

CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

NUTRITION KNOWLEDGE OF HISPANIC WOMEN

A thesis submitted in partial satisfaction of the  
requirements for the degree of Master of Science in

Home Economics

by

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## ABSTRACT

### NUTRITION KNOWLEDGE OF HISPANIC WOMEN

by

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Master of Science in Home Economics

The study measured the nutrition knowledge of a group of Hispanic women enrolled in a W.I.C. Clinic in Southern California whose children were at nutritional risk. The instrument was a questionnaire in English or Spanish which included six demographic questions (age, language spoken in the home, amount of medical care, number of medical visits made, months spent in the W.I.C. Program, and years of education), and twenty-three questions on nutrition. Pretest N = 366. Posttest N = 126. Significant differences in scores were due to an increased number of months spent in the W.I.C. Program, increased chronological age, and language spoken in the home (English). Problem areas were weaning knowledge (especially with regard to the appropriate use of cow's milk and knowledge of protein sources for a child over six months of age), knowledge of vegetable-protein sources, and natural food sources of vitamin C and iron.

## I.

### INTRODUCTION

#### Purpose

The purpose of the study was to measure the nutrition knowledge of a group of women of Hispanic heritage with emphasis on their knowledge of an appropriate diet for children from birth to five years of age.

The women were enrolled in the W.I.C. (Women, Infants and Children) Program in the city of Pacoima in the northeast area of the San Fernando Valley in California. The children were considered to be at risk nutritionally. The women attended nutrition education classes, received nutrition information provided by W.I.C., and obtained vouchers which could be exchanged for selected, specific, supplemental foods.

#### Justification

One aspect of the study was to investigate a subject (nutrition knowledge of the mother) which was critical to the growth and development of the children attending the W.I.C. Program, and which could be related to the general and nutritional well-being of other children in the family and in the community.

The influx of Hispanics into the U.S.A., particularly Southern California, during the past six years has created a situation with significant implications for the general health

and nutrition of the general population. W.I.C. meets this problem.

"Time" magazine (68), 1978, reported the growth of the Hispanic population in the U.S.A. as follows: 1960, 3.1 million; 1970, 9.1 million; 1978, 12.0 million counted and 19 million estimated.

1980 Census figures, according to Los Angeles City Community Development, Analysis & Planning Section (37) show the following:

Total Los Angeles population including most of San Fernando Valley:	2,966,358
White	1,432,735
Hispanic	815,974
Black	505,691
Asian and Pacific Islander	196,002
Other	362

Telephone conversations with the Los Angeles City Planning, Ethnic Section (36) indicated that more realistic data might be:

White	1,500,000
Hispanic	1,000,000
Hispanic Illegals	1,000,000

Other figures as reported in the 1980 Census, above.

The arrival of such a large number of people into one area during a relatively short time-span (1975-1981) implies a very large population of children under five years of age, since data from one survey (67) showed that Hispanic families are larger and younger

than other families in the country. Their median age is 22.1 years and 40 percent are under 18 years of age. (The Mexicans who will immigrate to the Southern California area in the future promise to have an even younger median age; La Opinion (52) has reported that 42 percent of the current Mexican population is under 15 years of age.) The specific reasons for, and consequences of, possible malnutrition in this group are discussed in the Review of Literature.

### Objective

The primary objective of the study was to determine the level of nutrition knowledge of this group of Hispanic women.

### Research Hypotheses

1. The women will have an average score higher than 60 percent correct responses to the pretest questionnaire and higher than 70 percent correct on the posttest.
2. The pre- and posttest scores will show significant differences by age group.
3. The pre- and posttest scores will show significant differences by language spoken in the home (Spanish or English).
4. The pre- and posttest scores will show significant differences due to receiving some form of medical care during the past year.

5. The pre- and posttest scores will show significant differences due to more than ten visits for health care during the past year (not including W.I.C.).
6. The pre- and posttest scores will show significant differences in responses due to number of W.I.C. nutrition education classes attended.
7. The pre- and posttest scores will show significant differences by number of years of education in a school.

#### Null Hypotheses

1. The women will not score an average of more than 60 percent correct responses to the pretest questionnaire or more than 70 percent correct on the posttest.
2. The pre- and posttest scores will not show significant differences by age group.
3. The pre- and posttest scores will not show significant differences by language spoken in the home (Spanish or English).
4. The pre- and posttest scores will not show significant differences due to receiving some form of medical care during the past year.
5. The pre- and posttest scores will not show significant differences due to more than ten visits for health care during the past year (not including W.I.C.).

6. The pre- and posttest scores will not show significant differences in responses due to the number of W.I.C. nutrition education classes attended.
7. The pre- and posttest scores will not show significant differences by number of years of education in a school.

The Director of the W.I.C. Clinic (60) determined the pretest score of over 60 percent and a posttest score of over 70 percent as being reasonable goals according to her evaluation of the questionnaire and the potential and past performance of the participants.

#### Limitations

The testing time allotted for administering the instrument was too short to allow for a lengthy questionnaire. This was especially true for the pretest, where a Consent Form and six demographic questions were involved in addition to the questionnaire. Anonymity was a problem since some of the subjects knew that their test identification numbers were being marked on their W.I.C. data packets.

#### Definition of Terms

Hispanic: Persons of Spanish, Mexican, Central or South American descent who (usually) have Spanish surnames.

## II.

### REVIEW OF THE LITERATURE

#### The W.I.C. Program

W.I.C. is an acronym for Women, Infants, and Children, and, according to Edozien (19:677), it is a special supplemental food program for women, infants, and children. This program, which was authorized by a September 26, 1972 amendment to the Child Nutrition Act of 1966, provided cash grants to state health departments and approved local health clinics for the purpose of providing special nutritious food supplements to low-income, pregnant and lactating women, infants, and children up to four years old who are at nutritional risk. It is administered by the Food and Nutrition Service of the United States Department of Agriculture.

In order to qualify for enrollment in the W.I.C. program, individuals must: 1) be in the specific population target group, i.e., pregnant women, women within six weeks after delivery, except that women who are breast feeding their babies are eligible for up to one year after delivery, infants, and children under four years old; 2) be certified to need food supplements because of known inadequate nutritional patterns, diagnosed nutritional anemia, inadequate or deficient patterns of growth, or high rates of prematurity or miscarriage; 3) reside in an approved project area; and 4) be eligible for free or reduced-cost medical treatment by the approved agency (19:677). Some other risk signs for children

are (2:579) obesity, chronic illness, or nutrition-related diseases (such as celiac disease, lactose intolerance, and phenylketonuria). Pregnant and postpartum women may be also considered at risk if they are younger than 19 or older than 40 years of age, have a poor obstetrical history (previous low-birth-weight infants, short periods between conception, gestational diabetes), are anemic, or experience poor weight gain (low or high). In California, the State Department of Health Services is responsible for the staffing and conducting of the local W.I.C. Clinics (60).

The W.I.C. Program provides vouchers for supplemental foods of high nutritional value to pregnant and postpartum women and to infants and children up to the age of five who are "at risk" for any of the reasons noted previously. W.I.C. also provides nutrition education classes, counseling and nutrition literature hand-outs. According to the American Dietetic Association (66), W.I.C. is unique because it is the only food assistance program that provides nutrition education as well as supplemental food, thereby promoting improved health status of recipients. W.I.C. is particularly concerned with raising the hemoglobin concentration of the blood by assuring or increasing intake of ascorbic acid and utilization of mixed meals containing heme and non-heme iron (enriched bread, eggs, corn, rice, wheat and liver) (59:10).

An eligible woman or child receives approximately \$25.00 worth of vouchers a month at no cost (60). W.I.C. foods are chosen to provide vitamins A, C, D, iron, protein, and calcium, and

include iron-fortified formula, milk, cheese, fruit juices, iron-fortified cereals, and eggs (60).

According to Jean Mayer (43), in 1981 almost 2.2 million pregnant women, infants and children were receiving benefits from W.I.C., and another 5 to 8 million were eligible but could not participate for lack of funding. Dr. Mayer also stated that:

Low birth weight is currently the eighth leading cause of death in the United States and, it is more strongly linked with neonatal mortality than any other variable. A baby under 5½ pounds at birth, whether because of prematurity or because of impaired fetal growth, is 20 times more likely to die than an infant of normal weight (43:7).

#### Hispanic and Mexican Nutrition History and Customs

According to a recent (1980) survey by Strategy Research Corporation (67), 59 percent of all Hispanics in the United States define themselves as Mexican in origin. According to the Director of the W.I.C. Program in Pacoima (60), the Hispanics of the study sample were predominantly Mexican, and Valbuena (71) has stated that approximately 90 percent of the population of the Pacoima area, where this study was conducted, is Mexican.

Influences on the dietary customs of the sample originated in Spain with side-effects from Rome (50:395), North Africa and Syria (35:2; 61:148-149), through Spain to Mexico (50:395), culminating in the food habits of Hispanics of the greater Los Angeles area, and, finally, in their dietary practices in Pacoima. There are considerable differences in food customs among new arrivals from Mexico according to their geographic origin:

differing food habits, social customs, and economic conditions resulting from varying climates, altitudes, types of soil (arid or fertile), and proximity to ocean or river. These differences may ultimately affect their health status and nutrition knowledge. May and McLellan (42) in their book "The Ecology of Malnutrition in Mexico and Central America--Studies in Medical Geography," discuss these geographic differences, as do Cerqueira et al. (11).

At the time of the Spanish conquest, the dominant people were the Aztec. The Aztec culture of fourteenth and fifteenth century Mexico was very stratified (50:951) and commoners lived primitively compared to the small middle and upper classes. There was, among the common people, a small nuclear family. Since milk-producing animals were not introduced into Mexico until after the Spanish conquest (46:54), the implication is that breast feeding would have been an economic necessity, with wet-nurses probably utilized by the upper class.

The cultivation of Indian corn, as well as a number of secondary crops, provided basic subsistence for all Meso-America. Secondary crops included the bean, squash or pumpkin, chile peppers, and tomatoes of both cooking and eating varieties. Additional foods, depending on climate and altitude, were pineapple, sweet potato, manioc (cassava), chayote, maguey, nopal, cherimoya, and avocado. Important commercial crops that were introduced after European contact included Old World cereals (wheat, barley, oats), bananas, coffee, sugarcane, sesame, and the peanut (50:955).

In the Mayan cultures of Central America, the preparation of the corn tortilla with lime provided a nutritious staple food. The corn was soaked in lime for many hours, thus improving the calcium value of the tortilla (29:28). Legumes of many varieties and fruits such as papaya, banana, and mango were and are common foods in most areas of Central America. Flesh foods (depending on the geographic area) included water fowl and fish (29:951). Eggs, cheese, milk, beef, chicken, mutton, pork or sea food are potential sources of protein in the contemporary Hispanic diet when the family can afford to buy them (67:55-56).

The 1979 report by Cerqueira et al. (11:133) stated that Mexico's high infant mortality rate was due not only to deficient food intake but also poor food customs and improper hygiene. A great many of the Mexican population lacked food, clean water, sewers, education, cars and jobs (11:133). Such conditions would be sufficient motivation for them to immigrate to the United States, carrying their food customs and beliefs with them. Cerqueira et al. (11:137) also mentioned consumption of empty calorie foods such as carbonated and non-carbonated beverages, sweet bread, and sugar. They pointed out that traditional foods such as beans, corn and chile had low prestige value, and that fish and vegetables, although relatively inexpensive and available, were not consumed by the people in the communities of their study. Broth (6:14) quoted Gladney as stating that Hispanics in the United States had a high consumption of carbonated beverages and low consumption of milk,

cheese, fruits and vegetables. In a survey of food acceptance patterns of Spanish-speaking New Mexicans (16) a Western Regional Research Project Standardized questionnaire was used to collect data. Information about how often 142 specific foods were served was taken. The list of foods (16:122) served most intensively did not include some foods widely used (by observation of the writer) by Hispanics in the greater Los Angeles area, such as chiles, soft white cheeses (of which there are approximately 20 varieties in some Los Angeles area markets), and flour and corn tortillas, all of which are used in quantity by local Hispanics. The study also reported that cake, pastry, ice cream and candy were not served daily. The beverage list did not include soft drinks and carbonated beverages. According to the Director of the W.I.C. Program (60) and by observation of the writer, cake, pastry ("pan"), ice cream, colored water ices, candy, soft drinks and carbonated beverages are part of the daily diet of many low-income Hispanics of the Los Angeles area, particularly the children. The report on "Dietary Patterns of Spanish-speaking People Living in the Boston Area" by Yohai (74) describes typical adult Hispanic diets, with emphasis on the Puerto Rican (which is quite different from the Mexican).

#### Neonate and Infant Nutrition

The main difference between mammals and non-mammals is the milk-secreting breast. Prehistoric man may have availed himself

of animal milk during accidental contacts with lactating mammals, but it may be presumed that nursing by a human mother was universal and fairly prolonged. Mother's milk was the only readily available source of nourishment prior to the domestication of animals, and it was a preferable source of nourishment to pre-chewed meats, nuts, roots and berries (31:15).

The first nutrition textbook in the English language (c. 1540) was a translation from the German, and the mother was advised to nurse for two years and to wean the child gradually (31:19). During the seventeenth and eighteenth centuries, however, there was a tendency to abandon breast feeding by the very wealthy, and wet-nursing (using hired, lactating women) became common (31:19).

The parts of the world undergoing the Industrial Revolution of the nineteenth century began to view infant and child feeding in a systematic way: the possibility of spreading syphilis via a wet-nurse was considered, and in France, Budin (1846-1907) started the first prototype infant welfare center ("consultation de nourrissons") where regular attendance and weighings enabled infant nutrition to be accurately studied (31:20).

From approximately 1900 to 1945, most of the Western World experienced a decline in breast feeding. A survey by Arnell (31:20) in Scotland, showed that only 30.9 percent of mothers attempted breast feeding, while only 4.7 percent continued beyond four months. The survey also revealed early, expensive and nutritionally unnecessary mixed feeding, often introduced after one month of age.

After World War II (1947), an increased interest in breast feeding began in the United States. The LLL (La Leche League) to encourage breast feeding was established. Advantages of feeding breast milk became known and accepted: it was less expensive, it was not contaminated by bacteria (unless the mother was), the temperature was correct, and bottles did not need to be cleaned and sterilized, and, most of all, if the mother's diet was adequate, the breast-fed baby was not likely to suffer from scurvy or iron-deficiency anemia (31:22). Martinez and Nalezienski's longitudinal study (40:260) on breast feeding in the United States reported a decline in breast feeding from 1955 to 1971 followed by a resurgence through 1979 with substantial increases in both high and low income groups. They also reported that the increase was not regional (40:261).

That breast feeding is superior is generally accepted almost everywhere (24, 28, 29, 30, 31). The first delivery of human milk after birth consists of fluid called colostrum. This contains more protein and less fat and carbohydrate than does later milk. Concentrations of sodium, potassium, and chloride are also greater in colostrum than in later milk (53:101). Between the third and tenth days, colostrum changes to a high protein milk. By day 10, human milk is mature milk.

Human milk and cow's milk provide approximately the same amounts of water, calories and fat. Casein and whey are the protein in both milks, although there is a large difference in

their occurrence ratio, i.e., human milk contains 40 percent casein, and cow's milk, 82 percent casein. Because of its low casein content, human milk forms a soft, flocculent, digestible curd in the infant's stomach. The increased casein content of fresh cow's milk causes the formation of a tough, hard-to-digest curd. Homogenization, boiling, and dilution of cow's milk modify the curd and prevent the formation of hard curds (53:102).

Human milk contains a larger concentration of lactose than cow's milk. Human milk also contains L-bifidus factor, a nitrogen-containing carbohydrate in concentrations forty times greater than in cow's milk. This carbohydrate is required by the bacteria Lactobacillus for growth. Both human and cow's milk provide adequate quantities of vitamin A and the B complex vitamins. Human milk from well-nourished mothers is a reliable source of vitamin C; processed cow's milk contains very little. Human milk provides larger amounts of vitamin E and lesser amounts of vitamin K than cow's milk. Cow's milk contains more than three times as much calcium and six times as much phosphorus as does human milk. The high phosphate load and high calcium:phosphate ratio of cow's milk have been implicated as factors in hypocalcemic tetany.

In addition to nutrients, human colostrum and milk contain antibodies, enzymes, and other factors (absent or present in only minute amounts in cow's milk), which protect the infant against enteric infections (53:103). Lactobacillus microorganisms in the intestinal tract, whose growth is dependent on L-bifidus factor,

produce both acetic and lactic acid. This acidic milieu interferes with the growth of pathogenic organisms such as Escherichia coli and Shigella, and provides a medium in which lysozymes may grow (53:104). Immunoglobulins to many different types of organisms, including pertussis, staphylococci, and salmonella, have been identified in human colostrum and, in lesser amounts, in mature milk. The immunoglobulins are not absorbed, and exert an effect only against pathogens that enter the body through the gastrointestinal tract. Lactoperoxidase, an enzyme in human milk and saliva, aids in killing streptococci, and may act on other organisms. Lactoferritin, an iron-binding protein in human milk, inhibits the growth of staphylococci and E. coli (53:140).

Human and cow's milk contain varying amounts of linoleic acid: human milk contains a total of 10.6 percent of its fatty acids as linoleic acid while only 2.1 percent of the fatty acids of cow's milk are in this form (44:129). A comparison between human and cow's milk has been given by R. Gulgarelli, Professor of Pediatrics at the University of Genoa (7:11-56). Professor Gulgarelli leaned heavily on Fomon's data, and commented that "Fomon, who had enormous faith in bottle feeding" (7:13) was in contrast to Nordio, who was fearful of it. He stated further that:

I always find myself in an intermediate position, in that I have always said and written that breast feeding is and always will be superior to bottle feeding, although it requires supplementing slightly, but I am convinced that if bottle feeding is well applied, it will give results almost equivalent to those of breast feeding (7:13).

According to Widdowson (72:76-77), since "human and cow's milk are not peculiar in containing little iron . . . One wonders how necessary it is to keep up the haemoglobin level of the human infant by artificial means." Some nutritionists, such as M. McWilliams (44), argue that there is a choice for the mother in whether or not to breast feed. Experts such as D. B. and E. F. P. Jelliffe (28) are devoted to breast feeding and some, e.g., P. Pipes (53), appear to be somewhat neutral. The importance of breast feeding for low-income and health-oriented mothers is supported in the works of D. B. and E. F. P. Jelliffe (28, 29, 30), especially in their 1979 editorial in The Journal of Tropical Pediatrics and Environmental Child Health (28).

IgA is an anti-viral, anti-bacterial immunoglobulin, and IgE is an inflammatory immunoglobulin (34:576). A study by Saarinen et al. (57:344) revealed that some healthy babies synthesize IgE and IgA in response to early weaning, and it was found that breast-milk feeding reduced serum IgE in infants. However, it might be inferred that while prolonged breast feeding would suppress IgE and resultant allergic reactions and weals (34:576), it would also suppress IgA, which might protect the infant from viral or bacterial infection. Saarinen et al. also pointed out that many factors of heredity and environment may contribute to the development of immediate hypersensitivity (Type 1 allergy, atopic allergy), and "prolonged breast feeding may postpone the development of some food allergies" (57:339); however, the prolongation of breast feeding

and delayed introduction of solid foods have been proven by a 636-subject study to have no effect on subsequent atopic eczema (33:546).

It has been demonstrated that human milk has anti-viral components. It may be protective against tuberculosis (a health problem in the Pacoima area in 1981 (38)) and it is anti-infective, containing anti-viral properties which offer active defense against intestinal parasites (28). In Sauer's article (58) concerning the use of infant formulas, he stated that in an Hispanic area of New York City, formula-fed babies had 50 percent more illnesses than breast-fed babies in the same ghetto, and, further, that breast feeding was relatively rare in that area. The study in Canada by Ellestad-Sayed et al. (18) determined that fully bottle-fed infants were hospitalized with infectious diseases 10 times more often and spent 10 times more days hospitalized than fully breast-fed infants. They also reported that "Breast-feeding was strongly protective against severe infection requiring hospital admission and also against minor infection." (18:295), and that the protective effect, which lasted even after breast feeding was discontinued, was independent of family size, overcrowding in the home, or income and education of the parents.

Cow's milk feeding in infancy (up to one year) was the subject of another study (21) whose data revealed that the proportion of infants with guaiac-positive stools was significantly greater among infants fed pasteurized cow's milk than among those on

Enfamil® or on cow's milk that had been heated beyond pasteurization. The study concluded that pasteurized cow's milk should not be fed to an infant until after one hundred forty days of age, or at approximately four and one-half months (21:545).

Certain studies and standards for infant and young child feeding have been developed by the National Academy of Sciences in their Recommended Dietary Allowances (48) and by the American Dietetic Association in such articles as "Infant Feeding Practices" which appeared in 1980 (39) and discussed the influence of feeding method on nutrient and calorie intakes and plasma measurement of renal functions. The results of this study indicated that solid foods should be delayed until five or six months of age.

The baby formula controversy between the infant formula manufacturers and government and other suppliers of infant nutrition knowledge and care throughout the world of the past few years (28:112; 58) will no doubt continue for the next decade. Certain additives are proving hazardous (28:112) and the promotional efforts of the formula companies are being questioned in and out of court. A study of breast feeding on 1,000 babies from birth to age one is currently in progress (1981) at the U.S. Department of Agriculture (58).

The core of the nutrition education program for W.I.C. mothers is the discussion and evaluation of the advantages and disadvantages of breast feeding (60). Much of the W.I.C. literature (8, 9, 10) is directly aimed at encouraging breast feeding

for as long as possible, and certainly for approximately one year. Some members of the local greater Los Angeles area culture may be against breast feeding by tradition or as indicative of low socio-economic status, as has been delineated in the preceding pages. The many positive attributes of breast feeding have also been enumerated and it is these on which W.I.C. concentrates; e.g., of the twelve topics to be discussed by W.I.C. prenatal mothers and nutrition instructors during 1982 (60), ten will be specific for the positive results to be gained from breast feeding. Advocacy of breast feeding underlies the structure of the W.I.C. Nutrition Education Program: if there is a sketch or drawing on W.I.C. data sheets, it almost always represents a woman breast feeding an infant.

W.I.C. encourages the following infant dietary regimens (10):

Birth - use

breast milk or iron-fortified formula.

4-6 months of age - add

iron-fortified infant cereal (rice, oats, barley).

5-7 months of age - add

strained and blended fruits and vegetables,  
fruit juices.

6-8 months of age - add

cottage cheese, yoghurt, strained meat, chicken,  
fish, egg yolk.

7-9 months of age - add

other infant cereals such as wheat and mixed grains, mashed vegetables and fruits, mild cheeses.

8-9 months of age - add

finger foods: toast squares, strips or slices of cooked vegetables;

peeled, soft fruit wedges or slices;

small, tender pieces of meat;

formula, water or juice from a cup with help.

10-12 months of age - add

food from the family table, including whole egg.

One year -

may be weaned from bottle or breast;

may drink cow's milk.

#### Weaning and Nutrition for the Young Child

Fomon (20) (1975) estimated that seven percent of energy consumed by infants in the United States was derived from semisolid foods (e.g., cereals, strained meats, vegetables and fruits, and eggs) in the first month of life and that the percentage increased to nearly 30 percent at five to six months. At the same time, consumption increased during the first six to nine months. After this, the percentage of energy derived from semisolid foods decreased, while that from table food increased to 46 percent at one year (20:350). Knowledge of the proper foods for weaning may be a problem among some Hispanics, as was found by Griffiths et al. (25:119) in Nicaragua, where student nutrition workers in rural

villages found (1977) the main problems (25:119) to be as follows:

1. Lack of knowledge of proper weaning foods.
2. Lack of variety in the diet.
3. Inadequate calories for young children.
4. Inadequate supply of vitamin A, calcium, iron, and protein food sources.

W.I.C. (10), through its nutrition education classes and pamphlets, encourages soft, mashed, strained, or blended foods until approximately seven to nine months of age. W.I.C. also encourages bottle feeding of plain water (with nothing added) in between feedings, especially for hot days. Water has an added advantage of not causing dental caries. Reduction of the amount of cow's milk consumed also decreases occult intestinal blood loss, with its consequent iron loss, and increases the intake of foods which are needed to provide iron and other minerals, vitamins and other nutrients (53:106; 15:36). Water could also be offered to an older infant who may be crying because he or she is thirsty and not necessarily because he or she is hungry (12:1179). W.I.C. also encourages limiting the use of pasteurized cow's milk by older children to six to eighteen fluid ounces depending on consumption of other dairy foods.

The neonate is capable only of sucking and swallowing liquids. The kidneys are immature and large amounts of protein and electrolytes are inappropriate. Later the infant learns to eat from a spoon, the gastrointestinal tract and kidneys are more

fully developed, and soft or mashed foods may be taken (four to five months). By five to six months, the infant is ready to express preference and interest in foods by opening of the mouth and leaning forward or away from foods. By one year, the child can eat modified table foods (adult foods) in small portions (12:1178-1179).

The W.I.C. Program advocates six food groups (9):

Milk and milk products

Protein foods, animal and vegetable

Breads and cereals

Dark green vegetables

Vitamin C fruits and vegetables

Other fruits and vegetables and nutritious snacks

These are outlined in the W.I.C. data sheet, Daily Food Guide (Guía Diaria de Alimentos (10)).

According to Pipes (54), patterns of obesity are set early in life and may be due to early weaning resulting in excess food volume and consequent weight gain (54:58). A 1981 study revealed that dietary cholesterol intake at age six was significantly correlated with serum cholesterol levels at the same age, and Matter (41) found (1980) that an accumulation of excess body fat might result in unfavorable serum lipid levels in adults. Since coronary heart disease is the leading cause of death in the United States (41:149), some limitation of excess dietary fat and excess calories in the foods of children from birth to five years of age is desirable.

Nutrient density of foods is important for the young child to ensure adequate supplies of vitamins, minerals and protein (44:185-192). Foods which a young Hispanic child might eat include Italian squash, mild red peppers, chayote squash, tomatoes, and avocado (70), which some Hispanics in the greater Los Angeles area grow with success (as observed by the writer). Other healthful foods which are often relatively inexpensive and readily available are a wide variety of beans, milk, eggs, white cheeses, peanut-butter, corn and enriched flour tortillas, dark green leafy vegetables, carrots, yams, potatoes, bananas, papayas and mangos.

Attitudes toward animal and vegetable proteins would influence their use for weaning and post-weaning nutrition of the young child. Brittin and Zinn (5:626) reported that of the three ethnic groups surveyed (Caucasian, Mexican-American, and Negro), the Mexican-Americans (annual family income \$6,200.60) spent more money on animal protein than the other two groups. Since the W.I.C. families may have lower incomes than those of the Brittin and Zinn survey, they may not be able to afford large animal protein purchases and would need to know vegetable sources of protein for maximum child nutrition.

The poor diet of some Hispanic children may result in, among other things, anemia, as demonstrated by some of the W.I.C. children, whose qualification for admittance to the W.I.C. Program may be diagnosed nutritional anemia. Nutritional anemias result from a low consumption of iron, protein, vitamin B-12

(cyanocobalamin), folic acid, pyridoxine (B-6), ascorbic acid (vitamin C), and copper (34:606). The World Health Organization considers anemia to exist in children aged six months to six years with hemoglobin levels below 11 gm/dl (73:9). The cause of anemia most prevalent in the United States as shown by regional and national surveys (59:10-12) is iron under-nutrition resulting in iron deficiency anemia.

A recent study (22:360, 365) on pre-school vegetarian children showed that calcium intake of these children was low, and height measurements were generally in the lower percentile ranges. Skinfold tests showed lower triceps and subscapular skinfold thicknesses, as well as arm muscle circumference. Mean heights and weights of the children (ages three to five years) were also low. Therefore, cheese, other dairy products, and dark green leafy vegetables need to be considered in the diet of a small child.

Esther Mercado, formerly of Monterrey, Mexico, and now of Los Angeles, California, and a lay authority on the foods of central and northern Mexico, reported (45) that the typical diet of a baby of a lower class family in central or northern Mexico was likely to be as follows:

1. Breast milk was used for approximately one year (the poorer the family, the longer the nursing period was continued).
2. Egg yolk was eaten at three to four months of age.
3. Quaker Oats® (avena) cereal was used at four to five

months of age. Thinned regular oats might also be used.

If the family could afford other infant cereals, these might also be used.

4. Banana (plátano) was eaten at four to five months of age.
5. Whole eggs were used at four to five months of age.
6. Beans of any variety (mostly pinto) were eaten at approximately five months of age. These could be washed or peeled, i.e., the mother would use just the soft inner part of the bean.
7. By five months of age a small piece of tortilla dipped in bean gravy would be given to the infant to gum on.
8. At seven months of age, the child might drink water from a cup and might possibly drink orange juice. The infant would not have any other liquid than breast milk up to this time.
9. By one year of age, the infant would eat table food, including pastas (small star-shaped forms of noodle) or fideos (thin pasta, similar to vermicelli), potatoes, soup, and small amounts of meat or chicken (when available).
10. Sweet drinks, sweet bread, and candies might also be eaten by the young child, depending on the nutrition knowledge of the mother and the family ability to pay for such foods.

Mrs. Mercado reported (45) that even a very poor person (especially if rural) was likely to eat, at least occasionally, some chicken, eggs, oranges, beans, potatoes, zucchini (calabasitas), milk (if there was a cow), various kinds of chiles, and tomatoes.

Legumes, especially beans, are particularly useful to small children where there is poverty. The bean is generally inexpensive and very nutritious. In a study on the nutritive value of brown and black beans for infants and small children, Graham et al. (23:2363) found that, in all but one of the several studies made, the beans (a precooked and instantized mixture of brown and black beans) were consumed without any problem and there were no signs of intolerance. However, it was found that nitrogen absorption did not compare favorably with that of casein, and the mixture was deficient in methionine. The final conclusion of the study was that beans should not be fed to very young children (23:2366).

Next to the use of homemade teat or cloth pacifier soaked in honey or milk or molasses, the activity that causes the most dental caries in the small child is the carrying or holding of a nursing bottle of milk or juice and its intermittent and/or constant use. This prolonged bottle feeding results in decay of the upper teeth and lower posterior teeth (62:2334). Inga Hoffman (26), West District Director of Health Education of Los Angeles County, has stated to the writer that bottle-mouth syndrome is one of the most severe health problems in young children in their area. There are now sophisticated, and what appear from the photographs (32:30)

to be uncomfortable ways of providing restorations ("caps") for children with these problems, but these would involve financial expenditures unavailable to most W.I.C. mothers. Therefore, W.I.C. is understandably concerned with the problem of bottle-mouth syndrome.

The use of vitamin C-containing juices to help fight infections and provide healthy skin is emphasized by the W.I.C. Program, and the program includes the provision of vouchers for such juices. One of the most important attributes of vitamin C is its function in the formation of collagen, bone calcification, the formation of dentin, and blood vessel strength (lack of ascorbic acid can cause very small hemorrhages under the skin). Low intakes of vitamin C can also cause scurvy which is a conglomerate of physiological problems, first identified by bleeding and swollen gums (44:35).

#### Nutrition Education Surveys

The National Research Council Bulletin 117 (49:120) stated that the survey of factual knowledge may have two purposes:

1. To determine the content of subject matter to be used in a particular situation; and
2. To measure the effectiveness of a method in presenting facts.

This study has attempted to fulfill both mandates. However, there do not appear to be many published nutrition-knowledge, attitude or education surveys in the area of the Hispanic, Mexican or

Mexican-American child from birth to five years of age with the scope of those of Devedas et al. in India (17) and Cerqueira et al. (11) in Mexico, of the school-age child.

A study by Hunt et al. (27:675) (1976) substantiated the effectiveness of nutrition education in raising nutrition status in low-income pregnant women of Mexican descent, although it was determined that some women still showed biochemical evidence of multiple depletion of nutrients at the final interview (27:680). It was also stated that there did not appear to be significant differences between control and treatment groups in the level of improvement in biochemical indices, except for folic acid (27:675). A 1975 study of W.I.C. clinics reported by Brother (6:28) revealed that the majority of the clinics were ineffective in their nutrition education efforts in the view of nine out of ten of the participants.

A study (1981) of W.I.C. by Slonin et al. (65:166) suggested that the eligible recipients were probably receiving less nutritional supplementation than was intended by the Program and it was found that 100 percent of the respondents used W.I.C. foods in preparing family meals. This study also reported a negative effect of formula supplementation by W.I.C., i.e., seventy percent of the respondents began to use the supplements during the child's first week after birth. The study concluded, however, that infant and child feeding practices were affected positively by the information received from advice givers--including W.I.C.

The effectiveness of nutrition aides working with health

professionals in a program of service and education was assessed in a recent study by Bowering et al. (4). The results of the evaluation of the Expanded Food and Nutrition Education Program (EFNEP) in East Harlem indicated that the subjects were responsive to nutrition information. The teaching goals of the aides were discouraging the use of cow's milk during the first six months of life, developing familiarity with large variety of foods appropriate for infants from six to eighteen months of age, and preventing iron-deficiency anemia. Therefore, in some respects, the goals of this program were similar to those of W.I.C. The study population was largely Puerto Rican. The authors commented as follows:

Evaluation of nutrition education programs is difficult when one attempts to move from assessing nutritional knowledge to assessing behavioral change. Most of the limitations of the present evaluation were related to the complexity of problems confronting low-income families and the difficulty of isolating simple and measurable, but still meaningful, variables (4:396-397).

The authors also stated that, despite its limitations, their evaluation suggests that grass roots programs, e.g., EFNEP and Cooperative Extension are an important potential resource for linking health education and health services with the needs of families and the necessity of the early development of good food habits.

Among the recent studies of the W.I.C. Program which indirectly included some aspects of W.I.C.'s nutrition education efforts was a medical evaluation of W.I.C. (1979) by Edozien et al. (19:691) which revealed an increase in hemoglobin level and a significant reduction in the anemia rate among the children, plus an increase

in body size and reduction in morbidity. A 1981 statement by M. L. Smith, President of the American Dietetic Association, and other experts (66) described several studies of the W.I.C. Program which indicated that W.I.C. infants and children exhibited accelerated growth, an increase in mean hemoglobin values, reduction in anemia, and an increased use of health care services. The Harvard School of Public Health, in a 1979 study (2:581), revealed that for every dollar spent on W.I.C. prenatal care, three dollars would be saved by avoiding future medical costs for low-birth-weight babies. This study, originated by Kennedy, on the "Effect of W.I.C. Supplemental Feeding on Birth Weight" was also cited by Berkenfield and Schwartz (2:581) as being a comparison of a W.I.C. group of mothers with a non-W.I.C. group of mothers, with the birth weights of the W.I.C. group of neonates significantly higher ( $p < 0.01$ ) than those born to the non-W.I.C. mothers. Therefore, there appears to be some concurrence regarding the value of W.I.C. and the services, including nutrition education, it provides, all of which contribute to increased nutrition knowledge, better nutrition practices and better health (38) in particular of the Hispanic, Mexican or Mexican-American child and mother who make up (in some areas) a large proportion of the participants (6:28).

Measurements of adult nutrition knowledge in various studies, as reviewed by Sims (63:122), showed correlations between high scores on nutrition knowledge and higher educational attainment and income level. Sims' original research (63:122) on the nutrition

knowledge of the mothers of preschool children indicated that women of higher economic status, younger women, and women who were less authoritarian in their child-rearing practices and felt nutrition was important for their children, made higher scores on nutrition knowledge tests.

The Interagency Committee on Nutrition Education (ICNE) in Canada has developed a standardized test to measure nutrition knowledge of adult diets, as reported by Prefontaine (56:152). A 25-item nutrition test was developed, based on concepts presented by the ICNE and stated in a series of goals. Experts ruled on what constituted important goals. Content validity was based on the way in which the questions related to the behavioral objects of the ICNE concepts and the relative importance of the concepts in the opinion of the expert judges. Prefontaine (56:152) also reported that most approaches used to assess levels of nutrition knowledge either covered only a limited area of nutrition or were suitable only for high school students. However, some aspects of nutrition knowledge as delineated by Olson and Sims (51:158), specifically that of an information-processing perspective, including parameters of nutrition knowledge information acquisition, knowledge structures, information integration in decision making, and ultimate food-choice behavior, plus other factors involved in their model of information processing, appear to refute Prefontaine's statement.

Sims (63:122) (1976) has stated that "to date, this author has found no published data on the relationship between attitudes

and knowledge of nutrition facts." However, Miriam Muñoz de Chavez (47:167) (1972) reported that, although some mothers in the rural areas of Mexico were ignorant and full of prejudices, they wanted to learn about nutrition and were deeply concerned about their children's diets. In studies (47) of three communities in Mexico, results from one area showed that even when the economic condition of the family was precarious, nutrition advice on routine feeding of a simple diet based on available foods such as papaya, banana, mashed beans, squash, and native greens, and provision of supplemental milk, helped seriously malnourished children recover to some extent, although not completely (47:168).

Surveys of nutritional knowledge made in Czechoslovakia by Adamec (1:108) (1972) of the Society for Rational Nutrition showed an increased interest in good nutrition at the national level by direct action of the government through the "Nutrition and Health" campaign subjects featured each year; e.g., 1957: "A varied diet--the basis of health," and 1971: "Let's shop with sense." In the campaign, mass media collaborated with regional and district centers of health education where lectures, discussions, film shows, contests among children and exhibitions were held. Local activities included the selection of a "Miss Nutrition" (1:108). Pre- and posttest surveys of nutrition knowledge were made at the end of each campaign and the results were used in planning subsequent campaigns (1:108-109).

Poolton (55) expressed concern for the gap between knowledge

and application of nutrition principles and the importance of developing favorable attitudes toward desirable eating practices (55:110). She suggested a student-centered discovery or problem-solving approach (55:113) as a means of narrowing the gap.

Results from a small (N = 40) survey of Spanish/Mexican American women in New Mexico (16) indicated the importance of several factors as reasons for food acceptance, as follows:

- social
- psychological
- cultural
- \*sensory
- \*economic
- \*geographic
- health
- convenience

The starred (\*) groups were the most often mentioned for frequently served foods, and health reasons were a factor 4.6 percent of the time (16:121).

Relating nutrition knowledge, attitude and behavior may be approached from many perspectives. Although many investigations involve school-age children or adults, Birch states (3:17) that food preferences are developed during the preschool period and suggests (3:18) that nutrition education of the preschool child might be more effective than education of the parents.

### III. METHODOLOGY

#### The Instrument

The instrument for this study was a questionnaire which was to be completed as a pre- and posttest by a group of women of Hispanic heritage living in the Pacoima area of the San Fernando Valley, California. The questions were formulated in Spanish and later translated into English. In the questionnaire, six items were demographic and 23 questions were about the nutrition of children aged birth to five years. The demographic questions were omitted on the posttest, which was given after a period of two months had elapsed. The two-month period was chosen as a reasonable length of time by the Director of the W.I.C. Program for the Clinic (60) where the questionnaire was administered and by the writer. A longer period might have resulted in a very small posttest sample. According to the W.I.C. Director (60), subjects might be lost due to the following reasons:

1. Change in subject's clinic appointment schedule.
2. Illness.
3. Childbirth.
4. Withdrawal from the W.I.C. Program.

The demographic questions concerned age, language spoken in the home, receipt of medical care, number of medical care visits made per year, number of months in attendance at the W.I.C. Clinic

in Pacoima, and number of years of education in a school. The subjects comprised a non-probability sample of attendees on five consecutive Wednesdays at the W.I.C. Clinic, and included all those women who had agreed to answer the questions. All of the subjects signed a Consent Form (Appendix C).

The items on the questionnaire were designed to measure information which was provided the subjects by W.I.C. in their nutrition education classes, in individual counseling by nutrition aides, in counseling by nutritionists, in W.I.C. slide tape nutrition education shows, and in nutrition literature handouts.

Acquisition of nutrition information from sources other than W.I.C. was taken into consideration by the demographic questions on whether visits for medical care had been made (some postpartum women might not have been receiving medical care), whether more than ten visits for health care had been made (not including W.I.C.), and level of general education. True and false questions were used to keep the test as simple and short as possible. The size of the sample was intended to compensate for any forced responses. Sample size goals and expectations were a large pretest sample (approximately 350 subjects), and a small posttest sample (approximately 100 subjects).

All questions were discussed with, or originated by, Gayle Schachne, Director of the W.I.C. Program at Granada Hills Community Hospital and of the W.I.C. Clinic in Pacoima, and/or Dr. Ann R. Stasch, Chairperson of the Thesis Committee. Demographic questions

included:

1. Age of Mother (categories for years: 0-18, 19-25, 26-35, and 36-50.

This was included to determine if there were differences in pre- and posttest scores by age group.

2. Language spoken in the home, English or Spanish, which was intended to determine differences in pre- and posttest scores by language spoken in the home.

3. Source of health care, some or none, which was intended to determine effect of other health/medical care on pre- and posttest scores.

4. Number of visits for health care per year, 0 to 10, or 11 or more,

which was intended to determine if quantity of medical contacts had an effect on pre- and posttest scores.

5. Months in the W.I.C. Program, 0, 1-4, 5-8, 9-12, and 13 or more,

which was intended to determine an association between number of months in W.I.C. Program and pre- and posttest scores.

6. Years of education in a school, 0-6, 7-9, 10-12, and 13-20,

which was based on the possible effect of formal education on pre- and posttest scores.

Division of independent variables by age group was made by estimation (by the writer) of age groups most likely to be preponderant, i.e., a relatively short six-year span for ages 19-25 seemed reasonable, since the median age was likely to be around 22.1, as

previously discussed on page 3. Mothers under 18 and over 35 years were expected to be small groups. Similar deductions were made for the education category. Establishing categories for months in the W.I.C. Program was made in arbitrary intervals of four months which created five categories from zero to over thirteen months. All non-demographic questions were described in three W.I.C. pamphlets, the first two of which were written by the Director of the W.I.C. Program for the Pacoima Clinic (60):

Daily Food Guide  
(Guía Diaria de Alimentos) (9)

What Do You Feed Your New Baby?  
(¿Que alimenta Ud. a su bebé?) (8)

The First Twelve Months  
A Guide to Infant Feeding (10)

<u>Question Number</u>	<u>Topic</u>
1, 2, 4, 6	Breast feeding
3, 9	Cow's milk
5	Tooth decay due to nursing bottle syndrome
7, 8	Water
10, 11	Fats, oils, obesity
12	Protein sources (eggs, milk, beans, cheeses)
15, 16	Iron sources
14, 17	Vitamin C sources
13, 22, 23	Nutrient dense fruits and vegetables such as squash, chayote, tomatoes, bananas, papaya, avocado and dark green vegetables
18, 20, 21	Foods low in vitamins and minerals such as coffee, cake, donuts, ice cream, and candy
19	Menu planning, variety in the diet

### Data Collection

The pre- and posttests were conducted in the community hall of the local Catholic Church, which was the normal location of the W.I.C. Clinic, during the regular clinic hours. A main goal of the administrator, for both the pre- and posttest administrations, was to interfere as little as possible in the operation of the W.I.C. Clinic.

During the administration of the questionnaires, W.I.C. nutrition aides were distributing vouchers in one area of the hall; participants received slide tape instruction on the principles of good nutrition in another area of the hall, and at scheduled intervals, a nutrition aide distributed literature on nutrition and gave a nutrition lecture in Spanish (using visual aids such as flip charts, velcro boards, and food models) for approximately 15 to 20 minutes in another area of the hall (some of the attendees would also see a nutritionist for specialized one-to-one counseling). The survey group occupied yet another area of the hall.

Tests were administered on a regular basis on May 27, June 3, 10, 17, and 19, 1981. Posttests were administered two months later on August 26, September 2, 4, 11, 16, and 23, 1981. Three hundred sixty-six subjects constituted the pretest sample. The posttest sample of 126 was identical to the same 126 women of the pretest. The other 240 subjects were not available at the posttest times scheduled. Based on data prepared by the Director of the W.I.C. Program (60), the subjects received instruction on

the topics described in Table 1 between the time of the pre- and posttests. The schedule showed two courses of study, i.e., that for "prenatal women" and that for "mothers of infants/children." The schedule also showed that the topics covered by the questionnaire were taught to most of one or the other of the two categories of mothers prior to the posttest. A summary of the 1981 schedule of classes for the Pacoima Clinic of the W.I.C. Program is given in Appendix D.

The pretest procedure was as follows:

1. The potential subject entered the hall and submitted her W.I.C. attendance card. W.I.C. personnel took the card, validated it, and pulled subject's W.I.C. data file packet. (The questionnaire administrator was not allowed to touch or examine the W.I.C. data file packets.)
2. W.I.C. personnel or the administrator asked the potential subject if she would be willing to take a test on nutrition which would help W.I.C. in their nutrition education program and thus benefit them and their children in better health through improved nutrition knowledge.
3. If the potential subject agreed to take the test, the administrator gave her a pencil and a Consent Form in either Spanish or English, according to her preference. The Consent Form was explained to the subject, and

Table 1

## W.I.C. Clinic Nutrition Education Schedule

Survey Test Dates	W.I.C. Clinic Nutrition Education Schedule	Prenatal Women	Mothers of Infants/Children
May 27, 1981	May, 1981	Weight Gain	Sanitation and Food Handling
June 3, 10, 17, 19	June	Reorientation Review of the six W.I.C. food groups	Re-orientation Review of the six W.I.C. food groups
	July	Calcium	Calcium
August 26	August	Advantages/ Techniques of Breast Feeding	Breads and Cereals
September 2, 4, 11, 16 and 23, 1981	September, 1981	Pregnancy: You and Your Baby	Child Feeding I

## 3. (continued)

sufficient time was allowed for the subject to read the Consent Form (which also described the benefits of the test to the mother and her children). The subject printed her name at the top of the Consent Form and signed her name at the bottom of the page. The name was printed at the top to ensure that a readable spelling of the name would be obtained.

4. The administrator then gave the subject a prenumbered questionnaire, and explained the method of marking it as follows: one "x" or check-mark for each of the demographic questions, and a circle around the "T" or the "F" for each of the true-false questions. The instructions for marking the questionnaire were also printed on the questionnaire.
5. Each subject was seated in a chair during the administration of the Consent Form and the questionnaire, and, depending on the number of subjects present, might have been seated at a table.
6. If the subject was illiterate, the administrator would read the Consent Form and questionnaire to the subject. If two illiterate subjects arrived at the same time (which rarely occurred), one of the subjects who had already taken the test would be asked to read to one of the illiterate subjects. The proxy administrator

## 6. (continued)

was instructed by the administrator not to discuss the Consent Form or questionnaire with the subject and the administration was monitored by the administrator.

## 7. After the test was completed, the subject was asked:

- a. not to discuss the questionnaire with anyone,
- b. to expect to take the same test again in two months, and
- c. to give her questionnaire to the nutrition aide at the table when her name was called.

Each subject was thanked for her cooperation in taking the test.

## 8. The subject then was seated at either:

- a. the area in front of the slide tape projector,
- b. the area in front of the nutrition aides' table for voucher pick-up and counseling, or
- c. the nutrition lecture area for the nutrition education lecture.

## 9. When called by the nutrition aide, the subject turned in her test, the nutrition aide marked the pre-assigned test number of the questionnaire on the lower left-hand corner of the subject's file packet and placed it on her section of the table. The tests were picked up by the administrator at hourly intervals.

Posttest procedures were as follows:

1. Each woman arrived at the clinic (singly). W.I.C. personnel took the woman's W.I.C. card, pulled her

1. (continued)

W.I.C. file packet, noted if there was a test number in the lower left-hand corner of the packet, and, if there was, wrote the number on a posttest questionnaire and handed a pencil and the questionnaire to the subject. W.I.C. personnel told the subject that this was the same questionnaire as that taken two months previously, except that there was no Consent Form and no demographic information to fill out.

2. The administrator greeted the subject, repeated that this was the same questionnaire (without the Consent Form and the demographic questions) and thanked them for their participation in the survey.
3. The pretest procedure as outlined in items 4, 5, 6 and 7 was then followed, except that the subject gave her completed questionnaire directly to the test administrator or to W.I.C. personnel.

### Computer Analysis

The data were analyzed using the Statistical Package for the Social Sciences, by frequency, t-test, and ANOVA measurements.

#### IV.

#### RESULTS AND DISCUSSION

The original sample consisted of 410 subjects, 95 percent of whom were of Hispanic origin. Only 366 subjects completed the pretest acceptably, and of this group, 39 subjects reported speaking English in the home and 326 subjects (89 percent) reported speaking Spanish in the home (see Table 2).

For a demographic profile of the predominant pre- and post-test subjects see Table 3.

From the original sample of 410 subjects, 44 were not included in the survey for the following reasons:

1. Some of the pretest questionnaires did not contain sufficient responses (less than 25 percent of the questions were answered) to include in the sample. Two of these subjects were Orientals for whom there was no available translator.
2. Fifteen of the pretest questionnaires were not clearly marked by the subjects, and by the time the administrator picked them up, the subjects had left.

For  $N = 366$  the pretest mean was 17.872 giving a score of 77.7 or 78 percent correct. For the paired data ( $N = 126$ ), the pretest mean was 17.6032, resulting in a score of 76.5 or 76 percent. The posttest mean for  $N = 126$  was 18.2698, resulting in a score of 79 percent. Therefore, final scores were as follows:

Table 2  
Demography of the Sample

Category Group	Pretest (N = 366)		Posttest (N = 126)	
	No. of Subjects	Frequency in %	No. of Subjects	Frequency in %
Age in years				
1. 0-18	46	12.6	10	7.9
2. 19-25	168	45.9	63	50.0
3. 26-35	118	32.2	43	34.1
4. 36-50	33	9.0	10	7.9
Missing values	1	0.3	0	0
Language spoken in the home				
1. English	39	10.6	14	11.1
2. Spanish	326	89.1	112	88.9
Missing values	1	0.3	0	0
Medical care received				
1. Some	340	92.9	118	93.7
2. None	19	5.2	7	5.6
Missing values	7	1.9	1	0.8
Medical visits made per year				
1. 0-10	267	73.0	95	75.4
2. 11 or more	62	16.9	16	12.7
Missing values	37	10.1	15	11.9
Months in the W.I.C. Program				
1. 0	45	12.3	18	14.3
2. 1-4	93	25.4	26	20.6
3. 5-8	100	27.3	34	27.0
4. 9-12	56	15.3	17	13.5
5. 13 or more	66	18.0	28	22.2
Missing values	6	1.6	3	2.4
Education in years				
1. 0-6	237	64.8	88	69.8
2. 7-9	68	18.6	23	18.3
3. 10-12	40	10.9	10	7.9
4. 13-20	17	4.6	5	4.0
Missing values	4	1.1	0	0

Table 3  
Demographic Profiles of Predominant Groups

Category Group	Pretest (N = 366)	Posttest (N = 126)
Age in years (four age groups)	19-25 years *(26-35)	19-25 years *(26-35)
Language spoken in the home (Spanish or English)	Spanish	Spanish
Medical care received (some or none)	Some	Some
Medical visits made per year (10 or less, more than 10)	10 or less	10 or less
Months in the W.I.C. Program (five groups)	5-8 months *(1-4)	5-8 months *(13 or more)
Education in years (four groups)	0-6 years *(7-9)	0-6 years *(7-9)

\*Second most predominant group

<u>Test</u>	<u>Score Correct</u>
Pretest (N = 366)	78 percent
Pretest (N = 126)	76 percent
Posttest (N = 126)	79 percent

A "t" test for the difference between paired pre- and posttest means (N = 126) produced a computed "t" of 2.18. Criterion value at 0.05 level of significance for a 2-tail test was 1.98. The computed "t" of 2.18 was greater than the criterion value of 1.98. Therefore, the data were significant (not due to chance), and there was a significant difference in test score for paired data due to the W.I.C. nutrition education program between the time of the pre- and posttest administration.

In a test between means of all the pre- and posttests ( $N_1 = 366$ , and  $N_2 = 126$ ), there was not a significant difference in overall test scores due to W.I.C. nutrition education. The computed "t" was 1.52. The criterion value was 1.96. Therefore, since the computed "t" was smaller than the criterion "t", the data were not significant.

A one-way ANOVA by group categories (Table 4) showed the pretest data were significantly different at the 0.05 level for two categories, age ( $F = 2.28$  with a criterion value of 2.08) and number of months in the W.I.C. Program ( $F = 2.57$  with a criterion value of 2.44). This reinforces the significance of the effect of the W.I.C. Program demonstrated by the significant "t" value for the pre- and posttest means (N = 126) discussed

Table 4  
One-way ANOVA by Group Categories (N = 126)

Category Group	Number of Subjects	Pretest			Posttest		
		Mean	F Ratio	Criterion Value	Mean	F Ratio	Criterion Value
Age in years			2.28*	2.08		0.51	2.08
1. 0-18	10	15.50			18.10		
2. 19-25	63	17.97			18.00		
3. 26-35	43	17.72			18.58		
4. 36-50	10	16.90			18.80		
Language spoken in the home			3.53	3.92		0.54	3.92
1. English	14	16.21			18.78		
2. Spanish	112	17.78			18.20		
Medical care received			1.99	3.92		2.41	3.92
1. Some	118	17.52			18.19		
2. None	7	19.14			19.86		
Medical visits made per year			0.16	3.94		1.31	3.94
1. 0-10	95	17.64			18.49		
2. 11 or more	16	17.31			17.62		
Months in the W.I.C. Program			2.57*	2.44		1.74	2.44
1. 0	18	17.00			17.94		
2. 1-4	26	16.65			17.81		
3. 5-8	34	17.62			17.68		
4. 9-12	17	17.18			18.29		
5. 13 or more	28	19.00			19.36		
Education in years			1.50	2.08		0.97	2.08
1. 0-6	88	17.58			18.01		
2. 7-9	23	18.00			18.91		
3. 10-12	10	16.10			18.50		
4. 13-20	5	19.20			19.40		

\*Significant at  $\leq 0.05$

previously. Women who had been in the W.I.C. Program the longest achieved the best scores, i.e., for women who had spent 13 or more months in the W.I.C. Program (means were 19.00 and 19.36 for their pre- and posttest scores, respectively). Best pretest scores were achieved by women 19-25 years of age, and best posttest scores by women 36-50 years of age.

A Two-way Analysis of Variance, Table 5, showed a significant effect ( $F = 5.02$  and  $p \leq 0.05$ ) of interactions on posttest scores due to language spoken in the home. Months spent in the W.I.C. Program were also significant ( $F = 3.29$ ). Results from the Two-way ANOVA also showed a highly significant  $F$  for age (10.67) and for language (9.83).

As might have been expected, the highest scores (see Table 6) on both pre- and posttests were achieved by women at the W.I.C. Clinic, who had received the most education. The best pretest scores were attained by women 19 to 25 years of age (the predominant group) and on the posttest by women 36-50 years of age. The women who spoke Spanish in the home (the predominant group) received highest scores on the pretest, however, posttest scores were highest for those who spoke English in the home, indicating the possibility of an increased score due to acculturation.

The groups with the lowest scores (Table 7) showed a trend toward low scores by the young age groups: 0-18 year-olds for the pretest, and 19-25 year-olds for the posttest. The English-speaking group scored low on the pretest and the Spanish group was

Table 5  
Two-way ANOVA Summaries  
(N = 126)

Category Group	Cell Means		Source of Variance	Sum of Squares	DF	Means Squared MS	F	Criterion Values	
	Pretest	Posttest						0.05	0.01
AGE									
0-18	15.50	18.10	Age	30.23	3	10.08	0.95	2.65	3.88
19-25	17.97	18.00	Pre-, posttest	60.80	1	60.80	10.67**	3.89	6.76
26-35	17.72	18.58	Interactions	39.80	3	13.27	2.33	2.65	3.88
36-50	16.90	18.80	Error	1986.95	244	8.14	--		
			Total	2117.78	251				
LANGUAGE									
English	16.21	18.78	Language	6.00	1	6.00	0.57	3.89	6.76
Spanish	17.78	18.20	Pre-, posttest	56.00	1	56.00	9.83**	3.89	6.76
			Interactions	28.57	1	28.57	5.02*	3.89	6.76
			Error	2022.41	248	8.16	--		
			Total	2118.98	251				
MEDICAL CARE									
Some	17.52	18.19	Medical Care	35.91	1	35.91	3.44	3.89	6.76
None	19.14	19.86	Pre-, posttest	6.33	1	6.33	1.06	3.89	6.76
			Interactions	0.01	1	0.01	0.00	--	--
			Error	2019.08	246	8.20	--		
			Total	2061.33	249				

Table 5 (continued)  
Two-way ANOVA Summaries  
(N = 126)

Category Group	Cell Means		Source of Variance	Sum of Squares	DF	Means Squared		Criterion Values	
	Pretest	Posttest				MS	F	0.05	0.01
MEDICAL VISITS									
0-10	17.68	18.48	Medical Visits	10.18	1	10.18	0.94	3.89	6.76
11 or more	17.31	17.62	Pre-, posttest	8.52	1	8.52	1.32	3.89	6.76
			Interactions	1.64	1	1.64	0.26	3.89	6.76
			Error	1902.14	220	8.65	--		
			Total	1922.48	223				
MONTHS IN WIC									
0	17.00	17.94	Months in WIC	132.32	4	33.08	3.29*	2.41	3.41
1-4	16.58	18.00	Pre-, posttest	34.10	1	34.10	5.54*	3.89	6.76
5-8	17.53	17.59	Interactions	16.15	4	4.04	0.66	2.41	3.41
9-12	17.18	18.29	Error	1832.98	226	8.11	--		
13 or more	19.07	19.44							
			Total	2015.55	235				
EDUCATION (years)									
1-6	17.58	18.01	Education	42.63	3	14.21	1.36	2.65	3.88
7-9	18.00	18.91	Pre-, posttest	21.93	1	21.93	3.73	3.89	6.76
10-13	16.10	18.50	Interactions	18.69	3	6.23	1.06	2.65	3.88
13-20	19.20	19.40	Error	1995.66	244	8.18	--		
			Total	2078.91	251				

\*Indicates data significant at  $\leq 0.05$

\*\*Indicates data significant at  $\leq 0.01$

Table 6  
 Groups with Highest Scores  
 (N = 126)

Category Group	Pretest	Posttest
Age in years	19-25 years	36-50 years
Language spoken in the home	Spanish	English
Medical care received	None	None
Medical visits made per year (0-10 or 11 or more)	0-10 visits	0-10 visits
Months in the W.I.C. Program	13 or more months	13 or more months
Education in years	13-20 years	13-20 years

Table 7  
 Groups With Lowest Scores  
 (N = 126)

Category Group	Pretest	Posttest
Age in years	0-18 years	19-25 years
Language spoken in the home	English	Spanish
Medical care received	Some	Some
Medical visits made per year (0-10 or 11 or more)	11 or more visits	11 or more visits
Months in the W.I.C. Program	1-4 months	5-8 months
Education in years	10-12 years	0-6 years

low on the posttest. Both pre- and posttest subjects indicated receiving some medical care, the inference being that they were prenatal or immediately postpartum. Both pre- and posttest groups visited a doctor or nurse practitioner more than ten times per year, confirming the inference that they were prenatal or immediately postpartum. As mentioned previously, the women with no previous attendance in the W.I.C. Program (the control group) scored higher than those who had been in the W.I.C. Program for 1-4 months on the pretest, and higher than those who had been in the W.I.C. Program for 5-8 months on the posttest. There was no logical explanation for low scores on the posttest by those who had spent 5-8 months in the W.I.C. Program. During the pretest there was considerable interaction between the subjects and the administrator due to explanations of the Consent Form, of the purpose of the questionnaire, the purpose of the Consent Form, how to fill out the Consent Form, and how to fill out the demographic and true/false sections of the questionnaire. The posttest consisted of only the twenty-three true or false questions of a test they had taken previously, so few interactions were necessary. In addition, the subjects were part of a group of women during the administration of the pretest (N = 366), but, on the posttest, subjects usually took the test alone (N = 126). Under those circumstances, it might have been embarrassing to ask for a reader. Logically, low scores on the posttest should have been made by the control group (no previous attendance at W.I.C.) or the women who

had spent 1-4 months in the W.I.C. Program. Low pretest scores by subjects with 10-12 years of education was another anomaly.

An ANOVA for pretest minus posttest (see Table 8) revealed a significant difference in posttest scores for those who spoke English in the home ( $F = 5.015$ , criterion value = 3.92) and those who were 0-18 years of age ( $F = 2.378$ , criterion value = 2.08). The reason for higher posttest scores by the English-speaking women may have been due to acculturation and its effect on learning.

A "t" test for three independent variables having two cases was done (Table 9), i.e., for language spoken in the home, medical care received, and medical visits made per year. The data were not significant.

Problem questions were as follows (Table 10):

<u>Question Number</u>	<u>Question</u>
3	"Fresh milk is good to give to a baby that is less than one year old." W.I.C. teaches that fresh milk should not be given until one year of age. Poor pre- and posttest scores on this question indicate a serious problem in weaning knowledge.
9	"Young children more than one year old need to drink more than a quart of milk a day." Subjects scored less than 50 percent correct on both the pre- and posttests, indicating a very serious problem regarding knowledge of

Table 8  
ANOVA for Pretest Minus Posttest

Category Group	Number of Subjects	Mean of Pretest Minus Posttest	F Ratio	Criterion Value
Age in years			2.328*	2.08
1. 0-18	10	2.6000		
2. 19-25	63	0.0317		
3. 26-35	43	0.8605		
4. 36-50	10	1.9000		
Language spoken in the home			5.015*	3.92
1. English	14	2.5714		
2. Spanish	112	0.4286		
Medical care received			0.001	3.92
1. Some	118	0.6695		
2. None	7	0.7143		
Medical visits made per year			0.313	3.94
1. 0-10	95	0.8526		
2. 11 or more	16	0.3125		
Months in the W.I.C. Program			0.538	2.44
1. 0	18	0.9444		
2. 1-4	26	1.1538		
3. 5-8	34	0.0588		
4. 9-12	17	1.1176		
5. 13 or more	28	0.3571		
Education in years			1.061	2.08
1. 0-6	88	0.4318		
2. 7-9	23	0.9130		
3. 10-12	10	2.4000		
4. 13-20	5	0.2000		

\*Significant at  $\leq 0.05$

Table 9  
 T-tests for Independent Variables  
 Having Two Cases  
 (N = 126)

Category Group	Number of Subjects	Pretest		Posttest	
		Mean	T Value*	Mean	T Value*
Language spoken in the home			1.88		0.74
1. English	14	16.21		18.79	
2. Spanish	112	17.78		18.21	
Medical care received			1.41		1.55
1. Some	118	17.52		18.19	
2. None	7	19.14		19.86	
Medical visits made per year			0.40		1.14
1. 0-10	95	17.64		18.49	
2. 11 or more	16	17.31		17.63	

\*All criterion values at 1.98 for a two-tailed test, significant at  $\leq 0.05$ .

Table 10  
 Responses to Individual Questions  
 Adjusted Frequency by %

Question Number	Correct Response	Pretest (N = 366) Adj. Freq. by %		Posttest (N = 126) Adj. Freq. by %	
		True	False	True	False
1	True	<u>96.9</u>	3.1	<u>95.9</u>	4.1
2	True	<u>92.3</u>	7.7	<u>91.1</u>	8.9
3*	False	<u>32.3</u>	<u>67.7</u>	<u>18.0</u>	<u>82.0</u>
4	True	<u>93.6</u>	6.4	<u>92.6</u>	7.4
5	False	<u>10.9</u>	<u>89.1</u>	<u>5.6</u>	<u>94.4</u>
6	True	<u>95.5</u>	4.5	<u>89.7</u>	<u>10.3</u>
7	True	<u>93.6</u>	6.4	<u>91.9</u>	8.1
8	True	<u>96.9</u>	3.1	<u>92.0</u>	8.0
9**	False	<u>77.4</u>	<u>22.6</u>	<u>58.7</u>	<u>41.3</u>
10	False	9.2	<u>90.8</u>	4.1	<u>95.9</u>
11*	False	20.7	<u>79.3</u>	14.8	<u>85.2</u>
12*	True	<u>81.3</u>	<u>18.7</u>	<u>80.2</u>	<u>19.8</u>
13	True	<u>90.6</u>	9.4	<u>91.0</u>	9.0
14**	False	<u>68.0</u>	32.0	<u>71.5</u>	<u>28.5</u>
15*	True	<u>81.0</u>	19.0	<u>73.7</u>	<u>26.3</u>
16*	True	<u>67.9</u>	32.1	<u>68.0</u>	32.0
17	True	<u>94.7</u>	5.3	<u>91.9</u>	8.1
18*	False	<u>13.7</u>	<u>86.3</u>	<u>15.0</u>	<u>85.0</u>
19	True	<u>89.8</u>	10.2	<u>91.5</u>	8.5
20	False	<u>6.7</u>	<u>93.3</u>	<u>4.0</u>	<u>96.0</u>
21	False	9.9	<u>90.1</u>	8.3	<u>91.7</u>
22	True	<u>90.4</u>	9.6	<u>92.7</u>	7.3
23**	False	<u>55.7</u>	<u>44.3</u>	<u>54.5</u>	<u>45.5</u>

Correct response underlined for convenience.

\*Indicates scores less than 88% correct for both pre- and posttests.

\*\*Indicates scores less than 50% correct for both pre- and posttests.

Question  
Number

Question

9 (continued)

appropriate quantities of milk for the child over one year of age. W.I.C. teaches that a child of over one year of age should not drink more than one quart of milk per day, and may substitute other milk products (milk equivalents such as one-half cup of cottage cheese, one ounce of cheese, or six ounces of yoghurt for six ounces of milk) for fluid milk. The rationale for this is that if more than one quart of milk is consumed, the child will not have the capacity for eating nutrient-dense foods such as fruits, vegetables, and grains, thereby becoming deficient in needed vitamins and minerals, especially iron and vitamin C.

- 11 "A fat baby is a healthy baby." This is a subject of some controversy. W.I.C. teaches that a fat baby is not necessarily a healthy baby although the fat baby may not necessarily be unhealthy. Consumption of large amounts of animal fat and excess calories are discouraged. The concensus at this time is that there is a correlation between excess body fat and high cholesterol and high serum lipid levels.

Question  
NumberQuestion

- 12 "Eggs, milk, beans and cheese are good sources of protein for the nutrition of children older than six months." This question requires a definition of the word "protein" by the subject. However, the question is one that is discussed by W.I.C. with the use of the word "protein" and the subjects should/might be expected to respond correctly. The writer sees this response as a failure to respond to a question on weaning. It may also indicate a definition of "protein" by the subjects as being only flesh/animal meat. In this case the education of the subjects in egg, dairy, and vegetable proteins, would be extremely valuable.
- 14 "Cereals and bread are a good source of vitamin C." Pre- and posttest subjects scored less than 50 percent correct. This is a serious knowledge deficit. W.I.C. teaches that fruits and vegetables, especially citrus and tomato juices, are high in vitamin C. A poor score on the question also demonstrates misconceptions regarding the nutritive value of bread and/or cereal grains.
- 15 "Liver, dried prunes, raisins and peanut butter are high in iron." W.I.C. teaches that these

Question  
NumberQuestion

15 (continued)

foods are good sources of iron. According to the Director of the W.I.C. Clinic (60), iron deficiency anemia is a major problem among the children of these women. The reason for the low score may be that the women are used to having iron added to infant formula and infant cereals or have used iron in the form of drops. Thus, iron has been supplied artificially and the women do not relate to ordinary foods as being good sources of iron.

16 "Corn tortillas are high in B vitamins and iron." W.I.C. teaches that corn tortillas are high in B vitamins, iron and possibly calcium (depending on method of preparation), and other nutrients. Poor response to this question may indicate low esteem for an excellent ethnic product, as well as lack of knowledge regarding the nutritive value of the corn tortilla.

18 "Foods high in calories like cakes, donuts, and ice cream, are high in vitamins and minerals." W.I.C. teaches that nutrient dense foods are apt to be dark colored (dark green or dark yellow or orange) and that children need to eat a balanced

Question  
NumberQuestion

18 (continued)

diet of fruits, vegetables, animal and vegetable protein, dairy products, and cereals and breads, with an emphasis on vitamin C and iron. W.I.C. also teaches that while ice cream is a reasonable milk equivalent, special foods such as cakes, donuts, ice cream, and candies should not be eaten every day and should be reserved as foods for holidays and "fiestas." Unfortunately, these highly refined carbohydrate foods, nearly devoid of nutrients, are usually attractive, inexpensive, and their purchase a great temptation for the low-income family.

23

"Banana, papaya and avocado are not good foods for your child." Subjects scored less than 50 percent correct on both pre- and posttests. W.I.C. teaches that these foods are good for a child to eat. Poor response to this question is evaluated as another demonstration of lack of weaning knowledge. Also, test administration revealed a problem with some of the subjects over the use of negative "not" which indicated that if the question had been posed positively, the subjects might have attained higher scores.

In general, low scores were achieved in the following areas:

<u>Area</u>	<u>Topic</u>
1. Weaning	1. Use of fresh milk at less than one year of age. 2. Amount of milk that a child over one year of age should drink. 3. Protein sources appropriate for a child over six months of age, e.g., eggs, cheese, beans, and milk.
2. Dairy- and vegetable-protein sources	1. Dairy protein sources such as milk, cottage cheese, yoghurt, and cheese. 2. Vegetable protein sources such as beans (many varieties including soy-beans), peas, tofu, potato, rice, rice products, whole wheat (breads and cereals), oatmeal, corn and corn products (including tortillas) and nut butters (including peanut butter).
3. Natural food sources	1. Vitamin C. 2. Iron.

On the posttest, there was a greater than five percent increase in scores on the following questions:

<u>Question</u>	<u>Topic (Increased Scores)</u>
3	The use of fresh milk by children of less than one year of age.
5	The results of the constant use of a nursing bottle by a young child.
9	The amount of milk a child over one year of age should drink.
10	Eating a lot of oil and fat is good for a child's health.
11	A fat baby is a healthy baby.

These results show increased weaning knowledge and increased knowledge of nutrition-related general health principles.

On the posttest, there was a greater than five percent decrease in scores correct on the following two questions:

<u>Question</u>	<u>Topic (Decreased Scores)</u>
6	Use of breast milk or formula during the first year.
15	Sources of iron.

The response to question 6 indicated that there was a problem in infant feeding knowledge. The problem might also be in the construction of the sentence. At the test administration, some of the subjects had difficulty in answering "true" or "false" due to the use of the word "or." With some subjects, there was a problem in responding if the sentence contained more than one direct statement. The reason for the use of the "or" was that W.I.C. teaches that breast feeding and formula with iron are both recommended forms of infant nutrition, and exclusion of one might have suggested unacceptability of the other. The response to question 15 indicated a serious problem in the knowledge of iron sources, since the question received a low score on both the pre- and posttest. As has been discussed previously, this may have been due to not relating iron sources to natural foods.

## V.

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Summary

A large, definitive study of the nutrition knowledge of Hispanic women was intended. Through the cooperation of the women at a W.I.C. Clinic in Pacoima and W.I.C. personnel at all levels, this study was made possible.

The project was designed in 1978 and implemented in the Spring of 1981. The survey instrument was a questionnaire in English or Spanish based on nutrition knowledge relevant to children from birth to five years of age. Six independent variables were tested: age, language spoken in the home, medical care, number of medical visits made per year, months in the W.I.C. Program, and years of education. Pretest N = 366 and posttest N = 126. True or false questions were used due to time limitations in test administration. The size of the sample was intended to compensate for forcing on the true-false responses. The intent of the survey was to determine nutrition knowledge of this group of Hispanic women, and not necessarily interactions with the W.I.C. Program. However, a "t" test (N = 126) revealed a significant ( $p \leq 0.05$ ) difference in pre- and posttest means due to the W.I.C. Nutrition Education Program. A One-way ANOVA ( $p \leq 0.05$ ) indicated a significant difference in test scores due to number of months in the W.I.C. Program and chronological age, and a Two-way ANOVA showed a

significant effect ( $F = 5.02$  and  $p \leq 0.05$ ) on test scores due to language spoken in the home. Months spent in the W.I.C. Program were also significant, since the  $F = 3.29$  ( $p \leq 0.05$ ) for the data indicated an effect of the independent variable on the pre- and posttest scores.

High test scores were received on the posttest by women in the 36-50 year-old category, by Hispanics who spoke English in the home, by those who were well-educated (13-20 years in school), and by those who had been in the W.I.C. Program the longest. Low posttest scores were received by the 19-25 year-old group, by Hispanics who spoke Spanish in the home, by those who were not well-educated (0-6 years in school), and by those in the W.I.C. Program for 5-8 months. It is possible that this last group consisted of more than the pretest number of subjects who were partly or fully illiterate and did not request a reader.

A One-way ANOVA by difference of individual category group pre- and posttest means (posttest means minus pretest means) revealed a significant difference in posttest scores for those who spoke English in the home ( $F = 5.015$ , criterion value = 3.92) and those who were 0-18 years of age ( $F = 2.328$ , criterion value = 2.08). These increases might have been due to the challenge of the pretest as motivation for higher posttest scores in these particular category groups, and/or the unique intent or ability of the particular age or language group to acquire new nutrition knowledge, i.e., higher scores due to acculturation.

Lack of nutrition knowledge was shown in the following areas:

1. Weaning foods, especially non-animal-protein sources and the appropriate use of cow's milk for a child before one year of age and after one year of age.
2. Dairy- and vegetable-protein sources, such as cheeses, beans, corn tortillas, and peanut butter.
3. Natural food sources of vitamin C and iron.

Many of the vitamin C and iron sources which were familiar to the subjects appeared to be processed sources (canned fruit juices, packaged, iron-fortified cereals, or iron drops) which may have made it difficult for the women to associate iron and vitamin C with natural food sources of these nutrients, such as iron-rich liver, raisins, dried prunes or peanut butter, or fresh food sources of vitamin C.

### Conclusions

Results based on the null hypotheses were as follows:

1. "The women will not score an average of more than 60 percent correct responses to the pretest questionnaire or more than 70 percent correct on the posttest." The null hypothesis was rejected for both the pre- and posttests since the pretest score correct for N = 366 was 78 percent, the pretest score correct for N = 126 (paired subjects) was 76 percent, and the posttest score corrected for paired subjects was 79 percent. These scores were higher than the hypothesized pretest

1. (continued)  
score of more than 60 percent correct and the hypothesized posttest score of more than 70 percent correct.
2. "The pre- and posttest scores will not show significant differences by age group." The null hypothesis was rejected for the pretest based on results from a One-way ANOVA where the pretest data were significantly different at the 0.05 level for a pretest F of 2.28 with a criterion value at 2.08. The null hypothesis was accepted for the posttest.
3. "The pre- and posttest scores will not show significant differences by language spoken in the home (Spanish or English)." The null hypothesis for the pretest was accepted. Based on the data from a Two-way Analysis of Variance, the null hypothesis for the independent variable of language spoken in the home was rejected, since the interaction data showed a significant F (5.02, with  $p \leq 0.05$ ), indicating better posttest scores were achieved due to the effect of language spoken in the home.
4. "The pre- and posttest scores will not show significant differences due to receiving some form of medical care during the past year." The null hypothesis for both the pre- and post scores was accepted.

5. "The pre- and posttest scores will not show significant differences due to more than ten visits for health care during the past year (not including W.I.C.)." The null hypothesis for both the pre- and posttest scores was accepted.
6. "The pre- and posttest scores will not show significant differences in responses due to the number of W.I.C. Nutrition Education classes attended." The null hypothesis was rejected for the pretest since a One-way ANOVA showed that the pretest data were significantly different at the 0.05 level with an  $F = 2.57$  and a criterion value of 2.44 for number of months spent in the W.I.C. Program. The null hypothesis was accepted for the posttest.
7. "The pre- and posttest scores will not show significant differences by number of years of education in a school." The null hypothesis for both the pre- and posttest scores was accepted.

#### Recommendations for Further Research

1. One hazard in the types of foods redeemed by the W.I.C. vouchers is that they are all soft, prepared foods, and there may be a tacit implication that these foods are appropriate as a general model for the entire dietary pattern of a young child regardless of age. A survey questionnaire listing the many appropriate

1. (continued)  
types of fresh fruits and vegetables, as well as various forms of animal and vegetable proteins suitable for the various age levels could be used to confirm or deny the correctness of the implication.
2. A measurement of non-Hispanic subjects on the survey questionnaire would also be interesting since only five percent of those who took the test in English were Caucasian or Black. Additional investigation into negative acculturation and nutrition knowledge, attitude, or behavior among Hispanics who speak English in the home and those who speak Spanish in the home might be revealing, since the study showed the poorer scores were made by the presumably less acculturated, i.e., those who spoke Spanish.
3. Many current (and past) nutrition surveys are devoted to 24-hour dietary recalls and biochemical testing of school-age children and adults. It is the writer's contention that more accurate research and improved measurements of nutrition behavior, attitudes, and knowledge regarding the nutrition of the young child from six months to five years of age should be escalated, since this age range is the third most crucial in human development (next to that of the foetus and neonate) and encompasses many important physical and mental parameters and problems, especially among the poor.

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APPENDIX A

Pretest Questionnaire  
with Demographic and Survey Questions

(Spanish and English)

## PREGUNTAS ACERCA DE LOS ALIMENTOS Y NUTRICIÓN PARA LOS NIÑOS

Ensayo # _____ del cuestionario		00
MARQUE UNO CON UNA EQUIS		
Edad de Madre (años)	0 - 18 _____	01
	19 - 25 _____	02
	26 - 35 _____	03
	36 - 50 _____	04
Lengua que habla en casa		
	Inglés _____	05
	Español _____	06
	Orientál _____	07
	Otro _____	08
Medio que usa para el cuidado de su salud		
	Doctor privado _____	09
	Centro de Salud _____	10
	Plan de Salud (Kaiser, Ross-Loos, IVA, etc.) _____	11
	Hospital _____	12
	La Paciente de la clinica _____	13
	Otro cuidado de la salud _____	14
	No cuidado de la salud _____	15
Aproximadamente cuántas visitas de la salud por año		
	0 - 10 _____	16
	11 o mas _____	17
Por cuantos meses ha venido ud. a recibir los cupones a WIC		
	0 _____	18
	1 - 4 _____	19
	5 - 8 _____	20
	9 - 12 _____	21
	13 o mas _____	21.5
Cuantos años en escuela como estudiante		
	0 - 6 _____	22
	7 - 9 _____	23
	10 - 12 _____	24
	13 - 20 _____	25

## PREGUNTAS

## CIRCULO UNO: VERDADERO O FALSA

- |   |   |    |
|---|---|----|
| 1. Leche materna es mejor para el bebé que leche de botella   | V | 26 |
|   | F | 27 |
| 2. Uno bebé que es alimentado de leche materna tendrá menos problemas de alergias                                     | V | 28 |
|   | F | 29 |
| 3. La leche fresca es buena para los bebés menores de un año  | V | 30 |
|   | F | 31 |
| 4. La leche materna ayuda a proteger a su bebé contra infección   | V | 32 |
|   | F | 33 |
| 5. Es correcto que los niños tengan o carguen la botella de leche todo el día y cuando duermen                        | V | 34 |
|   | F | 35 |
| 6. El primer año el bebé deberá tomar leche materna o fórmula con hierro  | V | 36 |
|   | F | 37 |
| 7. Cuando ud. usa fórmula concentrada, debe añadirle una cantidad igual de agua                                       | V | 38 |
|   | F | 39 |
| 8. Es necesario darle a su bebé un poco de agua entre las mamaderas   | V | 40 |
|   | F | 41 |
| 9. Los niños más de un año tienen que beber más de un cuarto de galón de leche en el día                              | V | 42 |
|   | F | 43 |
| 10. El comer mucho aceites y grasas es bueno para la salud de los niños   | V | 44 |
|   | F | 45 |
| 11. Un bebé gordo es un bebé saludable  | V | 46 |
|   | F | 47 |
| 12. Huevos, leche, frijoles y quesos son buenas fuentes de proteína para la nutrición de los niños mayores de 6 meses | V | 48 |
|   | F | 49 |

- |     |  |   |    |
|-----|--|---|----|
| 13. | Las verduras verdes oscuro (como espinaca o broccoli) son mas altas en vitaminas A, B, and calcio                    | V | 50 |
|     |  | F | 51 |
| 14. | Los cereales y panes son buenos fuentes de vitamina C  | V | 52 |
|     |  | F | 53 |
| 15. | Hígados, ciruelas secas, uvas secas y crema de cacahuete son mas altas en hierro                                     | V | 54 |
|     |  | F | 55 |
| 16. | Tortillas de maíz son altas in vitaminas B y hierro  | V | 56 |
|     |  | F | 57 |
| 17. | Jugos de vitamina C ayudar contra las infecciones y son buenos para la piel saludable                                | V | 58 |
|     |  | F | 59 |
| 18. | Alimentos altas en calorías como pasteles, donas, y helados, son altos en vitaminas y minerales                      | V | 60 |
|     |  | F | 61 |
| 19. | Es mejor que Ud. planée las comidas de su niño con variedad y que <u>no</u> le de lo mismo para comer todas los días | V | 62 |
|     |  | F | 63 |
| 20. | Café con leche y azúcar es un buen desayuno para los niños   | V | 64 |
|     |  | F | 65 |
| 21. | Una bara del dulce es buena para los niños entre comidas   | V | 66 |
|     |  | F | 67 |
| 22. | Calbaza, chayote, y tomates son alimentos buenos para su niño  | V | 68 |
|     |  | F | 69 |
| 23. | Banana, papaya y aguacate <u>no</u> son buenos comidas para su niño  | V | 70 |
|     |  | F | 71 |
| 24. | Me gustaria recibir solamente los cupones de W.I.C. y <u>no</u> asistir a las classes de educacion a W.I.C.          | V | 72 |
|     |  | F | 73 |
| 25. | Yo creo que estoy aprendiendo acerca de nutrición cuando asisto a las classes de W.I.C.                              | V | 74 |
|     |  | F | 75 |

## APPENDIX A

## QUESTIONS ABOUT FOODS AND NUTRITION FOR YOUNG CHILDREN

Test I.D. # _____		00
Mark one with an "X"		
Age of Mother (years)	0-18 _____	01
	19-25 _____	02
	26-35 _____	03
	36-50 _____	04
Language spoken in the home		
	English _____	05
	Spanish _____	06
	Oriental _____	07
	Other _____	08
Source of Health Care (mark one)		
	Private doctor _____	09
	Health Center _____	10
	Health Plan (Kaiser, Ross-Loos, IVA, etc.) _____	11
	Hospital _____	12
	Out-patient clinic _____	13
	Other health care _____	14
	No health care _____	15
Approximately how many visits for health care per year		
	0 - 10 _____	16
	11 or more _____	17
For how many months have you received WIC coupons		
	0 _____	18
	1 - 4 _____	19
	5 - 8 _____	20
	9 - 12 _____	21
	13 or more _____	21.5
How many years in a school as a student		
	0 - 6 _____	22
	7 - 9 _____	23
	10 - 12 _____	24
	13 - 20 _____	25

## QUESTIONS

Circle one: True or False

- |   |   |    |
|---|---|----|
| 1. Breast milk is better for a baby than milk from a bottle   | T | 26 |
|   | F | 27 |
| 2. A baby who is breast fed has less problems with allergies  | T | 28 |
|   | F | 29 |
| 3. Fresh milk is good to give to a baby that is less than one year old  | T | 30 |
|   | F | 31 |
| 4. Breast milk will help protect your baby against infection  | T | 32 |
|   | F | 33 |
| 5. It is all right for children to hold or carry a bottle of milk during the day and when they go to bed          | T | 34 |
|   | F | 35 |
| 6. The first year, the baby should drink breast milk or formula with iron   | T | 36 |
|   | F | 37 |
| 7. When you use concentrated formula, you need to add an equal quantity of water                                  | T | 38 |
|   | F | 39 |
| 8. It is necessary to give your baby a little water between feedings  | T | 40 |
|   | F | 41 |
| 9. Young children more than one year old need to drink more than a quart of milk a day                            | T | 42 |
|   | F | 43 |
| 10. Eating a lot of oil and fat is good for a child's health  | T | 44 |
|   | F | 45 |
| 11. A fat baby is a healthy baby  | T | 46 |
|   | F | 47 |
| 12. Eggs, milk, beans and cheeses are good sources of protein for the nutrition of children older than six months | T | 48 |
|   | F | 49 |

- |     |   |   |    |
|-----|---|---|----|
| 13. | Dark green vegetables (like spinach or broccoli) are high in vitamins A, B and calcium            |   |    |
|     |   | T | 50 |
|     |   | F | 51 |
| 14. | Cereals and bread are a good source of vitamin C  |   |    |
|     |   | T | 52 |
|     |   | F | 53 |
| 15. | Liver, dried prunes, raisins and peanut butter are high in iron                                   |   |    |
|     |   | T | 54 |
|     |   | F | 55 |
| 16. | Corn tortillas are high in B vitamins and iron  |   |    |
|     |   | T | 56 |
|     |   | F | 57 |
| 17. | Vitamin C juices help fight infections and are good for healthy skin                              |   |    |
|     |   | T | 58 |
|     |   | F | 59 |
| 18. | Foods high in calories like cakes, donuts, and ice cream, are high in vitamins and minerals       |   |    |
|     |   | T | 60 |
|     |   | F | 61 |
| 19. | It is better to plan children's food for variety and not have the same thing to eat every day     |   |    |
|     |   | T | 62 |
|     |   | F | 63 |
| 20. | Coffee with milk and sugar is a good breakfast for young children                                 |   |    |
|     |   | T | 64 |
|     |   | F | 65 |
| 21. | A candy bar is a good between-meal snack for young children                                       |   |    |
|     |   | T | 66 |
|     |   | F | 67 |
| 22. | Squash, chayote squash, and tomatoes are good foods for your child                                |   |    |
|     |   | T | 68 |
|     |   | F | 69 |
| 23. | Banana, papaya and avocado are <u>not</u> good foods for your child                               |   |    |
|     |   | T | 70 |
|     |   | F | 71 |
| 24. | I would rather just get the W.I.C. coupons and <u>not</u> come to the Education classes at W.I.C. |   |    |
|     |   | T | 72 |
|     |   | F | 73 |
| 25. | I think I am learning about nutrition by coming to the W.I.C. classes                             |   |    |
|     |   | T | 74 |
|     |   | F | 75 |

APPENDIX B

Posttest Questionnaire  
(Spanish and English)

PREGUNTAS ACERA DE LOS ALIMENTOS Y NUTRICIÓN PARA LOS NIÑOS # \_\_\_00  
 Circulo el V si la pregunta es verdad (es "si")  
 Circulo el F si la pregunta es falso (es "no")

- |   |   |    |
|---|---|----|
| 1. Leche maternal es mejor para el bebé que leche de botella  | V | 26 |
|   | F | 27 |
| 2. Uno bebé que es alimentado de leche maternal tendrá menos problemas de alergias                                    | V | 28 |
|   | F | 29 |
| 3. La leche fresca es buena para los bebés menores de un año  | V | 30 |
|   | F | 31 |
| 4. La leche materna ayuda protegera su bebé contra infección  | V | 32 |
|   | F | 33 |
| 5. Es correcto que los niños tengan o carguen la botella de leche todo el día y cuando duermen                        | V | 34 |
|   | F | 35 |
| 6. El primer año el bebé debera tomar leche maternal o fórmula con hierro   | V | 36 |
|   | F | 37 |
| 7. Cuando Ud. usa fórmula concentrada, debe añadirle una cantidad igual de agua                                       | V | 38 |
|   | F | 39 |
| 8. Es necesario darle a su bebé un poco de agua entre las mamaderas   | V | 40 |
|   | F | 41 |
| 9. Los niños mas de un ano tienen que beber mas de un cuarto de galón de leche en el día                              | V | 42 |
|   | F | 43 |
| 10. El comer mucho aceites y grasas es bueno para la salud de los niños   | V | 44 |
|   | F | 45 |
| 11. Un bebé gordo es un bebé saludable  | V | 46 |
|   | F | 47 |
| 12. Huevos, leche, frijoles y quesos son buenos fuentes de proteina para la nutrición de los niños mayores de 6 meses | V | 48 |
|   | F | 49 |

13. Las verduras verdes oscuro (como espinaca o broccoli) son mas altas en vitaminas A, B y calcio  
V 50  
F 51
14. Los cereales y panes son buenos fuentes de vitamina C  
V 52  
F 53
15. Hígados, ciruelas secas, uvas secas y crema de cacahuete son mas altas en hierro  
V 54  
F 55
16. Tortillas de maíz son altas in vitaminas B y hierro  
V 56  
F 57
17. Jugos de vitamina C ayudar contre las infecciones y son buenos para la piel saludable  
V 58  
F 59
18. Alimentos altas en calorías como pasteles, donas, y helados, son altos en vitaminas y minerales  
V 60  
F 61
19. Es mejor que Ud. planée las comidas de su niño con variedad y que no le de lo mismo para comer todas los días  
V 62  
F 63
20. Cáfè con leche y azúcar es un buen desayuno para los niños  
V 64  
F 65
21. Una bara del dulce es buena para los niños entre comidas  
V 66  
F 67
22. Calabaza, chayote, y tomates son alimentos buenos para su niño  
V 68  
F 69
23. Banana, papaya y aguacate no son buenos comidas para su niño  
V 70  
F 71
24. Me gustaria recibir solamente los cupones de W.I.C. y no asistir a las classes de educación a W.I.C.  
V 72  
F 73
25. Yo creo que estoy aprendiendo acerca de nutrición cuando asisto a las classes de W.I.C.  
V 74  
F 75

## APPENDIX B

QUESTIONS ABOUT FOODS AND NUTRITION FOR YOUNG CHILDREN # \_\_\_\_\_ 00

Circle the T if the question is True (is "yes")

Circle the F if the question is False (is "no")

- |  |   |    |
|--|---|----|
| 1. Breast milk is better for a baby than milk from a bottle  | T | 26 |
|  | F | 27 |
| 2. A baby who is breast fed has less problems with allergies   | T | 28 |
|  | F | 29 |
| 3. Fresh milk is good to give to a baby that is less than one year old                                   | T | 30 |
|  | F | 31 |
| 4. Breast milk will help protect your baby against infection   | T | 32 |
|  | F | 33 |
| 5. It is all right for children to hold or carry a bottle of milk during the day and when they go to bed | T | 34 |
|  | F | 35 |
| 6. The first year, the baby should drink breast milk or formula with iron                                | T | 36 |
|  | F | 37 |
| 7. When you use concentrated formula, you need to add an equal quantity of water                         | T | 38 |
|  | F | 39 |
| 8. It is necessary to give your baby a little water between feedings                                     | T | 40 |
|  | F | 41 |
| 9. Young children more than one year old need to drink more than a quart of milk a day                   | T | 42 |
|  | F | 43 |
| 10. Eating a lot of oil and fat is good for a child's health   | T | 44 |
|  | F | 45 |
| 11. A fat baby is a healthy baby   | T | 46 |
|  | F | 47 |

- |     |   |   |    |
|-----|---|---|----|
| 12. | Eggs, milk, beans and cheeses are good sources of protein for the nutrition of children older than six months | T | 48 |
|     |   | F | 49 |
| 13. | Dark green vegetables (like spinach or broccoli) are high in vitamins A, B and calcium                        | T | 50 |
|     |   | F | 51 |
| 14. | Cereals and bread are a good source of vitamin C  | T | 52 |
|     |   | F | 53 |
| 15. | Liver, dried prunes, raisins and peanut butter are high in iron   | T | 54 |
|     |   | F | 55 |
| 16. | Corn tortillas are high in B vitamins and iron  | T | 56 |
|     |   | F | 57 |
| 17. | Vitamin C juices help fight infections and are good for healthy skin  | T | 58 |
|     |   | F | 59 |
| 18. | Foods high in calories like cakes, donuts, and ice cream, are high in vitamins and minerals                   | T | 60 |
|     |   | F | 61 |
| 19. | It is better to plan children's food for variety and not have the same thing to eat every day                 | T | 62 |
|     |   | F | 63 |
| 20. | Coffee with milk and sugar is a good breakfast for young children   | T | 64 |
|     |   | F | 65 |
| 21. | A candy bar is a good between-meal snack for young children   | T | 66 |
|     |   | F | 67 |
| 22. | Squash, chayote squash, and tomatoes are good foods for your child  | T | 68 |
|     |   | F | 69 |
| 23. | Banana, papaya and avocado are <u>not</u> good foods for your child   | T | 70 |
|     |   | F | 71 |
| 24. | I would rather just get the W.I.C. coupons and <u>not</u> come to the Education classes at W.I.C.             | T | 72 |
|     |   | F | 73 |

25. I think I am learning about nutrition by coming to the  
W.I.C. classes

T  
F

74  
75

APPENDIX C

Consent Form  
(Spanish and English)

CUESTONARIO # \_\_\_\_\_

CALIFORNIA ESTADO UNIVERSIDAD, NORTHRIDGE

FORMULARIA DE CONSENTIMIENTO

CUESTIONARIO - CONTIENE PREGUNTAS  
ACERCA DE ALIMENTOS Y NUTRICION DE LOS NINOS

NOMBRE

Nombre de la madre participante (letra de molde)

1. Comprendo que he sido consultada para responder los preguntas del cuestionario acerca de alimentos y nutrición para los niños de 10445 Balboa Boulevard, Granada Hills, California. Comprendo que la duración sera aproximadamente quince minutos.
2. Comprendo que el propósito del cuestionario es ayudar a mis niños a recibir mayor nutrición y a ser mas saludables. (Esta investigación científica.)
3. Comprendo que este cuestionario no creará ningún reiso o dolor para mi.
4. Comprendo que la gente a W.I.C. aprenderá mucho de mis contestaciones al cuestionario y que esta ayudara al condición futura de la nutrición del niño.
5. Comprendo que Doris G. Stanton, (B.A., U.C.L.A.) quien puede ser localizada en el (213) 838-0318, contestará cualquier pregunta que yo tenga, a cualquier hora con respecto al cuestionario.
6. Comprendo que tengo el derecho de no participar en este cuestionario sin que afecte el tratamiento o cualquier servicio de W.I.C.
7. He sido informada que mi identidad no será hecha pública en ningún momento por ninguna razón.

Firma de la madre \_\_\_\_\_

Fecha \_\_\_\_\_

CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

CONSENT TO ACT AS SUBJECT

COMPLETION OF A QUESTIONNAIRE CONTAINING QUESTIONS  
ABOUT FOODS AND NUTRITION FOR YOUNG CHILDREN

NAME OF SUBJECT \_\_\_\_\_

1. I understand that I have been asked to complete a questionnaire regarding foods and nutrition for young children while I am at the W.I.C. Clinic at 10445 Balboa Boulevard, Granada Hills, California. I understand that this will take about fifteen minutes to complete.
2. I understand that the purpose of the questionnaire is to help my children receive better nutrition and become more healthy. (This is a scientific study.)
3. I understand that the questionnaire described above will be of no risk or discomfort to me.
4. I understand that the people at W.I.C. will learn a great deal from my answers to the questionnaire and that this will help my child's future nutritional status.
5. I understand that Doris G. Stanton (B.A., U.C.L.A.), who can be reached at (213) 838-0318, will answer any questions I may have, at any time, concerning the questionnaire.
6. I understand that I have the right to refuse to answer the questionnaire without affecting my child's treatment or any other W.I.C. service.
7. I have been informed that my identity will not be disclosed for any reason at any time.

Subject's Signature \_\_\_\_\_

Date \_\_\_\_\_

APPENDIX D

W.I.C. Schedule of Nutrition Education Classes

Given During 1981

SCHEDULE OF CLASSES  
GIVEN 1981

## Prenatals

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Month	Class
1/81	Survey
2/81	Protein (flipchart)
3/81	Breastfeeding (film)
4/81	Inside My Mom (film)
5/81	Weight Gain (flipchart)
6/81	Re-orientation (food models)
7/81	Calcium (velco board)
8/81	Advantages/Techniques of Breastfeeding (v. board)
9/81	Pregnancy: You & Your Baby (film)
10/81	Inside My Mom (film)
11/81	Weight Gain (flipchart)
12/81	Re-orientation (food models)

SCHEDULE OF CLASSES  
GIVEN 1981

Mothers of Infants/Children

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Month	Class
1/81	Survey
2/81	Protein (flipchart)
3/81	Dental Health I (velcro board)
4/81	Dental Health II (velcro board)
5/81	Sanitation and Food Handling (flipchart)
6/81	Re-orientation (food models)
7/81	Calcium (velcro board)
8/81	Breads and Cereals (film)
9/81	Child Feeding I (flipchart)
10/81	Fruits and Vegetables (flipchart)
11/81	Child Feeding II (flipchart)
12/81	Re-orientation (food models)