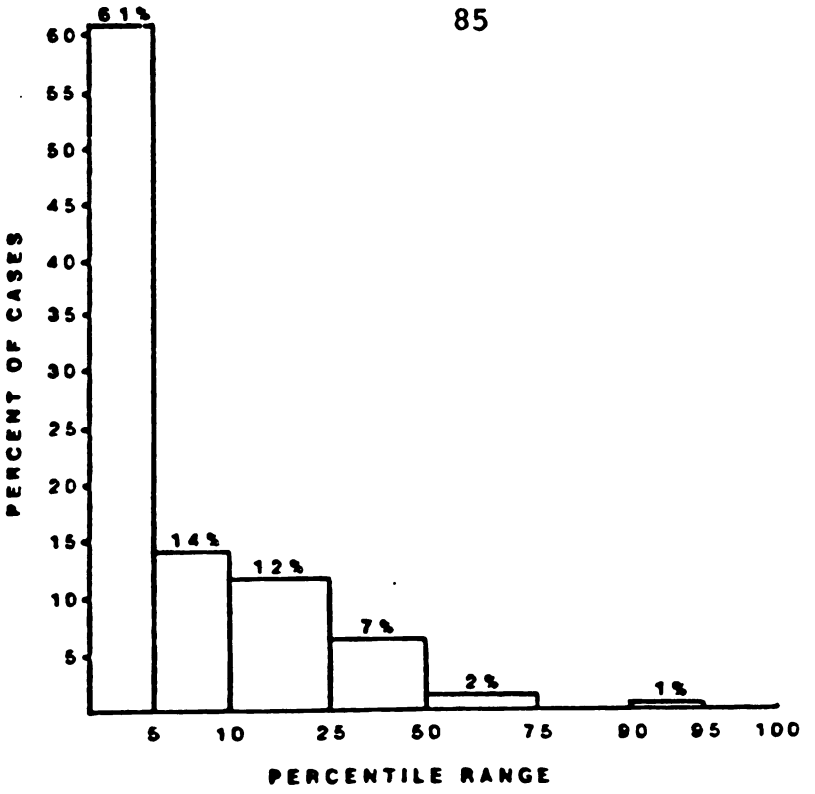


Figure 2: Weight-for-age distribution of Cotocollao Alto sample children in percentiles as compared to 1976 NCHS growth charts. Quito, Ecuador, June, 1983 (N=85).

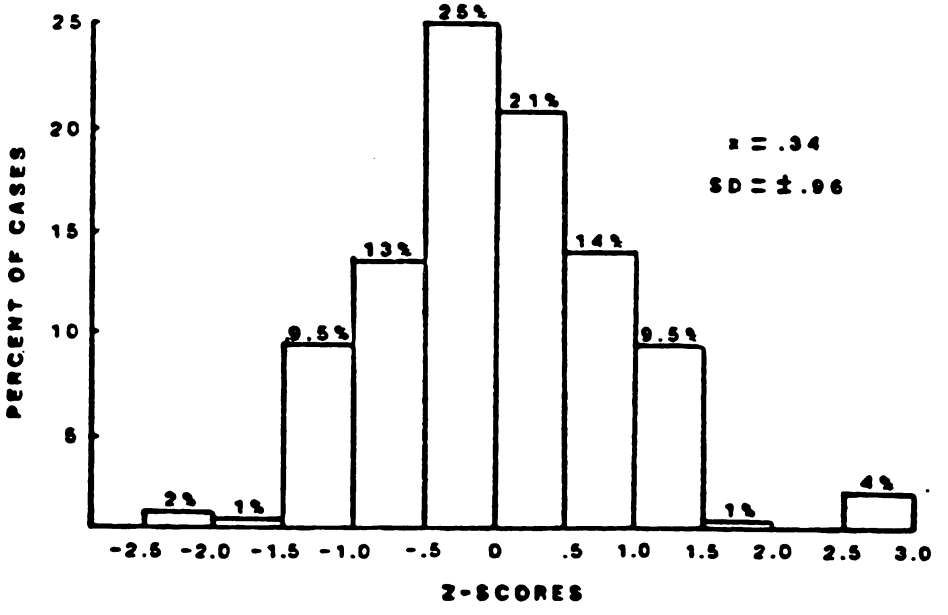


Figure 3: Sex and Age specific Z-scores for weight of sample children in Coto-collao Alto, Quito, Ecuador, June, 1983 (N=85).

migrating (none, one or both) and no effect of length of residence was found.

Height-for-age. Height-for-age of the CA children distributed from the 0-5 percentile range to the 90-95 percentile range of the NCHS growth charts (Figure 4). The 12 percentile point was the mean percentile height-for-age ofr these children. Most children (61%) fell into the 0-5 percentile range of the NCHS growth charts. Because this resulted in a distribution that placed most of the children in the same range, z-scores were computed for each child's height-for-age (Figure 5). This method produced a normal distribution ranging from -2.26 to a +2.59 z-score for height with a mean z-score for height of +.34 and a standard deviation of ± .96. Age was the only variable linearly related to height. This is an expected result as a child's height should normally increase with increased age. Nevertheless, based on the regression analysis, age explained only 18% of the variation in the height of this sample.

Weight-for-height. Weight-for-height of the CA children distributed from the 0-5 percentile range to the 95-100 percentile range on the NCHS growth charts (Figure 6). The 46 percentile point was the mean percentile point of these children. The greatest number of children (27%) were in the 25-50 percentile range. Fewer children fell below the 50 percentile point for weight-for-height than for weight-for-age or height-for-age. For further analysis, a weight/height ratio was calculated dividing weight by height. When

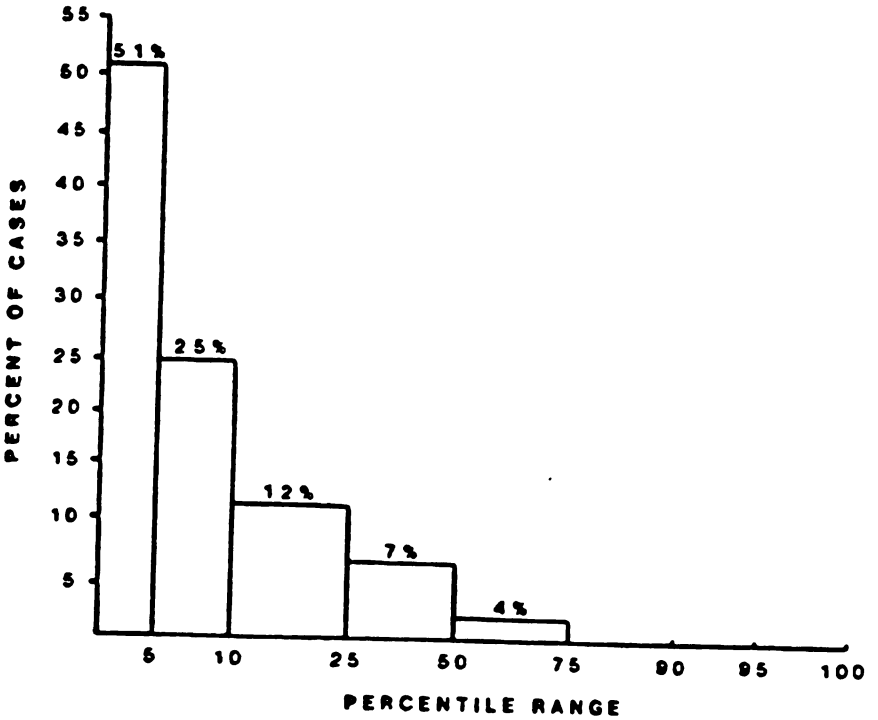


Figure 4: Height-for-age distribution of Cotocollao Alto sample children in percentiles as compared to 1976 NCHS growth charts. Quito, Ecuador, June, 1983 (N=85).

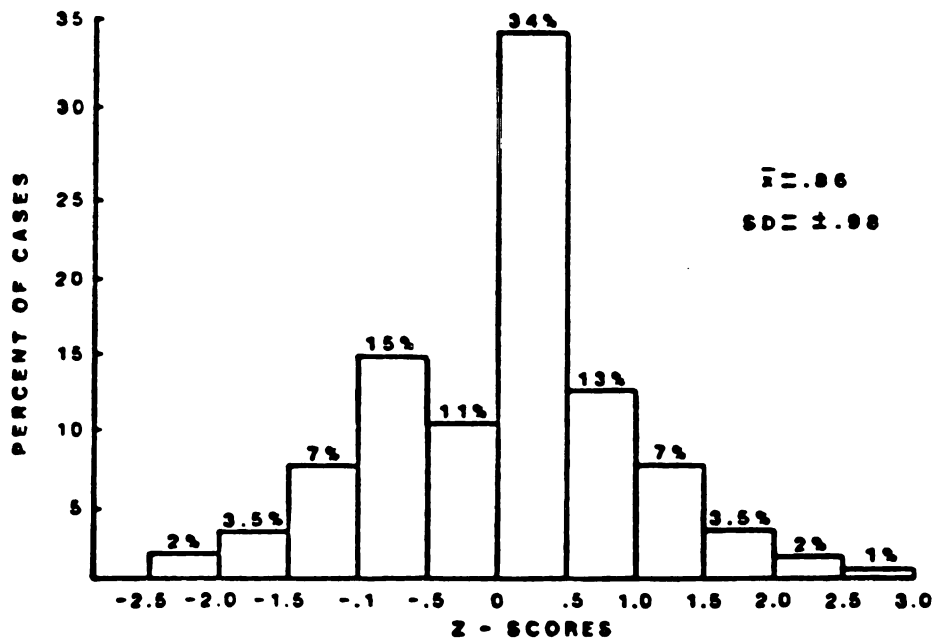


Figure 5: Sex and age specific Z-scores for height of sample children in Cotocollao Alto, Quito, Ecuador, June, 1983 (N=85).

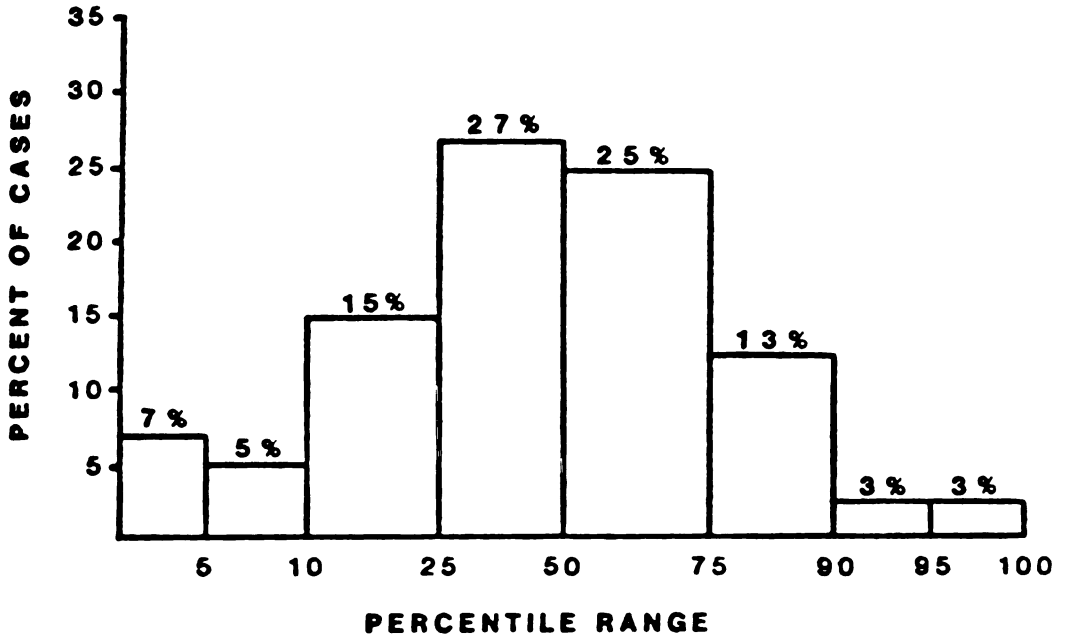


Figure 6: Weight-for-height distribution of Cotocollao Alto sample children in percentiles as compared to 1976 NCHS growth charts. Quito, Ecuador, June, 1983 (N=85).

one family with unusually high income was removed from the sample, the index was linearly related to income, showing an increase in the weight/height ratio of approximately .04 for every 1000 sucre increase in income. Sex was also found to be a predictor variable for weight/height ratio with females having a higher mean than males (Table 13).

Dietary change and Migration

Food frequency data were collected in a dual time framework from the homemakers who migrated. Frequency of food consumption was reported for "within the last month" in Quito and for "a one month period" during rural residency. Forty-one homemakers responded to the food frequency instrument in both the rural and urban time framework. Four homemakers had migrated at too young an age to recall rural food patterns.

The food frequency instrument was utilized to examine dietary changes related to migration. A correlated t-test was done to look for differences between rural and urban food consumption for the same person. These results are reported in Table 15. A student's t-test was done to look for a difference in urban food consumption between those persons who had only urban food frequency scores and between those persons who had both an urban and a rural food frequency score. This looked at the difference in present consumption between those who had always lived in the urban area and those who had migrated to the urban area. These results are reported in Table 16.

Table 15. Migrated homemakers reported food frequencies in a dual time framework of post- and pre-migration. Cotocollao Alto, Quito, Ecuador, June, 1983 (n = 85)

	Urban Mean Frequency	Rural Mean Frequency	Significance
Grains and Cereals			
chulpi	.70	3.25	.040*
corn	2.28	5.18	.031*
popcorn	4.03	2.66	.055
toasted corn	5.40	10.35	.010*
hominy	3.08	8.00	.003*
morocho corn	2.97	10.00	.0001*
barley	2.80	9.05	.001*
wheat	.53	1.35	.289
quinoa	1.23	2.33	.141
chuchuca	1.45	2.43	.154
barley flour	5.28	14.10	.0001*
wheat flour	3.58	7.00	.024*
morocho flour	.25	.05	.118*
corn flour	5.10	8.78	.039*
semola	.03	1.02	.006*
oats	4.80	4.23	.194
noodles	4.53	2.78	.016*
spaghetti	5.30	2.43	.015*
rice	28.05	13.65	.0001*
bread	29.28	15.95	.0001*
Legumes and Legume Flours			
peas	4.28	4.78	.475
lentils	1.18	1.40	.238
fava beans	6.25	6.58	.558
beans	4.15	5.60	.147
garbanzos	.08	.05	.323
lupin	3.40	2.38	.180
pea flour	2.08	3.56	.121
fava bean flour	3.77	5.40	.183
Vegetables			
cabbage	13.38	11.23	.163
purple cabbage	1.25	.15	.152
turnip greens	3.90	3.25	.645
swiss chard	3.45	.95	.014*
spinach	1.23	1.10	.861
onion	20.65	13.93	.002*
white onion	27.33	22.95	.024*
tomato	18.08	10.58	.0001*

Table 15. (Cont.)

	Urban Mean Frequency	Rural Mean Frequency	Significance
vegetables (cont.)			
lettuce	9.13	5.33	.012*
hot pepper	16.28	16.55	.876*
green beans	1.45	.78	.001*
green peppers	2.83	2.18	.548
cucumbers	1.00	.55	.002*
avacado	3.32	3.15	.899
squash	1.30	3.85	.046*
squash seeds	1.18	3.15	.063*
pumpkin	1.10	3.03	.070
carrots	23.43	18.88	.008*
white carrots	.80	1.18	.075
radish	1.50	.70	.0001*
beets	2.25	2.17	.917
ullucus tuber	2.30	3.48	.267
oka	.80	3.65	.027*
potato	30.00	29.35	.323
Fruits			
pears	2.58	.75	.018*
apples	1.93	.75	.0001*
figs	.70	.68	.918
tree tomato	1.75	1.38	.117
andean cherry	1.40	.83	.003*
papaya	2.80	1.93	.426
pineapple	2.80	2.05	.485
passion fruit	2.13	.58	.028*
orange	4.02	3.43	.440
lime	15.55	15.03	.651
green plantain	6.20	6.68	.734
red plantain	6.55	5.40	.345
ripe plantain	9.03	9.58	.719
banana	22.55	19.15	.165
babaco	.33	.08	.031*
chamburo	.18	.13	1.000
taxo	.85	.50	.085
naranjilla	1.70	2.23	.489
blackberry	1.48	2.33	.396
strawberry	1.13	.85	.396
grape	.67	.35	.202
mango	.83	.63	.031*
cantelope	.58	.25	.186
sour sop	.50	1.23	.336
cherimoya	.93	1.10	.432
tangerine	1.13	1.70	.448

Table 15. (Cont.)

	Urban Mean Frequency	Rural Mean Frequency	Significance
Meat and Eggs			
rabbit	.50	1.13	.012*
guinea pig	.63	2.38	.027*
chicken	2.95	3.05	.658
pork	2.53	4.67	.044*
lamb	.93	2.23	.100
beef	21.10	15.30	.003*
fish	1.35	.40	.0001
shellfish	.28	.03	.031*
eggs	22.40	24.73	.263
Milk and Dairy Products			
milk	15.80	26.75	.0001*
yogurt	1.70	.03	.116
cheese	4.93	7.10	.170
ice cream	14.20	8.98	.0001*
Miscellaneous			
sugar	30.00	25.65	.012
crude brown sugar	1.73	8.40	.006*
regular salt	1.53	10.63	.001*
iodized salt	28.50	19.10	.0001*
cookies	7.10	1.25	.002*
candy	8.48	2.00	.001*
coffee	27.10	22.78	.061
tea	1.95	1.98	.987
colas	16.60	7.48	.002*
mineral water	11.73	5.03	.004*
food supplement	.38	.03	.046*

* $p \leq .05$

Table 16. Reported urban food frequencies for migrants and non-migrants living in Cotocolloa, Quito, Ecuador, June, 1983 (n = 85)

	Urban mean Frequency for Non-Migrants	Urban Mean Frequency for Migrants	Significance
Grains and Cereals			
chulpi	.46	.70	.140
corn	1.66	2.28	.047*
popcorn	5.44	4.02	.374
toasted corn	6.35	5.400	.628
hominy	4.29	3.08	.429
morocho corn	5.62	2.98	.039*
barley	4.66	2.80	.07
wheat	.58	.53	.806
quinoa	1.75	1.22	.436
chuchuca	1.48	1.45	.934
barley flour	6.32	5.28	.621
wheat flour	5.38	3.58	.263
morocho flour	.48	.25	.318
corn flour	6.50	5.10	.480
corn starch	11.02	8.58	.369
semola	.02	.025	.898
oats	11.19	4.80	.002*
noodles	4.56	4.53	.978
spaghetti	6.87	5.30	.362
rice	25.46	29.28	.116
bread	29.45	29.28	.840
Legumes and Legume Flours			
peas	3.06	4.28	.231
lentils	1.31	1.18	.662
fava beans	3.38	6.25	.074
beans	3.13	4.15	.310
garbanzos	.15	.08	.290
lupin	2.04	3.40	.258
pea flour	1.04	2.07	.198
fava bean flour	5.73	3.78	.172
Vegetables			
cabbage	14.15	13.38	.787
purple cabbage	.17	1.25	.161
turnip greens	6.48	3.90	.143
swiss chard	2.79	3.45	.583
spinach	1.00	1.23	.514

Table 16. (Cont.)

	Urban mean Frequency for Non-Migrants	Urban Mean Frequency for Migrants	Significance
Vegetables (Cont.)			
onion	18.65	20.65	.482
white onion	27.70	27.40	.854
tomato	11.48	18.08	.021*
lettuce	5.94	9.13	.148
hot pepper	14.42	16.28	.554
green beans	1.17	1.45	.376
green peppers	1.17	2.83	.119
cucumbers	1.06	1.0	.831
avocado	1.92	3.33	.177
squash	1.63	1.30	.207
squash seeds	.98	1.18	.370
pumpkin	.90	1.10	.358
carrots	16.60	23.43	.150
white carrots	.66	.80	.637
radish	1.29	1.50	.518
beets	2.69	2.25	.520
ullucus tuber	2.08	2.30	.514
okra	.71	.80	.736
potato	28.16	30.00	.083
Fruits			
pears	1.60	2.57	.322
apples	2.29	1.92	.684
figs	.39	.70	.128
tree tomato	3.81	1.75	.055
andean cherry	1.06	1.40	.188
papaya	3.14	2.80	.719
pineapple	3.06	2.80	.785
passion fruit	2.00	2.13	.900
orange	5.44	4.02	.374
lime	14.66	15.55	.767
green plantain	6.60	6.20	.516
red plantain	5.85	6.66	.740
ripe plantain	11.40	9.03	.362
banana	24.33	22.55	.482
babaco	.13	.33	.116
chamburo	.10	.13	.764
taxo	.81	.85	.875
naranjilla	1.81	1.70	.868
blackberry	2.19	1.48	.023
strawberry	1.19	1.13	.826
grape	.52	.68	.389

Table 16. (Cont.)

	Urban mean Frequency for Non-Migrants	Urban Mean Frequency for Migrants	Significance
Fruits (Cont.)			
mango	.69	.83	.402
cantelope	.66	.58	.691
sour sop	.46	.50	.811
cherimoya	.71	.93	.231
tangerine	2.15	1.13	.246
Meat and Eggs			
rabbit	.46	.50	.766
guinea pig	.63	.63	1.000
chicken	2.93	2.95	.968
pork	1.58	2.53	.378
lamb	1.33	.93	.143
beef	24.33	21.10	.220
fish	1.33	1.35	.955
shellfish	.06	.28	.079
eggs	22.77	22.04	.888
Milk and Dairy Products			
milk	16.48	15.80	.818
yogurt	.90	1.70	.511
cheese	6.65	4.93	.353
ice cream	6.50	14.52	.123
Miscellaneous			
sugar	30.00	30.00	1.000
crude brown sugar	2.60	3.73	.456
regular salt	.63	1.53	.463
iodized salt	29.38	28.50	.456
cookies	3.16	7.10	.078
candy	3.88	8.48	.058
coffee	22.70	27.10	.061
tea	2.15	1.95	.895
colas	15.62	16.60	.749
mineral water	10.66	11.73	.722
food supplement	.17	.38	.263

* $p \leq .05$

Dietary change data were collected from those homemakers who had migrated. Changes in food intake, food acquisition, food preparation and food storage were reported.

Thirty-one said that there were no foods which had been eaten in the rural area which they did not eat in Quito. Three women said that their families consumed more milk in the rural area. Two women mentioned the use of crude brown sugar in the rural area which they no longer used in Quito. One respondent each stated that they no longer consumed corn, hominy, morocho corn, ullucus tubers or ocas. Twenty-nine homemakers reported that there were no new foods which they were eating in Quito which they had not eaten in the rural area. Spaghetti, sugar, rice and vegetables were reported to be new foods in three households. Three women said that their families now ate more beef. Two women reported consuming bread which they had not consumed in the rural area and one woman said that her family now ate fruits which were previously unavailable to them.

When asked about changes in food marketing, 14 women said that they had experienced no change in their marketing practices while 19 women stated that they had changed from growing food to feed their families to purchasing food to feed their families. Two women reported that they used to buy on a weekly basis and that in Quito they purchased food items in bulk and that now they purchased food by the pound.

Twenty-eight women changed their source of cooking fuel when they moved to the city. Twenty-four changed from wood to gas, three from kerex to gas, one from gasoline to gas and one from wood to kerex. Eight women reported that cooking time was reduced in the city. Ten women reported a change in cooking utensils. In the rural area they had used clay pots and wooden spoons, whereas in Quito they were not using aluminum pans and spoons. One woman also reported that her family used to eat on clay dishes with wooden spoons, a custom which is no longer practiced. One woman said that she now had a pressure cooker and one woman said that she had changed her seasoning.

Twenty-one women reported no change in the manner in which they stored food. Five women said that they used to store food for longer periods of time in the rural area. Three women reported that they now had refrigerators to store food. Seven women reported that they had used boxes, baskets and barrels to store food in the rural area and that they now used shelves to store food. One woman reported that she had had more space for storage in the rural area and another reported that she had more space for food storage in Quito.

The importance of these changes in dietary customs based on migration will be discussed in the next chapter. The implication of these changes will be considered.

VI. DISCUSSION

Methods and Procedures

Sampling from the public schools serving the community proved to be a strength of this study. This approach played a role in the high degree of cooperation of CA homemakers. First, the school personnel's support of the project facilitated entry into the children's homes (Lomnitz, 1977; Gladhart, 1981). Secondly, the fact that the children already knew the researcher and were familiar with the project also facilitated entry into their homes.

The advantage of random sampling is that the sample is obtained in such a way that each element of the population has an equal chance for selection, hence the sample will not be biased (Johnson, 1976). For a study, in which the main objective is to compare specific groups, random sampling of a whole population can be a weakness resulting in insufficient cases in each group to make the comparison. The objective of this study was to examine the relationship of length of residence in Quito and nutritional status by comparing children of new, recent and settled migrant families. Small sample size, however, proved to be a weakness resulting in an uneven distribution of new, recent and settled migrants with only a small number of new and recent

migrants (10% each). Future research to examine this relationship should stratify the population by length of residence, drawing the sample from each stratum. Random sampling could be employed to draw equal numbers from each stratum.

The sample consisted of children 8, 9 and 10 year of age. Studying children in this age group was important due to a void in the literature regarding causes of their nutritional problems. This age group was selected as an age group that could be considered a reliable source of their own dietary data. The physiological stability of these children, however, caused a limitation. Their slowed growth rates made differences in nutritional status more difficult to detect by methods employed here.

Dietary data were originally collected via a 3-day dietary record administered to the children as a homework assignment. As has been previously stated, these data were not useful for analysis due to lack of quantification and incompleteness of recording by the children. Although this methology was not useful for this study, it is believed that this method has potential for collection of dietary data from large numbers of children over a short period of time. Recommendations for the improvement of this methodology are the administration of the food record daily for three consecutive days as an in-class rather than a homework assignment. The failure of this method to provide data useful for nutrient analysis resulted in the use of one 24-hour dietary

recall to assess dietary intake and from which to calculate nutrient intake. The use of one 24-hour dietary recall is a major limitation of this study. Current recommendations are that a minimum of four 24-hour dietary recalls must be collected from each person for the dietary intake information to represent usual intake and account for daily variation (Food and Nutrition Board, 1982). Although the recalls were taken on different days of the week, it is possible that the day reported was non-representative of the child's usual intake.

During participant observation, food patterns and amounts of foods usually consumed were recorded in the field notebook. The training of the researcher in the administration of the 24-hour dietary recall and the use of food models for estimating quantities yielded information which was consistent with the recorded observations. However, the inability of children to recall their complete food intake with accurate quantities limits the interpretation of these dietary data (Sanjur, 1982).

Calculations of nutrient content of composite foods were based on recipes in a popular Ecuadorian cookbook generally accepted to be representative (Juanita, 1983). All soups and other mixed dishes contained meat. This was consistent with the mean monthly frequency of beef reported CA homemakers ($x = 22.3$ times per month; maxiumum = 30). Seventy-four percent of the sample reported daily beef

consumption. This is consistent with the fact whenever the researcher ate in CA, all soups contained meat.

Protein consumption for middle and upper class Ecuadorians exceeding that which is recommended has been reported (Murgueytio, 1980) and was observed by the researcher. The researcher noted that Ecuadorians of all socioeconomic classes have the concept that good nutrition means a high consumption of animal protein, particularly beef. Homemakers who did not include meat in their meal preparation may have been ashamed to admit it. Possibly, daily beef consumption reported by CA homemakers was actually no more than a bone proving bone broth for the soup rather than meat in the soup. The presence of meat in those meals in which the researcher participated can be attributed to the homemaker's anticipation of her participation.

The recipe method of nutrient calculations may be contributing to the high percent FAO/WHO recommended nutrient intake found for protein, iron and thiamin. If these composite dishes were prepared without meat, the protein, iron and thiamin content of these dishes would be reduced by 30 percent. Growth data for these children do not reflect a long term high level of protein intake. Had the CA children been consistently consuming a high level of protein, it should have been reflected in their height data with the sample distributing for more normally rather than with 61% falling into the 0-5 percentile range of height-for-age on the NCHS growth charts.

The Food Frequency Instrument assessed the use, non-use or the frequency with which various foods were usually consumed. Food frequency data have been found to provide meaningful descriptive information on food intake patterns. The food frequency is best utilized to measure the cultural aspects of the diet rather than to assess dimensions of nutrient intake (Campbell, et al., 1982). In this study, the food frequency instrument provided information on dietary patterns before and after moving to Quito. The dietary change instrument provided a partial food history to augment the information secured via the food frequency.

The use of forced-choice questions in the socioeconomic interview schedule were found to be appropriate for this population. Open-ended questions requiring conceptualization and abstract thinking were limited. The demographic data sheet was useful in yielding a profile of families in which the sample children resided.

Anthropometric data were collected via a spring-type bathroom scale and a tape measure. Although these simple instruments can sometimes be less accurate than more sophisticated ones, they were useful in this study because of their low cost, ease of transporting and simplicity. The limitations of the instruments were dealt with by calibrating the scale with a commercial weight, taring the scale after each measurement and utilizing a triangularly shaped wooden block along side the tape measure for height determinations.

Family Profile

The average family size for this simple was larger than either the 5.4 average family size reported to urban centers in Ecuador (Luzuriaga, 1979) or the 6.1 average family size reported for the Sierra region of Ecuador (Anonymous, 1983). As is true in Ecuador, most of these families were nuclear families (Weil et al., 1973). In 80 percent of these families the child's father was present and in 96 percent of these families the child's mother was present. Luzuraiga (1979) has reported high percentage of incomplete families among the poor people in the cities of Ecuador. Most of the families in CA, however, were families in which both the mother and father were present and in which both contributed to the functioning of the family unit. Most of these families, whether migrant or life-long Quito residents, were observed to be struggling for a better quality of life for themselves and their children. The family unit made an important contribution to this struggle by providing these families with identity, structure and a value system. Pity was expressed towards disrupted families who were viewed as less than ideal. The existence of strong nuclear families has been identified in other marginal urban communities in Latin America (Perlman, 1975; Lomnitz, 1977).

Most of the mothers of the sampled children where homemakers who spent the majority of their time involved in those tasks related to home and child care. Many mothers spent the morning preparing the major meal of the day,

taking this meal to their husband's work site and returning home to feed the children. The remainder of their days were spent washing, cleaning, marketing and going into town on errands related to family issues, husband's work or children's schooling. Of those mothers who worked, store owners usually had their stores connected to their homes and divided their time between the store and the home. Washer women, domestic servants, market women and brickmakers all worked on a daily basis, being away from home when the work situation demanded it. The rate of illiteracy of these women in CA was higher than the 7.6 percent illiteracy rate reported for urban women in Ecuador (Luzuriaga, 1979). This literacy rate, however, takes in all socioeconomic classes while the CA women were all members of the lower socioeconomic strata of Quito. Moench (1983) reported that nutritional studies in Colombia had found mother's educational level to be an important indicator of nutritional status. In Kenya which, like Ecuador, is a developing country, mother's education was shown to be the single most important variable in determining child survival (Mosley, 1983).

The fathers of these children were usually older than their wives and usually more educated. The majority of the CA fathers were away from home during the day, leaving the house before sunrise and returning after sunset. Most of the fathers were workmen or day workers working in construction or in textile factories. The artisans and craftsmen among them were tailors, carpenters and painters with small

businesses of their own. Those who worked in offices were lower level clerks or messengers. The role of the father was clearly imprinted in the minds of the children. Even though the actual contact time was limited, the father was regarded as the ultimate authority figure in the home.

Housing

Luzuriaga (1979) reported that housing units in the Sierra were more frequently rented than owned because of the high cost of construction materials. Seventy-four percent of the families in CA had purchased small plots of land in the neighborhood and built or were building their own homes. These findings are more consistent with recent findings that 67 percent of Quito migrants own their own homes (Anonymous, 1983). Housing data from studies conducted in marginal neighborhoods in Quito have shown that the construction materials are more permanent than those materials used in marginal neighborhoods in other areas (Luzuriaga, 1979). A cold climate is the main reason for this difference in housing construction materials between Quito and other large urban centers in South America. Although more costly and sturdier construction materials are used, much construction in CA was never finished and many homes remained partially constructed. The number of rooms was more related to the family income than family size. Overcrowded living quarters was as much a reality in CA as in other urban centers in Ecuador.

The urban poor initially live in marginal neighborhoods that lack all basic services but, with time, the population will secure these services (Luzuraiga, 1979). The people in CA secured electricity for the community in 1976. Through the demands of the community, water was piped into the community. There is no sewage system in CA and the neighborhood committees constantly work towards trying to secure one. Garbage was seen scattered throughout the community, along the streets, in the yards and, particularly, in the ravines. Many people complained about the garbage as an eye sore and a sanitation problem.

Gas was the fuel source most commonly used in Quito and was found to be the most common fuel source in CA. A 10 kilo gas tank cost about $2.00 to fill after a one time $10.00 cost to purchase the tank and hook-up. How often a family filled the tank depended upon the amount of cooking done. The tank fill-up ranged from once a month to once every 2-1/2 months.

Food storage facilities were varied. Regardless of the form of food storage, food storage was a problem. In both private homes and small grocery stores food was unwrapped and left out. Even those foods stored in cupboards or refrigerators were improperly prepared for storage. Flies and fruit flies frequently surrounded food items and homemakers reported cockroach infestations. Food spoilage in the Sierra is not rapid due to the cool climate, however, improper storage and lack of hygiene resulting in food

spoilage and food contamination was observed.

Migration

A limitation of this study was the distribution of migrants which resulted from a small sample size. Based on Jerome's criteria (see definitions), only 10 percent of these families were new migrants and 10 percent were recent migrants. The remaining sample was composed of settled migrants who, by definition, were assumed to be fully adapted to their new environment. This uneven distribution of new, recent and settled migrant families limited the between group comparisons of nutritional adequacy and nutritional status of school-aged migrant children.

A 1968 study of CA (Breihl, 1968) stated that the population of CA as 250 families. Both the local priest (Bruel, 1982) and the neighborhood president (Rundo, 1982) estimated the population of CA to be 500 families, which appeared to be a realistic estimate. If their estimates were correct, CA had developed and approximately doubled its population in the last 14 years. Sixty-eight percent of the sample were new or recent residents of Quito. Therefore, although CA had a population of incoming migrants and was estimated to have doubled in the last 14 years, it does not appear to be an original point of arrival for in-coming migrants. CA appears to be a neighborhood to which migrants moved after they had become partially adapted to the city, saved some money and were able to select a place where they wanted to live and build a home.

Although interviews with community leaders, school and health personnel and local clergy verified that CA had a large population of incoming migrants, these interviews did not reveal the secondary residence characteristic of CA. A sample survey yielding more precise information on the length of residence of CA migrants would have resulted in the elimination of this neighborhood as the research site and the subsequent selection of another neighborhood.

A recent study of marginal neighborhoods in Quito reported the length of residence for in-coming migrants in Quito (Anonymous, 1983). Table 17 compares the distribution found by these researchers and the length of residence found in CA. This comparison is further support that CA may be a secondary residence location for in-coming migrants.

Table 17: 1983 Reported Length of Residence for Quito Migrants (n = 722) Compared to Length of Residence of Cotocollao Alto Migrants, (n =63) Quito, Ecuador, June, 1983.

Length of Residence	1983 Report	Cotocolao Alto
0- 3 years	31%	5%
4-13 years	32%	29%
greater than 14 years	37%	66%

In this sample, 50 percent of those families who had migrated stayed with a friend or family member upon arrival. Kinship ties are reported to be an important adaptation factor for new migrants arriving in the city (Butterworth

and Chance, 1981). Again, the limitation of a small sample size in this study affected further examination of this variable. Because most of the families who had migrated were settled migrants residing in Quito more than 10 years, kinship ties at the time of arrival were not examined in relation to nutritional status.

Rivadeneira (1980) stated that two of the strongest motivators for rural to urban migration in Ecuador were better work opportunities in the city and better educational opportunities for their children. CA migrants also gave work as their major motive for migrating to Quito. A 1983 Ecuadorian study (Anonymous, 1983) on migration found that 80 percent of the migrants came to Quito to find work; the same percentage of CA migrants reported work as their motive for migration in this study.

Most of the migrant families in CA reported that they were satisfied with their lives in Quito. The questions about satisfaction with life in Quito did not ascertain if life was better in the rural or urban areas. It did, however, ask migrants to give their perception of their life in Quito relative to their perception of their life in the rural area. Ninety-six percent of the migrant gatekeepers in CA perceived the lives in Quito as being either satisfactory or happy. Even though the literature reports deplorable conditions of the urban slums (Perlman, 1975; Caliendo, 1979) and implies that health and nutrition status decline for migrants moving into the urban areas (Costa, 1971;

Basta, 1977; Ward and Sanders, 1980) migrants perception of their reality is different. Electricity in the home, water piped into the community and the availability of public transportation within the community are all amenities which are not available in many parts of rural Ecuador. There are more schools and more teachers in the urban education system, making public education more readily available to the children. A government health center over an hour away by public transportation may be shocking to city residents but is a luxury to someone from a rural area who may have had to walk 3 to 4 hours down a mountainside to the closest available health care.

It must be considered that not only is life in the city perceived to be better but that, in fact, life in the city may actually be better. In 1978, the number of land parcels in Ecuador with less than five hectares totaled 78 percent (Junta Nacional de Planificacion, 1974a). A 1975 employment study (Prealc, 1975) stated that 25 percent of the rural labor force were landless and potential migrants. If these migrants are from among those who were landless in the rural area or had insufficient land holdings for subsistence then, indeed, these people are better off in a marginal urban area where they are underemployed and live with minimal services.

Dietary Data

The limitations of the 24-hour dietary recall and the cookbook method of nutrient calculation restrict the

interpretation of the results. The one 24-hour dietary recall is possibly non-representative of the child's intake. The calculations of nutrients for mixed dishes utilizing a popular cookbook may have introduced an error in the estimation of meat consumption. If there is a systematically biased error introduced by this method of nutrient calculation, then the relationships of nutrient intakes of one child to another child would be true even though intakes would be high. If indeed, these dietary recalls reflect actual usual intake, then these children are consuming high quantities of protein, iron and thiamin. Such high intakes of protein, iron and thiamin, however, were not reflected in the children's growth measurements. A recent study of 7-year-old boys from low income families in La Paz, Bolivia found equally high means percent intakes of protein when comparing the nutrient intakes to FAO/WHO. For recommended Nutrient Intakes (Moreno-Black, 1983), however, no explanation was presented.

If CA is a secondary residence for in-coming migrants and the majority are home owners, then this population can be considered upwardly mobile, meaning that they would be making a concerted effort to emulate dietary patterns considered typical among middle and upper class Ecuadorians, ie, high beef consumption. Among those 24-hour dietary recalls with exceptionally high (more than 166%) reported protein intakes, meat and beans had been consumed in the same day. Beans and meat at the same meal is a common dietary pattern

among middle and upper class Ecuadorians. Beans and meat at the same meal would be a new dietary pattern for this population and, hence, is not yet reflected in the growth of their children. Sixty-one percent of these children fell below the 5th percentile of the NCHS height-for-age standard and 51 percent fell below the 5th percentile of NCHS weight-for-age standard.

Energy. Major carbohydrate sources of energy for these CA children were potatoes, rice, spaghetti, bread and bananas. Protein sources of energy were meat, eggs, milk and beans. Fats in their diets were limited, came mainly from use in food preparation and were either vegetable oil or lard. Energy requirements were mainly satisfied by the consumption of large quantities of carbohydrate rich foods. Based on data from the 24 hour dietary recall, a child in this sample consumed 1 to 1-1/2 cups of rice at a meal. Mixed soups would also be consumed in 1-1/2 to 3 cup servings by these children.

Although, the effect of mother's education was eliminated when examined in conjunction with other variables, the existence of a weak correlation between mother's education and energy intake and the higher mean energy intake for children whose mother's had attended school is important. The relationship between mother's education and the health status of her children has far reaching implications for health and nutrition policy in the developing world. Health policy planners must join forces with education planners to

insure that young girls have equal access to education and that health and nutrition information is included in the basic primary school curriculum. The importance of this relationship has been demonstrated by other researchers (Moench, 1983; Moreno-Black, 1983; Mosley, 1983).

Protein. While protein rich foods do provide calories for the diet, they also serve a more important and complex function. Amino acids are incorporated with other nutrients into body proteins that replace tissue that has been broken down and forms new tissue during growth. Cell walls and various membranes are composed mainly of protein. Enzymes, hormones and antibodies are proteins. Protein rich foods are, thus, an essential component of the diet, especially for growing children (Goodhart, 1980). As has already been noted, the recorded protein intake for this sample was high and should be reflected in their growth rate. Because height and weight were measured at one point in time, it is not possible to make statements about these children's rate of growth. Longitudinal data would have to be obtained to ascertain the affect of intake on the rate of growth. The CA children would have to be measured at two points in time with a year long interval between measures. The difference between the two measures could then be calculated to show the rate of growth (Healy, 1978).

Protein foods most commonly consumed by CA children were meat, milk, eggs and beans. Other foods making a contribution to protein nutriture were grains.

Iron. Meat and beans made the major contribution to iron intake among this sample of CA children. Some contribution to iron intake was made by greens and some was made by grains. If the meat intake of these children was over estimated through the use of the recipe method, their iron consumption was calculated higher than it actually was. Sex was found to be a significant predictor of iron intake for this population with girls having higher intake than boys. Per capita food expenditure was related to iron intake. Iron intake was found to decrease with increased food expenditure but increased again after food expenditure reached a higher level. This can be explained by the consumption of home grown greens and beans by those at the lower end of the per capita food expenditure scale, with those in the middle ranges neither purchasing nor growing iron rich foods and those at the upper range purchasing more iron rich foods.

Calcium. Milk and milk products made major contributions to calcium nutrition of these children with some contributions being made by greens. Although the mean percent calcium intake of the FAO standards was 84 percent, 44 percent of these children were receiving less than 66 percent of their calcium recommendation. Because calcium functions with phosphorus in the synthesis and remodeling of the skeletal tissue, low intakes of calcium could result in decreased rates of growth.

Vitamin A. Major sources of vitamin A for this sample were juices made from tree tomatoes, oranges and papaya.

Avocados, oranges, tangerines, bananas and plantains were a second major source of vitamin A. Soups containing carrots and seasoned with parsley and fresh corrainder added minimally to vitamin A intake. Milk and egg consumption also made some contribution to the vitamin A nutrition of these children. Vitamin A intake would vary seasonally with fruit consumption, increasing during mango season when this fruit is inexpensive, readily available and frequently consumed. Sixty-nine percent of these children consumed less than 66 percent of their daily recommendation of vitamin A putting them at nutritional risk with regard to this nutrient. The lack of vitamin A in the diets of Ecuadorian families may result from a lack of education as to the importance of this nutrient and which foods would supply it, rather than a lack of availability or affordability of vitamin A containing foods.

Riboflavin. Milk, meats and beans contributed significantly to the riboflavin intake of these children. Fava beans are an important source of riboflavin and were consumed by these children. Riboflavin intake was found to be affected by the sex of the child, per capita income and per capital food expenditure in families where both parents had migrated. Further interpretation of these results is not merited due to the questionable nature of the dietary data.

Thiamin. Meat and beans were those foods making major contributions to thiamin in the diet of these children. If the calculations of meat in the diet are high, then thiamin

intake was recorded higher than it actually was.

Anthropomentrics

Weight and height were measured and compared to the NCHS (1976) standards for boys and girls. This standard is currently recommended by WHO as an acceptable international standard and has been recognized by the Ecuadorian Ministry of Health for official use in Ecuador. This comparison found 51 percent of these children to be below the 5th percentile weight-for-age and 61 percent below the 5th percentile height-for-age. The skewed nature of this distribution which concentrated most of the sample at one end of the growth chart made it necessary to examine these anthropometric variables in another way. Researchers have recommended the use of z-scores for the presentation of anthropometric data (Waterlow, et al., 1977; Krick, 1982). The z-score allows the researcher to locate each observation on the normal curve in terms of its number of standard deviations from the center of the curve (Johnson, 1976). Often this method is employed by obtaining the mean and standard deviations from the National Center for Health Statistics/ Center for Disease Control which reports height, weight and weight/height by age and sex according to percentiles and notes upper and lower standard deviations (NCHS, 1976). Values for individual points are published by age and sex from the 5th to the 95th percentile, however, are unavailable at either extreme. Waterlow et al., (1977) has stated that in populations where large numbers of children are

outside the range of the reference population they cannot be accurately classified by percentiles. Garn et al., (1983) used country specific z-scores to compare statural attainment of fat and lean individuals in Central America. Taking the six Central American countries as a whole, but using country specific normalized z-scores, Garn et al. found that fat boys and girls in the 8-12 year age range averaged 0.5 z-scores taller than their lean peers. This trend was repeated in direction for Central American adolescents and adults.

Neither the methodology of comparing these data to an international standard nor calculating z-scores based on the NCHS standards was feasible for this study. Weight and height data were, thus, examined by calculating a z-score for each child as he or she distributed around age and sex specific means of the sample itself. This methodology yielded a normal distribution for children's heights and a positive z-score for weight for more than 50 percent of the children.

The question of whether all child populations throughout the world have the same genetic potential for growth is unresolved. Mueller and Titcomb (1977) examined the genetic and environmental determinants of growth in a rural Colombian population and found parent-child correlations similar to those in well nourished Colombian populations concluding that heritability is not reduced by malnutrition. Garn (1962), advocating growth standards for children based

on their parents maximum growth, as stated that parental build may be the chief determinant of offspring growth in well-nourished populations but that nutrition may play a more important role where caloric insufficiency exists. Newman (1975) hypothesized that environmental factors might override genetic factors affecting growth in lower class Guatemalan children. Martorell (1982) looked at the effect of genetics and environment on growth by comparing anthropometric data from numerous international studies involving children for all socioeconomic classes. He concluded that for the most part low stature is evidence of wretched conditions of poverty, malnutrition and disease to which a population has been exposed for many generations.

Another factor possibly affecting the growth potential of this sample of Ecuadorian children is the high altitude environment in which they live. Mueller et al., (1980) studied growth and development in a hypoxic environment in Bolivia and Chile and found growth retardation at high altitudes apparent for height, weight, transverse chest and arm circumference but found that high altitude children exceeded coastal children in anterior-posterior chest measurements at most ages. These researchers concluded that hypoxia may induce differential growth acceleration of anatomical features related to oxygen transport (chest) and diminution of linear and soft tissue measurements. Variations in soft tissue measurements of high altitude populations suggest difference in socioeconomic and related

factors. If the growth pattern exhibited by the z-score analysis in this study is accurate, these children distribute around their own age and sex specific means in such a way that the majority of the sample is within a normal range, with a small percentage of the sample at either extreme. If the analysis of these anthropometric data had ended with a comparison to an international standard, we would have been forced to conclude that this was a sample of children suffering from both past and present malnutrition. The z-score separates those children who are within a normal range in relation to each other and those who have deviated from their own norm. It may be more realistic to focus on those children at either extreme of the z-score scale as being those children with nutritional problems. Taking into consideration possible genetic factors, the hypoxic environment in which these children live and the long-term environment of poverty, population specific z-scores are a more accurate means of assessing the growth of these children.

Weight-for-height as compared to the NCHS standards found the largest percentage of these children to be within the 25-75 percentile range, indicating that when age expectations of growth were disregarded, most of these children had a satisfactory weight for their height. This could be evidence of past malnutrition which has been alleviated or as many researchers have suggested (Garn, 1962; Newman, 1977; Martorell, 1982) it may be evidence of a population

that has experience poverty, malnutrition and disease for generations.

A weight/height index was calculated to yield a single observation that could be utilized as a dependent variable in the regression analysis. Weight divided by height was selected from those indices available as one of those least biased by height (Lee et al., 1981). Per capita income and sex were the only variables found to explain differences in the weight/height index within this population. Girls were found to have higher weight/height indices than boys. Because part of the sample was already 11 years old at the time of measurement, it is possible that some of the girls had already begun their pre-puberty growth spurt whereas the boys had not. If these girls had, in fact, begun the pre-puberty growth spurt, their nutrient needs would also have increased, possibly explaining the consistently higher nutrient intake of female children.

The findings related to per capita income as a predictor of child growth supports statements by Ecuadorian researchers (Rivadeneira, 1980; Chauvin, 1983) that income is the single most important factor affecting the nutritional status of children in Equador. Independent of whether children are rural of urban or how long their families have lived in the city, an increase in the families income can mean a more adequate diet and better nutritional status for the children.

Dietary Change and Migration

A number of significant differences in rural and urban food consumption for the same person were found (Table 13, p. 81). Differences in present food consumption patterns between persons who had migrated and persons who had not migrated had no more significant results than could be expected from performing 104 t-test (Table 14, p. 83). When between 100-105 t-tests are run, 5 of those tests will be at or below the $p \leq .05$ level regardless of the data (Snedecor and Cochran, 1980). Overall, this indicated that migration from rural to urban areas in Ecuador affected the dietary patterns of the migrating families and that they adapted completely to the dietary patterns of their urban counterparts. Further interpretive analysis of these data revealed certain patterns of change which could have an effect on nutritional status of migrant children. Dietary patterns which emerged from this analysis will be presented.

In the process of nutritional adaptation, Kolasa (1974) has identified three categories of changes in dietary patterns: those changes which have a potentially positive effect, those changes which have no effect and those changes which have a potentially negative effect. Discussion of these dietary trends related to migration will be summarized in light of these categories for nutritional adaptation.

1 - Decreased whole grain consumption, replaced by refined grains and refined grain products. Corn consumption, in all those varieties in which it has traditionally been consumed, barley and barley flour consumption decreased. These products are indigenous foods, grown and eaten by subsistence farmers in the Ecuadorian Sierra. Migrants eat less of these traditional grains and begin consuming the "city" grains and grain products: bread, rice, spaghetti. Rice is not grown in the Sierra but is grown in the costal region of Ecuador and brought up to the Sierra. In the recent years, Ecuadorians have come to include rice as an essential part of the any meal (Chauvin, 1983). Bread has replaced toasted barley flour consumption at breakfast and afternoon snacks. Rice and spaghetti have both replaced barley and corn use in the traditional mid-day soups.

Cornstarch consumption increased. Cornstarch is prepared as a thick gruel replacing other gruels which may be made of barley flour, pumpkin or, possible, bean flour.

Grain products such as bread, rice and spaghetti utilized by these homemakers were not enriched products, hence those nutrients lost in the refining process were not replaced. This change from whole grains to refined grains and refined grain products results in a dietary loss of micronutrients and a lower fiber intake. Even though fruit and vegetable consumption was increased (see below), there would be a net decrease in total dietary complex carbohydrates due to the fact that the grain consumption changes were major

while the fruit and vegetable consumption changes were minor. Diets low in complex carbohydrates may increase the risk of heart disease, diabetes and obesity (Select Committee on Nutrition and Human Needs, 1977).

2 - Increased fruit and vegetable consumption. Consumption of swiss chard, tomatoes, onions, scallions and lettuce was increased by frequency of consumption. Green beans, cucumbers and radishes were new foods incorporated into the diet for the first time. First time incorporation into the diet also explains the significant difference in consumption of pears, apples, andean cherries, passion fruit, babaco and grapes. These were unavailable to people in the rural area either because of cost or limited supply. The increased fruit and vegetable consumption, for the most part, represented an increased complexity of the diet, i.e., inclusion of foods not previously eaten. The evidence of the diet increasing in complexity and diversity with increased urbanization has been previously documented (Chassy et al., 1967). Although, these foods were not incorporated into the diet with great frequency, their sometime incorporation and the number of foods added should effect both vitamin A and vitamin C nutrition. Vitamin C nutriture in Ecuador is rarely at risk and most people exceed their recommendation for this nutrient. However, vitamin A deficiency in Ecuador has been frequently reported and this study found vitamin A to be the most limiting nutrient in the diet, with 69 percent of the children ingesting less

than 66 percent of their recommended intake for this nutrient.

3 - Increased use of sugared foods such as cookies, candies, colas and ice cream. Homemakers reported a marked increase in the frequency with which their families consumed sugared foods such as cookies, candies, colas and ice cream. Ice cream was often found to go from never being consumed in the rural area to daily consumption in the urban area. Ice cream is easily purchased at the small neighborhood stores for the equivalent of a few pennies. The ice creams are sometimes prepared with flavored water, sometimes with flavored watered down milk and are always very sweet. Their major contribution to nutriture would be calories rather than calcium and protein.

Cookies, candies and colas are also bought at the neighborhood stores and purchased at recess time by the children during the day. These foods are status foods and are purchased for a few sucres. Parents frequently give children money to purchase snacks during school recesses. Although, each individual expenditure for a sugared food may be small, it is done daily by all family members, making the overall cost to the family high.

"Panela" or crude brown sugar cakes are the traditional sweetener in the rural areas of Ecuador. Homemakers indicated reduced use of this sweetener in the urban area. Many abandoned its use completely and replaced it with the use of refined white sugar. This change would be of little

nutritional consequence, although there are some trace vitamins and minerals in the crude brown sugar that are no longer found in the refined white sugar. Mainly this change, indicated an overall increase in the use of sweetener because white sugar is easier to use than brown sugar cakes. White sugar is used daily in most homes in coffee and teas and in homemade fruit juices. Homemade desserts were not common among these families and those which are valued, like fig preserves, were made with panela.

Sugars, especially foods that contain sticky forms of refined and processed sugars have been implicated in tooth decay (Select Committee on Human and Nutrition Needs, 1977). The most important problem resulting from the increased consumption of sugared foods is the danger in displacing complex carbohydrates which are valuable sources of micronutrients with refined sugar which is essentially an energy source with little additional nutritional value (Mayer, 1975).

4 - Decreased use of milk. Milk consumption in the rural area frequently meant a family cow or milk purchased inexpensively from a nearby family or relative. All milk in the city must be purchased. Most of it is carton packaged milk purchased daily in the small neighborhood grocery stores. Milk is most often consumed in coffee by using one full cup of hot milk and a teaspoon of instant coffee. it is also added to soup for flavor and consistency.

Forty-four percent of the sampled children consumed less than 66 percent of their recommended nutrient intake for calcium when compared to FAO standards, and, as previously stated, this low calcium intake could have a deleterious effect on growth especially during critical periods of growth. At between 15 and 18 sucres a liter, economics should not limit milk consumption for these families. Most of these families spend more in colas, ice creams, cookies and candies in a one-week period than it would cost to purchase a liter of milk a day. A well designed educational program to promote milk consumption as essential to child growth could affect the calcium intake of school-aged children.

5 - Decreased use of granulated salt, replaced by iodized salt. Endemic goiter and cretenism has been a major nutritional problem in Ecuador (Greene, 1973; Rivadeneira, 1980; Murgueytio, 1980). The 1968 iodized salt law made this product available to the public but it has been reported that the use of iodized salt is not common in remote rural areas and that there hasn't been a sufficient education campaign to promote its use (Freire, 1983).

Moving to the city made these homemakers more aware of the availability of the iodized salt and more aware of the importance of using this product. The use of iodized salt daily provides sufficient iodine in the diet to prevent goiter and cretenism. This change in dietary pattern makes a large contribution to the nutritional well being of the

Ecuadorian population. Better distribution of the product in the rural areas is called for as is an educational program directed at rural homemakers to encourage the use of iodized salt.

6 - Decreased use of traditional animal protein sources, replaced by beef, fish and shellfish. The use of pork, guinea pig and rabbit decreased significantly with migration. The significant increase in fish and shellfish represents families eating a food sometimes which they had never before eaten. Neither fish no shellfish make a significant contribution to the protein intake of these families. Pork, guinea pig and rabbit have virtually disappeared from these families' meals and all have been replaced by beef consumption. Chicken as a source of animal protein has remained fairly constant, appearing on the family table approximately once a week.

While this change would have little nutritional consequences, it is a change in dietary pattern which merits discussion. Of primary importance, this change results in an increased cost for animal protein in the urban areas than in the rural areas. All three traditional sources of animal protein are cheaply available in the rural area. Pigs are raised around the house, guinea pigs are raised under the hearth and the rabbits are caught wild. There is little cost in raising these animals as they are fed the refuse from the human table. Beef, however, always involves a cost. Because these families have increased their incomes

by moving to the urban area and decreased their ability to raise animals or catch them wild, this is a logical change. Another consequence of this dietary pattern change is lack of variety in the diet resulting from replacing three animal protein choices with one animal protein choice.

7 - Decreased consumption of those foods considered to be "Indian" or low status foods. Foods native to the Andeas and considered indigenous are appearing with less frequency on the tables of urban and rural Ecuadorians, as well. Summer squash and pumpkin are both considered to be the food of the rural poor and their consumption is abandoned as soon as possible. Toasted barley flour or "Machica" was the traditional breakfast food of the Quechua Indian of the Ecuadorian Sierra. It is difficult to get in the city whereas bread is both cheap and readily available. Corn is eaten in the rural areas in a number of varieties ranging from corn on the cob to hominy corn. This grain is also associated with Indian dietary patterns and is decreased when families move to the city.

A move away from traditional dietary patterns is a consequence of urbanization and industrialization. The market becomes saturated with packaged foods which are associated with progress and increased status. These foods are attractive because they are easier and faster to prepare. These changes in dietary patterns are not negative or positive but all changes must be weighed as a whole.

Table 18 summarizes these migration related dietary changes and their potential effect on nutritional status. Increased fruit and vegetable consumption and the increased use of iodized salt have a potentially positive effect on the nutritional status of the migrant child. The reduction in whole grain consumption replaced by refined grains and grain products, the decreased milk consumption and the increased use of sugared foods can be regarded as changes which could have a potentially negative effect on the nutritional status of migrant children. The change in the source of animal protein and the decreased consumption of Indian foods would have no effect on nutritional status.

It is important to examine the total dietary pattern as it relates to the nutritional status of the migrant child and remember that one food or one dietary change cannot be implicated in nutritional status. The interrelationship between these changes produces an effect that combines positive, neutral and negative affects. The migration of families from the rural Sierra to the city of Quito does produce changes in food consumption that affect dietary adequacy and, therefore, potentially affects the nutritional status of migrant children.

The change from growing food to purchasing food is a factor mentioned as causing nutritional stress to migrating families (Calinedo, 1979). The presence or absence of nutritional stress in a migrating family would depend on the families' premigration rural circumstances. Families with

Table 18: Migration related dietary changes and their potential affect on nutritional status of children

Dietary Change	Potential effect on Nutritional Status
Decreased whole grain consumption, replaced by refined grains & refined grain products	Reduction of riboflavin and thiamin intake Reduced fiber intake Increased risk of heart disease, diabetes and obesity
Increased fruit and vegetable consumption	Increase in vitamin C & vitamin A intake
Increased use of sugared foods	Increased dental decay Displacement of complex carbohydrates
Decreased use of milk	Decreased calcium intake
Increased use of iodized salt	Increased iodine intake Reduced incidence of goiter & cretenism
Decreased use of traditional animal protein sources, replaced by beef, fish and shellfish	No Effect
Decreased consumption of "Indian" foods	No Effect

insufficient land or no land in the rural area who have obtained employment in the city might not undergo nutritional stress due to migration. If the homemaker was from a remote rural area, food which was grown or raised would have comprised all that was available to feed her family. In the city, where she purchased food, greater choices would be available to her.

Changes in fuel sources meant an increase in expenditure for fuel in all cases. The change from wood to another source such as gas or kerex meant a reduction in cooking time. This change from wood to gas could also have health implications since many rural residents suffer from respiratory problems related to smoke inhalation.

Food in the rural areas was stored longer because the entire crop of harvested tubers and grains was stored for family use. Shelves versus boxes, barrels or baskets kept on the floor would reduce food infestation by vermin and insects. Many additional changes are still needed in food storage techniques in order to provide a safer food supply for these families.

Viewed as a whole, these changes affected the role of the family's food system gatekeeper. The change from whole grains to refined grains reduced the meal time preparation. The change in fuel source further reduced cooking time and relieved the woman from the chore of collecting wood. The change from growing food to purchasing food reduced the time necessary for food acquisition. The change away from

traditional protein sources represents a change from raising to purchasing animal protein sources further reducing a woman's food acquisition time.

Ninety-six percent of those homemakers who migrated reported satisfaction or happiness with their lives in Quito. Changes in dietary patterns and dietary customs due to rural to urban migration resulted in the decreased drudgery of the gatekeeper's work and in the time needed to fulfill her feeding obligations to her family, without threatening her primary role as wife and mother. These changes are believed to be primary contributors to the gatekeepers satisfaction with her post-migration life in the city. Figure 7 depicts the relationship between changes in dietary patterns and customs due to migration and the gatekeepers satisfaction with life.

Sims et al., (1972) assessed the qualitative facets of family life by measuring the mother's social-psychological attributes. The mother's self-concept contributed to the mother's social-psychological attributes which was a factor influencing the nutritional status of the child. A mother who is satisfied with her life would provide better care for her children that could indirectly influence nutritional status. Many other factors impacting the lives of these migrating gatekeepers would have to be examined before this statement could be proven.

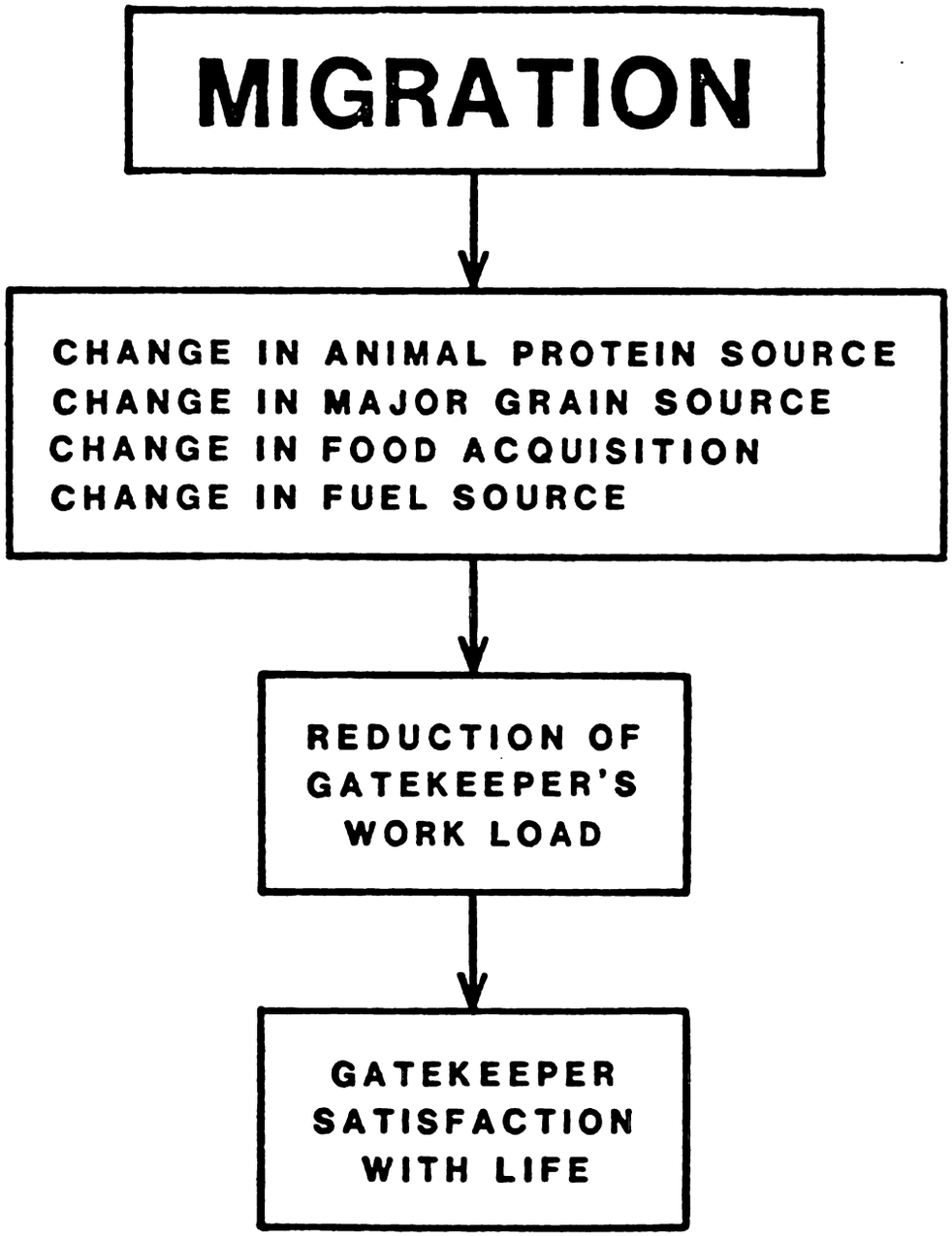


Figure 7. The relationship between migration related dietary pattern changes and gatekeeper satisfaction with life.

VII. SUMMARY, IMPLICATIONS & RESEARCH RECOMMENDATIONS

SUMMARY

The objective of this study was to examine the relationship between the nutritional status of school-aged migrant children and their families' length of residence in Quito, Ecuador. A small sample size resulted in an uneven distribution of new, recent and settled migrants limiting the between group comparisons of children's nutritional status.

No relationship was found between length of family residence and the children's dietary adequacy as determined by calculations and their intakes of energy, protein, iron, calcium, thiamin, riboflavin and vitamin A. Percent means of the 1974 FAO/WHO Recommended Nutrient Intakes adjusted for sex and age were all greater than 50 percent, although the range was wide with 30 percent or more of the children found to consume less than 66 percent of their daily recommendation for energy, calcium, vitamin A, riboflavin and thiamin. The use of only one 24-hour dietary recall to obtain dietary data limited the interpretation of the results.

A linear relationship was found between the weight of the child and the length of family residence in Quito, with

an interaction effect of the number of parents migrating (none, one or both). When the sample was stratified by number of parents migrating to examine the interaction, no effect of length of residence was found. Age was the only variable linearly related to height. Sex was found to be a predictor variable for weight/height ratio, with females having a higher mean index than males. When one family with unusually high income was removed from the sample, the weight/height ratio was linearly related to income. showing an increase in the weight/height ratio of approximately .04 for every 1000 increase in income. This weight/height ratio and income relationship indicates that as the family's income increases, the child's weight-for-height also increases. Rivadeneira (1980) examined nutritional studies in Ecuador and concluded that nutritional status of children was more dependent on the economic situation of the child's family than on any other factor. These data support the conclusion that economic factors are the most important predictor of the nutritional status of children. Regression analysis showed income to be the only significant predictor of the weight/height ration for the CA children.

A number of significant differences in rural and urban food consumption were found for the same person. No difference in present food consumption patterns were found between those persons who had migrated and those persons who had not migrated. Indications were that migration from the rural to urban areas in Ecuador affected the dietary patterns of

migrating families and that they eventually adapted completely to the dietary patterns of their urban counterparts. Further interpretive analysis of these data revealed patterns of change which could affect the nutritional status of migrant children. Increased fruit and vegetable consumption and increased use of iodized salt were found to be adaptations with a potentially positive effect on nutritional status. The change from complex grains to refined grains and refined grain products, the decreased consumption of milk and the increased consumption of sugared foods were found to be adaptations with a potentially negative effect on nutritional status. The change in the source of animal protein and the decreased consumption of Indian foods were adaptations found to have no effect on nutritional status.

Other major changes in dietary patterns were a change in cooking fuel source and a change from growing to purchasing food. The combined changes in dietary patterns reduced the female work load as she migrated from the rural to the urban area. The relationship between migration related dietary changes and the gatekeepers' overall satisfaction with life was demonstrated (Figure 7, page 133). The gatekeepers satisfaction with life on child care and, therefore, directly on nutritional status of the child can only be postulated.

IMPLICATIONS

Although the literature reports deplorable slum conditions in cities in the developing world that may, in fact, be deplorable; they may also be less deplorable than condition in the rural areas. Regardless of the conditions of the cities slums and squatter settlements, as long as life in the city is perceived to be better than life in the countryside, migrants will continue to leave the rural countryside for the bright lights of the city.

The Ecuadorian government is aware of the strain which the migration process is putting on both the urban and the rural areas, and can choose many directions to slow this process. Money for research that will increase agricultural productivity needs to be provided. Farmers need to be given incentives to try new varieties, new crops and new farming methodologies. Because the decentralization of industry can function as a deterrent of out migration, small industries to generate income in the rural areas need to be identified. More credit and loan opportunities need to be made available for small businesses and small farms. Improvement of basic services in the rural areas, such as water, electricity, education and health, is critical to slowing down the process of our migration from the rural Sierra to Ecuador.

The interaction of internal migration and nutrition is far too complex for a better-worse hypothesis. Migration does result in changes in dietary patterns. Some of the changes are positive adaptations, some are neutral and some

are negative adaptations. Nutrition education programs are needed in both the rural and the urban areas. In the rural areas, particular emphasis should be placed on the consumption of iodized salt and the increased consumption of fruits and vegetables. The maintenance of traditional dietary patterns such as whole grain consumption, complementary protein consumption and the use of indigenous protein sources make a positive contribution to nutritional status and need to be encouraged. In the urban areas, there is a need to perpetuate the trend towards increased fruit and vegetable consumption. Increased consumption of calcium rich foods for growing children needs to be promoted. Nutrition educators need to create programs that will counter the effect of large scale advertising promoting the consumption of sugared foods such as colas, cookies, candies and ice creams. Following Rody's (1977) model in the Western Caroline Islands, the people's own pride in indigenous Andean foods could be developed to promote the consumption of these foods and to decrease consumption of pre-packaged, readily available sugared foods.

Impact could be made on the nutritional status of migrant and non-migrant school-aged children through the Ecuadorian school breakfast program. Stricter provisions need to be made for the control of food included in the school breakfast. Education needs to be provided to school personnel as to the needs of the children and the nutritional value of foods provided.

RECOMMENDATIONS FOR FUTURE RESEARCH

1 - The 3-day dietary record as an instrument for the collection of dietary data from school-aged children needs to be further researched. The number of days recorded and the Food and Nutrition Board's recommendation (1982) of a 4-day record needs to be considered. Various means of administering the dietary record within the school environment need to be examined. A high level of researcher involvement is recommended.

2 - Further examination of length of residence needs to stratify the sample by length of residence and random sample within each group.

3 - Research is needed to examine those factors which interact with the migration-nutrition relationship and affect its course. Factors causing variance among migrating families of similar socioeconomic levels and variance among rural families of similar economic levels need to be identified. Studies of greater depth need to be done to develop a model of the internal migration-nutrition status relationship. A matched sample of brothers, one who migrated and one who remained in the rural area is suggested. In depth data should be collected on socioeconomic and demographic variables and attitudes and beliefs as well as dietary and anthropometric data for assessment of dietary adequacy and nutritional status. Previous studies have focused on either the urban or the rural side of the relationship. There is a need to look at both sides simultaneously in a well designed

research project that can be analyzed to explain variance among urban families, among rural families and between rural and urban families.

APPENDICES

APPENDIX A

THREE DAY DIETARY RECORD FORM, TWENTY FOUR HOUR DIETARY RECALL FORM AND ANTHROPOMETRIC DATA RECORD SHEET

PROYECTO: Estado Nutricional de Niños Escolares: Cotocollao Alto. BSW.

REGISTRO DE ALIMENTOS

NOMBRE _____

ESCUELA _____ GRADO _____

FECHA DE NACIMIENTO _____ EDAD _____

NOMBRE DE JEFE DE FAMILIA _____

DIRECCION _____

BARRIO _____

INSTRUCCIONES:

1) Apunte todos los alimentos consumidos durante los 3 días del deber.
2) Durante los 3 días del deber, midan sus comidas como hemos aprendido hacer en la escuela, usando tasas, vasos y cucharas.
3) Si la comida combina varios alimentos, es necesario apuntar los ingredientes.
4) Si no come en el desayuno, el almuerzo o la merienda, indicar apuntando la palabra "nada".
5) Es importante apuntar todo lo que se come y no olvidar nada, incluyendo caramelos, galletas, colas, etc.
6) Es también importante que no apunte la comida que usted no ha consumido.
7) Sea siempre honesto. Este deber es confidencial y reservado. Nadie más conocerá sus respuestas.
8) Indique, por favor, como ha medido las comidas:

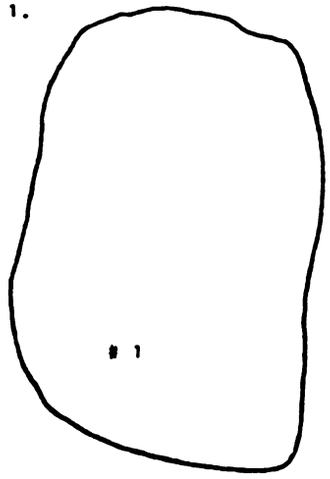
Yo medí mi comida usando: (escoje una alternativa en cada columna).

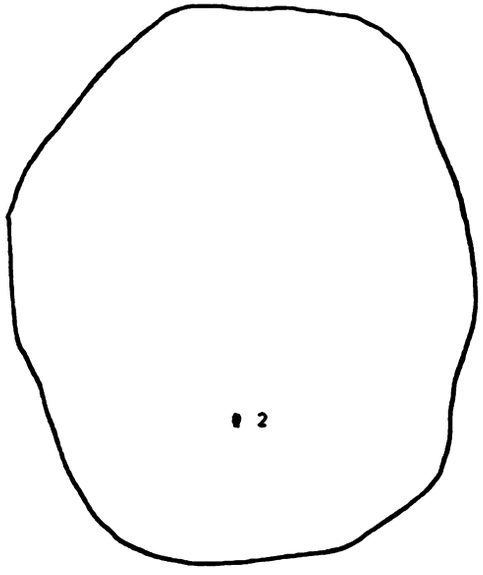
_____ Una tasa de porcelana, sin oreja
_____ Una tasa de porcelana, con oreja
_____ Una tasa de loza
_____ Una tasa de plástico

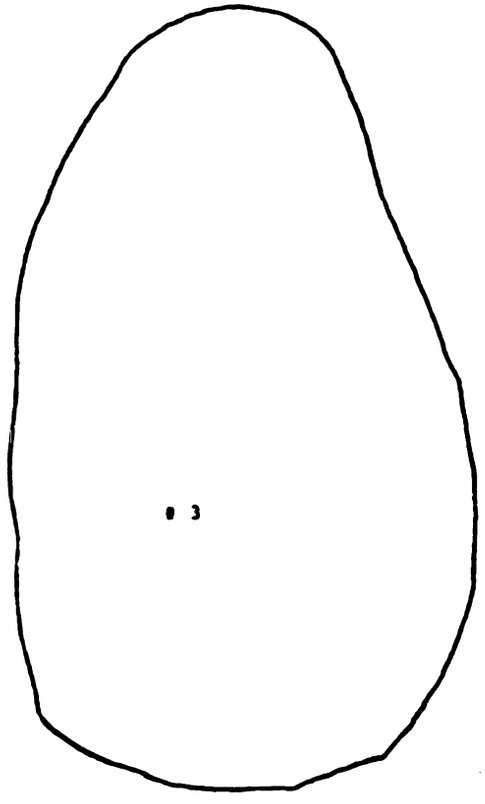
_____ Una cuchara de metal
_____ Una cuchara de palo.

Indique, por favor, usando los números de estos dibujos, el porte del pedazo de carne o pescado consumido:

Ejemplo: Un pedazo de carne, # 1.







PROYECTO: Estudio Nutricional de Niños Escolares: Cotocollao Alto PSW NOMBRE _____

FECHA DE HOY _____ DIA DE SEMANA _____

	ALIMENTOS	CANTIDAD	NO APUNTE EN ESTAS COLUMNAS Kc	P	C	T	R	I	C	A
DESAYUNO										
ENTRE DESAYUNO Y ALMUERZO.										
ALMUERZO.										
ENTRE ALMUERZO Y MERIENDA.										
MERIENDA.										
ENTRE MERIENDA Y ANTES DE DORMIR.										

(Form 1A)
English Translation of 3-Day Dietary Record

Name

School - Current Grade

Birthdate - Age

Head-of-Family Name

Address

Neighborhood

Directions

1) Write down all foods consumed during the 3 days of the assignment.
2) During the 3 days of the assignment, measure your food as you have learned to do at school, using cups, glasses and spoons.
3) If a dish contains many different foods, please write down the ingredients.
4) If you do not eat breakfast, lunch or dinner, please note this by writing "nothing" in the appropriate space.
5) It is important to write down all that you consume and not to forget anything, including candies, cookies, colas, etc.
6) It is also important not to write down foods which you did not consume.
7) Always be honest. The information obtained from this assignment will be kept confidential. No one else will see your answers.

(Form 1A)
English Translation of 3-Day Dietary Record (Continued)

8) Please indicate how you measured your foods: I measured my foods using (Check one alternative in each column)

enameled cup, no handle	a metal spoon
enameled cup, with handle	a wooden spoon
a porcelain cup	
a plastic cup	

Page 2

Please indicate using the numbers on these drawings, the size of any piece of meat you consume:

Example: One piece of meat, #1

Page 3 (Utilized in triplicate; one page for each day of the record)

Name

Date - Day of the Week

Column across reads: - Foods - Quantities - Do not write in these columns

Column down reads: Breakfast

Between breakfast and lunch

Lunch

Between lunch and supper

Supper

After supper and before you go to bed

1B

PROYECTO: Estado Nutricional de Niños
Escolares : Cotacollao Alto.

FICHA ANTROPOMETRICA

NOMBRE DEL NIÑO

NOMBRE DEL JEFE DE FAMILIA

ESCUELA GRADO

FECHA DE NACIMIENTO

DOCUMENTOS PRESENTADOS

- Partida de Nacimiento
- Partida de Bautizo
- Información Paterna
- Verificado

OTRO: _____

Edad en meses

Estatura en cm

Peso en gramos

(Form 1B)

English Translation of Anthropometric Record

Anthropometric Record

Name of the child

Name of the Head of Household

School - Grade

Date of birth

Documents presented

Birth certificate	Age in months
Baptismal certificate	Stature in centimeters
Parental information	Weight in grams
Verified	
Other	

Proyecto: Estado Nutricional de Ninos Escolares: Cotocollao Alto

Codigo _ _ _ _
Formulario: 1C

Nombre_____

Dia de Semana_____

Vamos recordar juntos todos los alimentos, comidas y bebidas consumidos por usted en las ultimas 24 horas. Empezaremos por recordar la ultima cosa consumida por usted.

	ALIMENTOS	CANTIDAD	NO APUNTE EN ESTAS COLUMNAS Kc	P	E	T	K	I	C	A
DESAYUNO										
ENTRE DESAYUNO Y ALMUERZO.										
ALMUERZO.										
ENTRE ALMUERZO Y MERIENDA.										
MERIENDA.										
ENTRE MERIENDA Y ANTES DE DORMIR.										

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INIAPS
1982-83

(Form 1C)

English Translation of 24-hour Dietary Recall Form

Name Day of the Week

Together we are going to remember all the foods and drinks which you have consumed in the last 24 hours. Lets start with the last thing which you consumed.

Column across reads:

Foods - Quantities - Do Not write in these columns

Column down reads:

Breakfast

Between breakfast and lunch

Lunch

Between lunch and supper

Supper

After supper and before you go to bed.

APPENDIX B

SOCIOECONOMIC INTERVIEW SCHEDULE

Instituto de Investigaciones Nutricionales
y Médico Sociales-ININMS

CODIGO - - - - -

Formulario: 2

ENCUESTA SOCIO-ECONOMICA

PROYECTO: ESTADO NUTRICIONAL DE NIÑOS ESCOLARES: COTOCOLLAO ALTO

Le voy a hacer unas preguntas sobre usted y su familia. Las preguntas serán sobre varios temas. No es necesario contestar cualquier pregunta con lo cual usted se siente incómoda. Sus respuestas serán reservadas y confidenciales.

1. Nombre del entrevistado _____

2. Relación al entrevistado
   al niño

   ___ Madre
   ___ Padre
   ___ Hermano(a)
   ___ Tío(a)
   ___ Abuelo(a)
   ___ Otro

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3. Nombre del niño _____

4. Sexo del niño ___ Masculino ___Femenino

5. Edad del niño ___ Años ___Meses

6. Fecha de nacimiento del niño _____
(día/mes/año)

7. Lugar de nacimiento del niño:

___Quito(0)
___Pichincha(1)
___Imbabura(2)
___Carchi(3)
___Bolívar(4)
___Cotopaxi(5)
___Tungurahua(6)
___Chimborazo(7)
___Loja(8)

8. Quién es el jefe de familia?.

___Padre del niño
___Madre del niño
___Tío del niño
___Tía del niño
___Hermano del niño
___Hermana del niño
___Abuelo del niño
___Abuela del niño
___Otro _____
___Otra _____

9. Cuál es la actividad económica principal del jefe de familia?__

_____

10. Además de su actividad principal económica, que otro tipo de activi_
dades económicas tiene usted? Dígales en orden de importancia.
(Entrevistador: Pone el número en frente de cada actividad).

___arrienda casa(s)
___arrienda terreno(s)
___venta de productos sembrados en sus terrenos
___uso familiar de productos sembrados en sus terrenos
___dinero recibido de otros familiares
___alimentos u otros productos regalados
___otro trabajo. Explique _____
___Otro _____

11. Empleo de fuerza de trabajo familiar adicional

Esposa ___ Si ___ No
Hijos ___ ___
Otros ___ ___ quienes son?._____

12. Cuál es su ingreso mensual familiar por:

Actividad económica principal S/._____
Otras actividades S/._____
Otros miembros de la familia S/._____
TOTAL S/._____

13. Estima, por favor, los gastos mensuales en los siguientes:

___Comida ___Casa
___Transporte ___Ropa
___Utilidades (luz, agua, tele., combustibles
___Diversión ___La salud
___Otros gastos: Defina _____

Las próximas preguntas serán sobre la vivienda y los servicios disponibles. (Entrevistador: Apunte lo que se puede en base de observación y pregunte solamente lo que es necesario).

14. Lugar de residencia:

___Sta. Anita (1) ___El Triunfo (5)
___Sta. Ana(2) ___San José de Jarrín (6)
___Bellavista Alta(3)
___El Bosque (4)

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1982

15. Area de construcción total de la casa _____ mts^2

___Arrienda ___Dueño

16. Cuál es el número de personas que viven en esta casa? _____persona

17. Material de construcción de las paredes:

___bareque ___ladrillo
___adobe ___madera
___bloque ___otro _____

18. Material de la construcción del techo:

___teja ___loza
___zinc ___otro _____

19. Material de la construcción del piso:

___baldosa ___tierra
___tabla ___parquet
___cemento ___otro _____

20. Cuántos cuartos tiene la casa? _____ cuartos.

21. Composición de los cuartos: (Apunte el número en cada raya, utilizando 0 (cero) si la casa no tiene este cuarto).

___cocina ___sala-comedor
___cuartos de dormir ___baños (sólo servicio __ baño completo)
___letrina ___bodega
___otro

22. Muebles y aparatos domésticos: (Apunte un número en cada raya, utilizando 0(cero) si no hay).

___mesas ___sillas
___soffá ___mesas pequeñas
___lámparas ___camas
___cortinas ___alfombras
___radio ___televisor
___máquina de coser ___liquadora
___refrigerador ___estufa (combustible: __ eléctrica __ gas
___horno ___leña ___gasolina ___Kérex.
___otro _____

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23. Facilidades para almacenamiento de alimentos:

___anaqueles (___abiertos ___tapados con cortinas ___cerrados)
___cajones ___pipas
___barril ___sacos
___otro _____

24. Servicios: Agua

___potable ___entubado
___vertiente ___acequia/río
___pozo ___otro _____

25. Distancia que tiene que caminar para recojer agua _____ mts

26. Control de basura

___la entierra ___la quema
___la tira a la quebrada
___colección de basura ___bota al campo
___otro _____

27. Control de escretas

___letrinas ___campo
___canalización ___otro _____

Las próximas 6 preguntas son las últimas. Estas preguntas serán sobre la venida de usted y su familia a Quito

28. Cómo vino la familia a Quito?.

___toda la familia junta
___adultos separados, antes del matrimonio
___el padre primero, despues la familia
___la madre primera, despues la familia
___niños primero, despues los padres
___Otro _____

29. Qué tiempo lleva residiendo en este barrio? _____meses
_____años

30. Qué tiempo lleva residiendo en la ciudad de Quito? _____meses
_____años

31. Tenía usted parientes ya residiendo en Quito cuando llegó?

___sí ____nó . Si tenía, quién?

___abuelos paternales del niño
___abuelos maternales del niño
___tíos del niño
___tíos de los padres del niño
___compadres
___amistades

32. Vivió con algún pariente cuando llegó a Quito?.

Si vivió, por cuanto tiempo? ___semanas
___meses
___años

Las próximas preguntas son abiertas. Voy hacer cada pregunta y escribir sus comentarios en cuando usted contesta la pregunta.

33. Por qué motivo(s) se vino a vivir en la ciudad de Quito? _____

_____

_____

_____

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43. Cómo se siente sobre su venida a Quito? Quiero decir, cree usted que ha logrado lo que quería con su venida a Quito?. Cuáles son sus reacciones negativos y positivos sobre su venida a Quito?.

_____

_____

_____

_____

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INIMMS
1982

CODIGO _ _ _ _ _

FICHA DEMOGRAFICA

	MIEMBROS DEL HOGAR	PARENTESCO	SEXO	EDAD	PARA MAYORES DE 6 AÑOS			
					INSTRUCCION		OCUPACION	
	¿Me los nombres de cada uno de las personas que componen este hogar? (empezando con el Jefe del hogar).	¿Cuál es la relación de esta persona con el	Hombre = 0 Mujer = 1	Años cumplidos.	¿Cuántos años de escuela ha completado? (escribir número, ninguno = 0)	¿Sabe leer y escribir Si = 1 No = 2	¿A qué labor se dedica la mayor parte del tiempo?	LUGAR DE NACIMIENTO
	VIVOS							
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

COMENTARIOS _____

(Form 2)

English Translation of Socioeconomic Interview Schedule

I am going to ask you some questions about you and your family. These questions will be on all subjects. It is not necessary to answer any question with which you feel uncomfortable. Your answers will remain anonymous and confidential.

1. Your name
2. Your relationship to the child
3. Name of the child
4. Sex of the child
5. Age of the child
6. Birthdate of the child
7. Place of birth of the child
8. Who is the head of household
9. What is the principle economic activity of the head-of-household
10. Besides the principle economic activity, what other type of economic activity do you engage in? (Record in the order of importance)

House rental — Land rental

Sale of agricultural products — Other

Family use of agricultural products grown on your own land

Money received from relatives

Food or goods received as gifts

Other work. Explain

(Form 2)
English Translation of Socioeconomic Interview Schedule
(Continued)

11. Additional family members in the work force

    Wife

    Children

    Others

12. What is your monthly family income from:

    Principle economic activity

    Other economic activities

    Other family members

    Total

13. Please estimate your monthly expenses on the following:

Food	House
Transportation	Clothes
Utilities	
Recreation	Health
Other expenses. Explain	

The next questions are about housing and services available. (Interviewer: Record these answers based on your observation and ask questions only when necessary)

14. Location of residence within the neighborhood

15. Total square feet of your house

Rented	Owned

16. How many persons live in your house?

(Form 2)
English Translation of Socioeconomic Interview Schedule
(Continued)

17. What are the walls made of:

Clay	Brick
Adobe	Wood
Cement block	

18. What is the roof made of:

Tile	Cement slabs
Zinc	

19. What are the floors made of?

Dile	Dirt
Planks	Parquet
Cement	

20. How many rooms does the house have?

21. Composition of the rooms. (Note the number of each type of room, using 0 if the house does not have the room)

Kitchen	Living-dining area
Bedrooms	Bathroom (toilet only - full service)
Latrine	Storage room

22. Furniture and appliances (Note number in each space, using 0 if they do not have it)

Tables	Chairs
Sofa	Small tables
Lamps	Beds
Curtains	Rugs

(Form 2)
English Translation of Socioeconomic Interview Schedule
(Continued)

22. Furniture and applicances (Cont.)

Radio	Television
Sewing machine	Blender
Refrigerator	Stove (fuel source: electric, gas, wood, gasoline, kerosene)
Oven	

23. Facilities for storing food:

Shelves (open-covered with curtains-closed)

Boxes	Bins
Barrels	Sacks

24. Services: Water

Potable	Piped
Watershed	Creek or river
Well	

25. Distance you must walk to your source of water?

26. Garbage control

Buried	Burned
Thrown in ravine	
Collection service	Thrown in the countryside

27. Human waste control

Latrines	Countryside
Sewage system	

(Form 2)
English Translation of Socioeconomic Interview Schedule
(Continued)

The next six questions are the last. These questions deal with you and your families coming to Quito.

28. How did your family come to Quito?

    All the family together

    Adults separate, before marriage

    The father first, then the family

    The mother first, then the family

    Children first, then the family

29. How long have you lived in this neighborhood?

30. How long have you lived in the city of Quito?

31. Did you have relatives already living in Quito when you arrived?

    If yes, who?

        Paternal grandparents of the child

        Maternal grandparents of the child

        Aunts and uncles of the child

        Aunts and uncles of the parents

        God-parents

        Friends

32. Did you live with relatives when you first arrived in Quito?

    If you did, for how long?

(Form 2)
English Translation of Socioeconomic Interview Schedule
(Continued)

These last two questions are open-ended. I am going to ask each question and write down your comments while you answer the question.

33. For what reasons did you come to live in the city of Quito?
34. How do you feel about having come to Quito? What I mean is, do you feel that you have accomplished what you wanted by coming to Quito? What are your positive and negative reactions to being in Quito.

Demographic Data Sheet

Question asked in each column across:

1. Give the name of each person living in this house, starting with the head-of-household.
2. What is the relationship of each person to the child?
3. Each persons sex
4. Each persons age
5. How many formal years of school each person has completed?
6. Can this person read or write?
7. What is this persons principle activity?
8. Each persons place of birth

APPENDIX C

FOOD FREQUENCY INSTRUMENT AND DIETARY CHANGE INSTRUMENT

CODIGO - - - - -
Formulario: 3a

FRECUENCIA DE ALIMENTOS

PROYECTO: ESTADO NUTRICIONAL DE NIÑOS ESCOLARES: COTOCOLLAO ALTO

NOMBRE DEL NIÑO _____

NOMBRE DE LA PERSONA ENTREVISTADA _____

RELACION DEL ENTREVISTADO AL NIÑO _____

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1982-83

1

	Indique por favor, cuántas veces en el último mes su familia ha consumido los siguientes alimentos.					Indique, por favor cuántas veces al mes su familia acostumbraba consumir los siguientes alimentos antes de venir a Quito.			
	(ALIMENTOS, ETC)	NUNCA	A VECES	CADA SEMANA	CADA DIA	NUNCA	A VECES	CADA SEMANA	CADA DIA.
		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	GRANOS								
	Chulpi								
	Choclo								
	Canguil								
	Maíz tostado								
	Mote								
	Morocho								
	Arroz de cebada								
	Trigo								
	Quinoa								
	Chuchuca								
	Máchica								
	Harina de trigo								
	Harina de Maíz								
	Harina de Haba								
	Harina de morocho								

		(ALIMENTOS, ETC)	NUNCA	A VECES	CADA SEMANA	CADA DIA.	NUNCA	A VECES	CADA SEMANA	CADA DIA.
		Harina de arveja	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Harina de maizena								
		Harina de cebada								
		Harina de plátano								
		Otro								
	2	LEGUMINOSAS								
		Arbejas								
		Lentejas								
		Habas								
		Frijoles								
		Garbanzos								
		Chochos								
		Otro								
	3	LEGUMBRES								
		Col								
BSW-MSU INNMS 1982-83		Col morada								
		Nabo								
		Acelga								
		Espinaca								
		Cebolla paiteña								
		Cebolla blanca								
		Tomate								
		Lechuga								
		Ají								
		Vainita								
		Pimiento								
		Pepino								
		Aguacate								
		Sambo								
		Pepas de sambo								
		Zapallo								
		Pepas de zapallo								

		(ALIMENTOS, ETC)	NUNCA	A VECES	CADA SEMANA	CADA DIA.	NUNCA	A VECES	CADA SEMANA	CADA DIA.
			(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Zanahoria								
		Zanahoria blanca								
		Ráibano								
		Remolacha								
		Melloco								
		Ocas								
		Papas								
		Otros								
	4	FRUTAS								
		Peras								
		Manzanas								
		Higo								
		Tomate de árbol								
		Capulí								
BSW-MSU ININMS 1982-83		Papaya								
		Piña								
		Maracuyá								
		Naranja								
		Limón								
		Plátano								
		Maqueño								
		Guineo								
		Maduro								
		Babaco								
		Chamburo								
		Taxo								
		Naranjilla								
		Mora								
		Frutilla								
		Uvas								
		Mango								
		Melón								
		Guanabana								
		Chirimoya								
		Mandarina								
		Otros								

		(ALIMENTOS, ETC)	NUNCA	A VECES	CADA SEMANA	CADA DIA.	NUNCA	A VECES	CADA SEMANA	CADA DIA.
	5	CARNES, PESCADOS	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Carne de conejo								
		Carne de cuy								
		Carne de gallina								
		Carne de cerdo								
		Carne de borrego								
		Carne de res								
		Pescado								
		mariscos								
		Otros								
	6	PRODUCTOS LACTEOS								
		Leche								
		Yogurt								
BSW-MSU ININMS. 1982-83		Queso								
		Helados								
		Huevos								
	7	ADICIONALES								
		Azúcar								
		Sal en grano								
		Sal yodada								
		Panela								
		Pan								
		Arroz								
		Tallarines								
		Fideos								
		Leche Avena								
		Avena								
		Sémola								
		Galletas								
		Caramelos								
		Café								
		Té								
		Colas								
		Agua Mineral								
		Otros								

(Form 3A)
English Translation of Food Frequency Instrument

Name of the child

Name of the interviewee

Relation of the interviewee to the child

Please indicated how many times in the last month your family consumed the following foods

Response choices:

never, sometimes, weekly, daily

Please indicate how many times during a one month period your family consumed these foods before coming to Quito.

Response choices:

never, sometimes, weekly, daily

List of foods

1-Grains

Small popping corn
Corn on the cob
pop corn
toasted corn
hominy
hard dried corn
barley
wheat
quinoa
dried corn mush
toasted barley flour
wheat flour
corn flour
fava bean flour
hard dried corn flour
pea flour
cornstarch
barley flour

2-Legumes

Peas
Lentils
Fava beans
Beans
Lupine

3-Vegetables

Cabbage
purple cabbage
turnip greens
swiss chard
spinach
bermuda onions
white onions
tomato
lettuce
hot peppers
green beans
peppers
cucumbers
avocado
summer squash
summer squash seeds
pumpkin
carrots
white carrots
radishes
beets
ullucus tubers
okas
potatoes

(Form 3A - Cont.)
English Translation of Food Frequency Instrument

List of foods (Cont.)

4-Fruits

pears
apples
figs
tree tomatoes
andean cherries
papaya
pineapple
passion fruit
orange
lemons
plantains (green)
red bananas
bananas
ripe plantains
babaco melon
chamburo
taxo
naranjilla
blackberries
strawberries
grapes
mangos
canteloupe
soursop
chirmoya
tangerines

5-Meats, Fish

rabbit
guinea pig
chicken
pork
lamb
beef
fish
shellfish

6-Dairy Products & Eggs

Milk
yogurt
cheese
ice cream
eggs

7-Miscellaneous

Sugar
Granulated salt
Iodized salt
Crude brown sugar cakes
bread
rice
noodles
spaghetti
Food supplement
semola
cookies
candies
coffee
tea
colas
mineral water

Pagina 1

CODIGO ----------
Formulario : 3b

FORMULARIO DE CAMBIOS ALIMENTICIOS

Quiero hacerle unas preguntas sobre la alimentación de su familia. Lo que más me interesa son los cambios en conseguir los alimentos, preparar la comida y guardar la comida que son relacionados a la venida de su familia a vivir en Quito. Le voy hacer cinco preguntas y anotar sus respuestas.

1. Hay comidas que comían en el campo que no comen aquí en Quito?

   Si --- NO---

   Si es que su respuesta es sí, cuáles? _____

   _____

2. Hay comidas que comen aquí en Quito que no comían en el campo?

   Si --- No---

   Si es que su respuesta es si, cuáles? _____

   _____

3. Qué cambios han habido en la forma de conseguir los alimentos desde suv venida a Quito

   Cambios en las compras del mercado _____

   Cambios en los alimentos conseguidos de sus propios terrenos _____

   _____

   Otros _____

   _____

4. Cuáles cambios han habido en la preparación de la comida desde su venida a Quito?.

   Cambios en los aparatos para cocinar _____

   Cambios en combustibles para cocinar _____

   Cambios en tiempo para cocinar _____

   Cambios en la manera de cocinar _____

   Otros _____

   _____

5. Cuáles cambios han habido en la forma de almacenar las compras desde su venida a Quito.

   Cambios en el espacio para guardar _____

   Cambios en la forma de guardar _____

   Cambios en las comidas guardadas _____

   Cambios en el tiempo de guardar sus comidas _____

   Otros _____

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(Form 3B)
English Translation of Dietary Change Instrument

I wish to ask you some questions about feeding your family. What I am most interested in are those changes in acquisition, preparation and storage of foods that are related to you and your family moving to Quito. I am going to ask you 5 questions and write down your responses.

1. Are there foods which you ate in the rural area which you no longer eat in Quito? If yes, which ones?

2. Are there foods which you eat in Quito which you did not eat in the rural area? If yes, which ones?

3. What changes have taken place in the way that you acquire food since you moved to Quito?

    Changes in foods purchased

    Changes in foods acquired from your own land

    Others

4. What changes have taken place in the way which you prepare food since you came to Quito?

    Change in cooking utensils

    Change in fuel source

    Change in cooking time

    Change in the way you prepare food

    Others

(Form 3B - Cont.)
English Translation of Dietary Change Instrument

5. What changes have taken place in the way in which you store food since you came to Quito?

Change in storage space

Change in storage method

Change in foods stored

Change in storage time

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