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Family factors related to obesity in Mexican-American and Anglo preschool children

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The University of Arizona, 1992
Family Factors Related to Obesity in Mexican American and Anglo Preschool Children

by

Yen-Chi Liao

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ABSTRACT

The purpose of this secondary analysis of data was to investigate the relationship between family factors and obesity in Mexican American and Anglo preschool children. The purposive sample consisted of 341 mothers and their children, of which 180 were Mexican Americans and 161 were Anglos. Demographic characteristics indicated that Mexican American children: were heavier; living in single parent families more frequently; had more body fat; had mothers with higher body mass index (BMI); had larger family size; were less likely to be first born or only children; had less educated parents with lower level occupations and lower family income; and had mothers who used control in feeding practices more often than their Anglo counterparts. Results identify areas for prevention of childhood obesity.
CHAPTER I
INTRODUCTION

Obesity has been associated with many health problems throughout the life-span (Dietz, 1986). For the purpose of health promotion, the prevention of obesity should begin in programs for children between the ages of three and five (Blessing, 1986). In planning and implementing an obesity prevention program for children, the family is the primary institution to be approached. Hence, appropriate family assessments are needed. As the Mexican American population is one group at risk for the development of obesity (Yanochik-Owen & White, 1977), the purpose of this descriptive correlational study is to investigate the relationship between family factors and obesity in Mexican American and Anglo preschool children using secondary analysis of data.

Overview of the Problem

Childhood Obesity

With food productivity increasing rapidly, the nutritional problems of children in the United States is more related to overnutrition than undernutrition (Kleinfield, 1986). Obesity then becomes one of the serious nutritional diseases in childhood (Dietz, 1983). Actually, obesity may be described as an American epidemic, affecting one-fourth of the population as a whole (Gutierrez & May, 1990). It is estimated that about 5-15% percent of infants and preschoolers and 10-35% adolescents are obese (Neuman, 1983; Dietz & Gortmaker, 1984). The prevalence of obesity is greater in females than in males after infancy, in urban populations particularly in inner cities, and in disadvantaged groups (Neuman, 1983). Gortmaker, Dietz, Sobol, and Wehler (1984) compared the incidence of pediatric obesity from 1963 to 1965 with the incidence from 1976 to 1980 and found a
54% increase. Cowell, Montgomery, & Talashek (1989) also found that the percentage of overweight school-age children increased from 9% in 1980 to 17% in 1986. The increasing prevalence of obesity among children in the United States implies the importance of this problem.

Before the past decade, concern for obesity and its associated health problems had generally focused on adult populations. Some physicians assumed that childhood obesity did not affect childhood health. It was suggested that obese children should be left alone and that they would grow out their baby fat (Powers, 1980). Recent studies indicate that obesity in children and youth, if untreated, can become a major health hazard. They reveal that mild to moderate obesity probably causes minimal morbidity. In infancy, being 20% above the ideal weight, or rapid weight gain may be a risk factor for lower respiratory tract infection (Levine, Carey, Crocker, & Gross, 1983). Also, there may be immune dysfunction occurring in obese children (Chandra & Kutty, 1980).

The most serious and most life threatening complication of severe obesity is carbon dioxide narcosis with decreased ventilator capacity and micro-atelectasis known as the Pickwickian syndrome (Riley, Santiago, & Edelman, 1976). In addition, lesser degrees of obesity compounded by upper airway obstruction by hypertrophied tonsils and adenoids may give rise to anoxia with poor oxygen situation, called the "chubby puffer syndrome" (Stool, Eavey, & Stein, 1977). Because of dyspnea, even the mildest of exertion in these obese children limits their already meager activity level even further (Neumann, 1983). Chronic airway obstruction with hypertrophied tonsils and adenoids may cause sleep alteration, cardiac signs, and abnormal arterial gas levels (Levine, Carey, Crocker, & Gross, 1983). The orthopedic complications of obesity are well recognized. Dietz, Gross and Kirkpatrick (1982) reported 75% of the patients who were affected by Blount's disease
and slipped capital femoral epiphysis were obese. In addition, childhood obesity is also the leading cause of pediatric hypertension, and accounts for more than one fourth of all maturity-onset diabetes mellitus (Dietz, 1983).

The consideration of childhood obesity is not only important for its relationship with childhood health but also with adult health. The adipose cell theory proposes that overfeeding during critical periods of adipose cell proliferation causes an increase in the number of fat cells that does not decrease later in life. Critical periods of adipocyte proliferation are from birth to two years and during prepubescence age, 9 to 12 years (Martorell, Mendoza, & Castillo, 1989). Researchers reveal that 14% of heavy infants, 40% of the obese children aged seven and 60-70% of the obese children aged 10 to 13 will become obese adults. The relative risk of an obese child becoming an obese adult increases from 2.33:1 in infancy to 6.55:1 in preadolescence (Epstein, Koeske, & Wing, 1986).

The relationship of childhood obesity to adult obesity and the degree to which it can be prevented is important. Studies reveal that the probability of obese children becoming obese adults is very high. As few obese adults are able to successfully reduce and maintain non-obesity, the prognosis for these obese adults who were obese since childhood is very poor. A longitudinal study of children provides evidence that impending or actual obesity begins at ages six to nine years with some predictability provided as early as age two years for girls and age three years for boys (Peck & Ullrich, 1985). As more and more research points to the relationship of childhood obesity to adult obesity, weight control measures in infants, children, and adolescents is suggested (Mallick, 1983). Attention has now been focused on prevention of obesity in children.
Health Promotion and Disease Prevention in Preschool Children

The preschool age is a good time for both health promotion and disease prevention (Mott, 1990). During this stage, the child becomes aware of and gains an appreciation for how the body functions. The way children perceive their bodies is related to how they care for their bodies. The more completely they comprehend their own anatomy and physiology, the more likely they are to participate in self-care activities that promote health (Mott, 1990). Parents or health educators can teach children about the body, how it functions, and how to keep it healthy. In addition, the preschool age is considered an ideal time to teach preventive health behaviors because parental influences have the greatest impact on children in this period (Dailey, 1985). Habits of diet and exercise in children are not as firmly established as in adults; and, therefore, they are more amenable to change (Zakus, 1982). Reports of the Childhood Obesity Workshop of the National Institute of Child Health and Human Development also suggest that prevention of obesity should begin in programs for children between the ages of three and five years (Blessing, 1986).

Families and Preschool Children

The family is the primary institution to accept the responsibility of child rearing and educating (Whaley & Wong, 1987). To preschool children, families are seen as significant influences and support. Children in preschool age tend to hold their parents and families in high regard (Mott, 1990), because they continue to need physical affection and love from their parents. When considering obesity in the preschooler, it is important to examine the family factors associated with early-onset obesity and to identify those factors that may be amenable to preventive action.
Obesity and the Mexican American Population

Childhood obesity was seen to be increasing especially in ethnic minority groups (National Institutes of Health Consensus Development Conference Statement, 1985). Mexican Americans experience a higher prevalence of obesity than the general population in the United States (Yanochik-Owen & White, 1977). In Southwest United States, about 22.4% of the people identify themselves as Mexican Americans (1990 Census of Population and Housing: Arizona, 1991). Yanochik-Owen and White (1977) reported that obesity occurred with greater frequency in Mexican Americans than in the general population. In a study of 2,241 Mexican American children in Arizona, they found that 13.3% of those aged 2 to 5 years are overweight, compared to 8.9% of other ethnic groups, the difference is statistically significant. Environmental factors such as the advent of Women, Infants, and Children (WIC) federal assistance, food stamps, and school lunch programs have increased the availability of food for most Mexican American children (Alexander, Sherman & Clark, 1991). Psychologic influences related to the use of food by this population for nonnutritive purposes such as a substitute for acceptance, relieving boredom, resisting depression, and rebellion, could contribute to childhood obesity (Reichley, Mueller, Hanis, Joos, Tulloch, Barton & Schull, 1987). These factors together with low socioeconomic status, may predispose Mexican American preschool children to the development of obesity (Oken, Hartz, Giefer & Rimm, 1977).

Problem Statement

Data in this study were obtained from Alexander and Sherman's (1991) investigation of "Obesity in Children" which was conducted to compare subjects from two cultures to determine the degree to which maternal nutritional knowledge, maternal feeding practices, maternal values, socioeconomic status, level of acculturation and other selected
demographic variables are related to obesity in Mexican American preschool children and in Anglo preschool children.

Obesity is a multi-factorial problem in which genetic and environmental factors interact (Taitz, 1991). Medical research has estimated that 95% to 97% of all cases of obesity fall into the category of exogenous obesity, caused by environmental factors outside the body; only three to five percent are diagnosed as endogenous obesity, caused by metabolic or endocrine dysfunctions (Zakus, 1982). Besides the genetic factor, environmental factors have been suggested as contributing to the risk of obesity in children. The environmental associations can be divided into four parts: physical environment, ethnicity, social environment, and family environment (Dietz, 1983). Within this four environmental associations, Dietz (1983) stated that family variables appear to be the most important correlates of obesity. The child in the preschool age is under the protection of his or her family while interacting with the environment outside the family (Mott, 1990). Accordingly, during preschool age, the family is the key environmental factor. What are the factors within the family which may be related to obesity in preschool children?

Purpose of Research

The purpose of this study, using secondary analysis of data, is to investigate the relationship between family factors and obesity in Mexican American and Anglo preschool children. By determining the relationship between family factors and preschool obesity in this secondary analysis of data, strategies for the prevention of obesity in the Mexican American and Anglo preschool child can be identified to assist health care providers.
Conceptual Framework

General systems theory (Bertalanffy, 1968) provided a broad basis for this study of family factors related to childhood obesity. A system consists of two or more elements (individual component parts) that interact with each other and together make up a whole (Scipien, Chard, Howe & Barnard, 1990). Systems theory states that there is constant and reciprocal interaction among the several members within a system. In a system, all members continually influence and are influenced by all others.

Marlow and Redding (1988) describe the family as a system which is made up of a group of open subsystems; that is, individuals (see Fig. 1). Inputs occur intrafamilially and extrafamilially. The family interacts with its members and with the environment. This continuous interaction enables the family to be a dynamic, growing, evolving entity (Lansberry, 1990). Each member is affected by and affects the other. The family unit is greater than and distinct from its individual member. The combined mutual interaction and interdependence of its members is an important key to understand the family. Growth and development of children occur as a result of their cultural and hereditary backgrounds and the care and love that adults, usually their families, bestow upon them. The structure and functions of the families in which children have been raised also affect life styles of children (Marlow & Redding, 1988). Life styles are associated with health, and nutrition is a primary requisite of health.

Malnutrition includes overnutrition as well as undernutrition. Overnutrition or obesity is the focus of this study. Accumulation of adipose tissue in the body is the cause of obesity in people. Adipose tissue consists of connective tissue cells with the specific capacity to synthesize and store neutral fat, and also serves as a reserve of energy. The
Figure 1. Family as a System
growth of adipose tissue occurs from genetic and environmental factors through either disturbance of eating patterns or metabolic processes (Taitz, 1991). The genetic factor is considered as the first family factor in this study. Body fat composition at birth is genetic predisposition for obesity. The birth weight can be an indication of the child's weight in his or her later life. The risk of obesity among children increases in proportion to parental obesity. It is lowest when neither parent is obese, higher when one parent is obese, and highest when both parents are obese. Maternal relative weight does not correlate with adiposity in the first year of life but is a factor at two years of age (Kramer, 1985). Hence, the child's birth weight and maternal weight (Body Mass Index) are considered as indicators when investigating the relationship between genetic factors and childhood obesity.

In the family environment, separation from the mother has been associated with obesity among black adolescent girls. Families with obese children tend to have one parent absent, due to death or other factors. Obesity is prevalent among children whose parents have been separated or divorced (Dietz, 1983). Maternal marital status is seen as the second family factor associated with obesity in children.

The prevalence of obesity is inversely proportional to family size. Dietz (1986) states that obesity is more prevalent among only children. The highest prevalence of obesity occurs in single-child families and declines with increasing family size (Dietz, 1983). From these studies, the family membership is seen as the third family factor.

Saltzer and Golden (1985) found that within the lower socioeconomic status population, the childhood and maternal measures of weight are positively correlated. In the higher socioeconomic status population, there is no relationship between maternal and childhood obesity. Children from lower socioeconomic families highly resemble the
adiposity of their mothers, while this relationship is not observed for the children from the middle socioeconomic families. Girls from lower socioeconomic status backgrounds are generally heavier than others. Lack of education, limited income, and differing values are all implicated as being associated with obesity. Both the education and occupation status of mothers, and the family income level are used as indicators for assessing the fourth family factor, that is, socioeconomic status.

Many children whose families are overweight may not have inherited fat genes but have learned the family's habit of abundant intake and limited physical activity (Carman, 1976). Therefore, family feeding practices are seen as the fifth family factor. In this study, family feeding practices are represented by introducing solid food into the child's bottle before 12 months of age, child's snack pattern, and number of persons who feed the child.

The conceptual framework for this study is shown in Figure 2. The model is based on literature review and on the framework of Sherman and Alexander's (1990) study of factors related to obesity in Mexican American and Anglo preschool children. Family factors are found to be categorized into genetic factors, family type, family membership, socioeconomic status and family feeding practices. These family factors are defined as the independent variables; preschool obesity is the dependent variable. An overall approach is used to study the family factors associated with obesity in the preschool child. The conceptual framework suggests the relationship of genetic factors, family type, family membership, socioeconomic status and family feeding practices with obesity in the preschool child. The schematic diagram, the variables of interest are represented figuratively. Constructs, concepts, and the linkages between them are clarified to identify areas of inquiry regarding preschoolers' obesity and to provide a context for findings that
Figure 2. Conceptual Framework
otherwise might be isolated or meaningless. Knowledge of the relationship among the variables may lead to practical interventions and preventive measures.

On the construct level, multiple family factors are associated with obesity that is defined as a state of excess body weight. The measurement of the weight for height, age, and sex are recognized methods of determining childhood obesity. The triceps skinfold (TSF), and the subscapular skinfold (SSF) measurements are used to confirm the child's diagnosis of obesity. The dependent variable (preschool obesity) has been associated with certain family factors (independent variable).

On the conceptual level, certain family factors are identified as independent variables including genetic factors, family type, family membership, socioeconomic status and family feeding practices. Operational indicators for the genetic factors are the child's birth weight and maternal weight (BMI); for the family type is the maternal marital status; for the family membership are the the child's family size and the child's birth order; for the socioeconomic status is mothers' education and occupation, and family income status; for family feeding practices are the child's age of introduction of solid food, child's snack pattern and the number of persons who feed the child. The vertical lines represent correlative relationships between two variables. The horizontal lines represent the correlations without any cause-and-effect relationship.

Research Questions

The research questions for this study are as follows:

1. Is there a difference between the two groups, Mexican American and Anglos, in the extent to which obesity in preschool children is related to the family factors of:
   a) genetic factors as indicated by the child's birth weight and maternal weight (BMI)?
b) family type as indicated by maternal marital status?
c) family membership as indicated by the child’s family size and the child’s birth order?
d) family socioeconomic status as indicated by mothers’ education and occupation, and family income status?
e) family feeding practices as indicated by child’s age at introduction of solid food, child’s snack pattern and the number of persons who feed the child?

2. To what extent is obesity in Mexican American and Anglo preschool children related to the family factors of:
   a) genetic factors as indicated by the child’s birth weight and maternal weight (BMI)?
   b) family type as indicated by maternal marital status?
   c) family membership as indicated by the child’s family size and the child’s birth order?
   d) family socioeconomic status as indicated by mothers’ education and occupation, and family income status?
   e) family feeding practices as indicated by child’s age at introduction of solid food, child’s snack pattern and the number of persons who feed the child?

Definition of Terms

Important terms used in this research are defined as follows:

**Family:** members who reside in the same household with the preschool child. Consists of individuals, each with a socially recognized status and position, who interact with one another on a regular recurring basis in socially sanctioned ways (McFarlane, 1986).

**Obesity:** is defined by weight for height, age and sex greater than 120% and triceps (TSF) and subscapular skinfold (SSF) in the 85th percentile (Dietz, 1983).
**Preschooler:** child who is three years of age through five years of age.

**Significance to Nursing**

Public health nurses are well situated to help prevent obesity by virtue of their close and continuous contact with the family. An understanding of preschool obesity, and its potential health risks are necessary for effective prevention of adult obesity. The prevention of childhood obesity is important to nurses who are in continuous contact with families and who are entrusted with the health and development of children. This study focuses on identifying family factors related to obesity in Mexican American and Anglo preschool children. The findings will have an impact on nursing practice and influence the delivery of health care. In addition, public health nurses can utilize the study findings as professional knowledge in preventing and managing childhood obesity in communities.

**Summary**

Mexican Americans have a higher prevalence of obesity as compared to the general population in the United States. The relationship of childhood obesity to adult obesity and the degree to which it can be prevented is of concern. The family is the most important institution for health care providers to approach when evaluating the child's health problems. This study is designed to investigate the relationship between family factors and preschool obesity in Mexican American and Anglo preschool children. If an association is supported by the findings of this study of secondary analysis of data, then the relationships between the family factors and childhood obesity can be considered in designing prevention strategies.
CHAPTER II
LITERATURE REVIEW

The family is the fundamental nurturing, socializing and health care unit in society. It initiates the child into the human community, protects the child and provides the necessities for survival. In addition, the family provides the child with a value and belief system that serves as a frame of reference for interpreting both the opportunities and the constraints of the larger society. The way the family is organized and the priorities it sets strongly influence the child's important formative experiences (Lansberry, 1990). To approach the health problem of childhood obesity, the family is a logical starting place to be considered (Kinston, Loader & Miller, 1987). This chapter will examine the literature for studies relevant to the concepts presented in the conceptual framework. From the literature review, the relationship between the concepts of genetic factors, family types, family membership, socioeconomic status, family feeding practices and obesity in preschool children will be explained and discussed.

Obesity

When the body assimilates more calories than it needs for a certain period of time, obesity is the result. It is the consequence of either excess intake, reduced expenditure or both. Taitz (1991) stated that obesity may be defined as an excess of adiposity considered to be undesirable, or adiposity above an arbitrary cut-off of a suitable anthropometric measurement. The assessment of obesity has to rely on direct or indirect measurements through laboratory procedures, such as (1) weight alone, (2) relating body weight to height, (3) direct measurement of such subcutaneous fat by skinfold determinations, and
(4) laboratory methods involving densitometry, hydrometry and gamma-ray spectrometry (Taitz, 1991).

The measurement of weight usually is combined with other methods to diagnose obesity. In relating weight by height, sex and age, the definition of obesity is set as a weight for height greater than 120% of the ideal, controlled for age and sex (Epstein & Wing, 1987). Other measures of relative weight in children are derived from height and weight indexes. The most popular index is the Body Mass Index (BMI), measured in Kilograms per meters squared. The BMI correlates highly with the percentage of fat both in adults and in children (Epstein & Wing, 1987). However, for the child, weight for height is the most accurate measure of relative body weight of the commonly used weight-height indices. Weight for length is not dependent on age or sex, and thus it may eventually be possible to develop uniform standards for children by using this measure (Durant & Linder, 1981).

Skinfold thickness measurement may be a valuable adjunct to the clinical assessment of obesity. This method is used to measure trunk fat (subscapular) or/and limb fat (triceps) by calipers and has a high correlation with total body fat. Many investigators use skinfold measures to estimate the obesity in children by using a large population sample for assessing the child's triceps skinfold thickness proportion. Obesity is defined by a triceps skinfold thickness in excess of the eighty-fifth percentile (Dietz, 1983). This population standard allows investigators to define obesity both in terms of percentage overweight and amount of body fat as assessed by triceps skinfold measures (Epstein et al., 1981). Harrison, et al. (1988) recommended that the subscapular skinfold thickness together with the triceps skinfold thickness be used in health-related fitness tests for children.
The combination of relative weight and skinfold measures is relevant because using the former alone may overestimate obesity. Some people who may be heavy for their height and, therefore, obese according to relative weight standards are very muscular and not really obese. Research on the prevalence of obesity using both relative weight and skinfold measures, however, showed that a higher percentage of children were considered obese if skinfold measures were used rather than the relative weight criteria. For boys, 27% were considered obese according to skinfold criteria, whereas 17.4% were obese when relative weight was used. For girls, 22.6% versus 17.9% were obese, according to skinfold and relative weight criteria. These data suggest that some children who have excess fat as assessed by skinfold measures may not be 20% over their ideal body weight (Epstein & Wing, 1987). Among children and adolescents with obvious obesity, weight for height or weight relative to the fiftieth percentile correlates better than skinfold with total body fat. When weight for height is increased, or if the visual assessment of overweight is questionable, triceps skinfold measurements should be used to distinguish the obese from the non-obese (Dietz, 1983).

Genetic Factors

Body fat composition at birth may be a genetic predisposition to adiposity. It may either result from genetic predisposition or intrauterine environmental factors. The tendency for infants large at birth to become obese was studied by many researchers. Crisp, Douglas, Ross, and Stonehill (1970) had a prospective nationwide study of a cohort of 5,362 babies born during one week of March, 1964. The babies were weighed at birth and also subsequently, at the ages of 4, 7, 11, 15, and 20 years. Their report is of the developmental aspects of the clinical state of obesity by inspection of the National Survey data over the span of the first 15 years and after the entire 20 years. They considered body
shape and its relationship to some aspects of behavior within a group of 3,078 of these children. These children were weighed and measured by school medical officers at each of the three age stages: 7, 11, and 15. The children self-reported such measures at the age of 20. In their study, obesity was defined by overweight in relation to height. Roughly, 16% of the population was thus defined as fat, 68% as average in shape and size, and 16% as thin. The birth weight related to shape at 7, 11 and 15 years reveals that the fatter children are heavier at birth than the average or thin children, and this difference is as marked when their shape is assessed at the age of 15 as it is if the assessment is at 7 years. At each of these four ages, there were approximately twice as many fat children among those who weighed eight pounds or more at birth as among those who weighed less than six pounds.

Mossberg (1989) studied 504 overweight children (233 boys and 271 girls) who were admitted to the hospital from 1921 to 1947, and were followed for 40 years with questionnaires at ten intervals. For patients with a birth weight greater than 4,500 g, weight for height in puberty and in adulthood was higher (p = .05 -.10) than those for patients with lower birth weight.

Alexander, Sherman, and Clark (1991) studied 143 Mexican-American mothers and their preschool children. Subjects were interviewed and asked to complete questionnaires regarding maternal knowledge, feeding practices, weight locus of control, and ideal infant body habitus. The questionnaires were administered in random sequence. Chi-square and Hotellings T square tests were used to determine if there were differences between the obese and non-obese children. The results showed a significantly greater mean birth weight of children in the obese group (t = -2.47; p < .02).

From these studies, there is no doubt that genetic factors are important in obesity. It appears that heritability is particularly important in fat children over ten years of age,
while in children under ten, environmental factors are probably more important (Brooke and Abernethy, 1985). Birth weight alone, however, is a poor indicator of the degree of adiposity and a poor predictor of future obesity (Taitz, 1991).

The risk of obesity among children increases in proportion to parental obesity. Rony (1940) studied 250 patients in Chicago and found 69% of the obese children had at least one obese parent; the parents of 25% of the obese children were both obese. Bauer (1945) studied one thousand obese patients in Vienna and found that 73% had either one or both obese parents. The incidence of obesity in children increases from 8% in the child without an obese parent to 40% if one parent is obese and reaches 80% if both parents are obese (Dietz, 1983).

Garn and Clark (1976) report data from the Ten State Nutrition Survey of skin fold thickness (triceps and subscapular) for more than 40,000 infants, children, and adults. Significant family correlations exist. Parent-child fatness correlations approximate .25 and increase with the age of the child. They found a clear and demonstrable influence of parental fatness, from the analysis of both one-parent and two-parent fatness combinations, on the fatness level of the offspring. Boys and girls with two lean parents tend to be the leanest; boys and girls with two obese parents tend to be the fattest; and the introduction of one obese parent significantly affects the fatness level of the offspring, whether the parent is male or female.

Stunkard, Sorensen, Hanis, Teasdale, Chakraborty, Schull, and Schulsinger (1986) examined the contributions of genetic factors and the family environment to human fatness in a sample of 540 adult Danish adoptees who were selected from a population of 3,580 and divided into four weight classes: thin, medium weight, overweight, and obese. There was a strong relationship between the weight class of the adoptees and the body mass index
of their biologic parents (for the mothers p < .0001; for the fathers p < .02). There was no relation between the weight class of the adoptees and the body-mass index of their adoptive parents. Cumulative distributions of the body-mass index of parents showed there was a strong relationship between the body mass index of biologic parents (for the mothers p < .001; for the fathers p < .04) and adoptee weight class and no relationship between the body mass index of adoptive parents and adoptee weight class.

Price, Cadoret, Stunkard, and Troughton (1987) studied 357 adult adoptees (172 males and 185 females, age eighteen to thirty-eight years) from two Iowa adoption agencies. These adoptees had been separated from their parents at birth and adopted during the first year of life. Information about adoptees and their parents (both biologic and adoptive) was obtained by interview with each adoptee and one adoptive parent. Self-reported height and weight were used in this study, since direct measurements of the adoptees and their parents were not available. From their results, the body mass index of biologic mothers was highly correlated with that of their daughters (r = .40; p < .001). There was a trend for the body mass index of biologic fathers to correlate with that of their daughters, but failure to reach statistical significance (r = .18; p < .16). The correlations between the body mass index of biologic parents and their sons were positive, but the correlation with neither parent individually was statistically significant. The correlations between adoptive mothers and adoptees were low (r = .06 with daughters and r = .04 with sons) and not statistically significant. The relationship was also low and nonsignificant between adoptive fathers and adoptees (r = .09 with daughters and r = -.09 with sons).

In Mossberg's (1989) study of 40 years follow-up of overweight children, a positive correlation (p < .001) was found between the parents' degree of excess weight and the children's weight for height. For both sexes, the birth weight showed positive
correlations (p < .001) with the parents' weight and the mother's degree of obesity. He concluded that whether an obese infant will stay obese depends a great deal on the degree of obesity in the family, especially in the mother. In Alexander, Sherman, and Clark's (1991) research of obesity in Mexican American preschool children, they also found a significantly greater Body Mass Index for mothers of obese children (t = 3.91; p < .000).

However, there are some different findings in regard to the inheritance theory. Garn and Bailey (1976) made similar fatfold comparisons on 6,372 pairs of serologically-verified biological parent-child and 429 pairs of adoptive parent-child. All correlations were based on age and sex-specific z-transforms of the triceps and subscapular fatfold values. Adoptive parent-child pairs show fatness similarities quite comparable to those exhibited by biological parent-child pairs. In the child's age group under four years, the correlation for biological pairs was r = .09, and for adoptive pairs r = .12; in the 5 to 9 age group, the correlation for biological pairs was r = .19 and for adoptive pairs r = .11; in 10 to 14 age group, the correlation for biological pairs was r = .23 and for adoptive pairs r = .17; and in 15 to 18 age group, the correlation for biological pairs was r = .32 and for adoptive pairs, r = .39. They concluded that the genetic hypothesis is not sufficient to explain fatness similarities of genetically-related individuals living together.

Hartz, Giefer and Rim (1977) analyzed data from an epidemiological investigation of obesity among 73,532 women who belonged to a Take Off Pounds Sensibly group from 1960 to 1970. The data was based on height, weight, parity, medical and obesity history; spouse's height, weight, and age; height and weight of each subject's children; and whether or not each child was biologically related to the mother. The study used data from 254 families with 546 nonbiologically related children and 10,337 families with 25,554 biologically related children. An analysis of variance technique was used to evaluate the
effect of family environment and heredity for children from age four to eleven. The
f values for testing the family effect in both biologically or non-biologically relationships
were significant (p < .0001). The estimate of heritability was low (11%). Their results
suggest that family environment, which consists of such things as parental example and
child rearing techniques, has an important effect on childhood obesity.

The increasing prevalence of obesity among children implies that genetic factors
alone cannot explain obesity. Multiple studies have demonstrated strong and consistent
associations of childhood obesity with variables in the family environment as well.

Family Type

Graham (1972) used a prospective study to identify the relationship between marital
status and the growth of the children with severe malnutrition. Between January, 1961
and December, 1966, 104 failure-to-thrive infants and children admitted with severe
malnutrition to the British American Hospital in Laim, Peru were involved. Yearly
anthropometric, physical, laboratory, and radiologic examinations were made of those
children and of all siblings. These children's home environments and their families' social
economic status were observed. The results revealed that children with married mothers
had a marked advantage in their growth.

During 1980 to 1981, Nolte, Smith, and O'Rourke (1983) studied the relationship
between health risk attitudes and behaviors and parental presence in 5,411 school-age
children, from ages 11 to 20 (grades 7 to 12), in Central Illinois. Subjects were 52% male
and 95% white. They found that students living with none or only one parent reported
being more overweight than students with both parents ($x^2 = 7.51$, p < .05). The students
reported significantly greater unfavorable attitudes about smoking and weight. While these
findings do not imply a cause and effect relationship, it does appear that students living
with none or one parent are at higher risk than students with both parents.

Alexander, Sherman, and Clark (1991) in their study of obesity in Mexican American preschool children found that the percentage of married mothers in the group of non-obese children (33%) was higher than that of obese children (28%), but was not statistically significant.

Characteristics of the family organization, such as the presence of a father or male in the household, play an important part in the child's weight status. Mellbin and Vuille (1989) used a cohort study of 971 Swedish children to follow from birth through 15 years of age. All the children had shown an increase in relative weight of more than 15% and were separated into three groups. Group A had 25 children between the ages of 7 and 10 years. Group B had 23 children between the ages of 10 and 13 years. Group C had 22 children between the ages of 7 and 13 years. For each case, a control matched for sex and relative weight at 7 (group A and C) or 10 years of age (group B) was selected. In this study, they found more overweight children among the single or divorced parents than among those with intact families (group A, case : control = 7 : 6; group B, case : control = 12 : 4; group C, case : control = 2 : 3). Similarly, Dietz (1987) reported that children of married parents lose weight at higher rates than those of divorced parents. Separation from the mother has been associated with obesity among black adolescent girls, and parental deaths have been reported to be more frequent in families of obese children (Zakus, 1982). Obesity may also be increased among children whose parents have been separated or divorced (Dietz, 1983).
Family Membership

Obesity is not just a consequence of mothering; several additional parental characteristics may influence prevalence. The parents of obese children tend to be older than the parents of non-obese children. The highest prevalence of obesity occurs in single-child families and declines with increasing family size (Dietz, 1983).

The prevalence of obesity may be inversely proportional to family size. However, in Crisp, Douglas, Ross, and Stonehill's (1970) study of obese children, they found that the body shape of a child bears little relationship to the family size. The obese children were usually found among only children and the youngest children of the larger families. The results also revealed that obese children tend to have had older mothers (30 years or older when their child was born) than those of thin children ($x^2 = 8.92; p < .01$). There was a similar tendency for the obese children to have older fathers, though this would be expected from the correlation between the ages of husbands and wives.

Ravelli and Belmont (1979) analyzed the prevalence of obesity by family size and birth order for a total population of over 280,000 19-year-old Dutch males, who were from one- to five-child families. For the entire population, the prevalence of obesity was higher in the labor social class than in the non-labor. In both social classes, obesity rates declined with increasing family size, and these relationships between family size and obesity were statistically significant ($p < .0005$). Regardless of social class, only children were uniquely at risk for obesity.

Epstein, Koeske, Wing, and Valoski (1986) report the relevance of family size, the number of obese living in the child's home, and parental weight of 102 children in a one-year weight loss treatment program. Family size showed a significant univariate effect on
outcome ($F_{3,97} = 3.36; p < .02$); the more children in a family, the smaller the weight loss for the target child. Over the year of treatment, only-children lost significantly more weight ($p < .01$) than did children in families with four or more children. The BMI change over one year showed statistically significant relationships with number of children, $r(92) = .29; p < .01$ and number of obese siblings, $r(92) = .24; p < .02$. The number of children in the family was positively related to the number of obese children, $r(92) = .58; p < .001$.

**Family Socioeconomic Status**

In a study of childhood obesity, Chrisp, Douglas, Ross, and Stonehill (1970) used 5,362 children to find some developmental aspects of disorders of weight. The children were weighed at birth and also subsequently, at the ages of 4, 7, 11, 15, and 20 years. Their report found that among the 7-year-olds there is no difference between the social classes in the proportion of obese or thin children. At later stages, however, there is a slight increase in the proportion of obese children in the lower socioeconomic class. Of the children who were obese at 15 years of age, 40% were children of the lower socioeconomic class.

Saltzer & Golden (1985) studied 144 children, 70 males and 74 females, and their mothers. The mean age of the children was 5.9 years with a standard deviation of 2.7. They found that within the lower socioeconomic status population, the childhood and maternal measures of weight are positively correlated. Maternal ideal body weight correlated with percentile skinfold thickness in the children ($r = .54; p < .01$). In the higher socioeconomic status population, there was no relationship between maternal and childhood obesity. Maternal percent ideal body weight was inversely correlated with education of the mother ($r = -.21; n = 123; p < .01$), and father ($r = -.30; n = 116$).
p < .001). This indicates that the higher the level of maternal and paternal education, the less obese was the mother. Children from the lower socioeconomic status highly resembled the adiposity of their mothers, but this relationship was not observed in the middle class children.

Golden, Saltzer, DePaul-Snyder, and Reiff (1983) studied 144 children, from 2 to 14 years of age with a mean age of 5.9 years, and identified the relationships among relative weights of children and their mothers and socioeconomic status (SES). Subjects were from low and middle SES. Child weight was weakly correlated with maternal weight for the entire sample (r = .18; p < .003). In the lower SES group, child weight was positively correlated with maternal weight for each subgroup, reaching significance in children less than six (r = .60; p < .02; n = 14) and in all girls (r = .48; p < .06; n = 12). In comparison, there was no correlation in the weights of mothers and daughters from middle SES. Although the weight of older male children from middle SES was significantly correlated with the weights of their mothers, those mothers were not obese. There was no statistically significant difference in the weight of boys over 6 years of age in lower and middle SES.

Teasdale, Sorensen, and Stunkard (1990) report their study of 2,015 adoptees (1,155 male and 860 females; mean age = 41.2; S.D. = 8.1) in Copenhagen. Subjects had complete information on their own and their paternal social classes, geographical region of rearing, and current and maximum body mass index. There were significant inverse relationships between adoptees' body mass index and their own social class (r = -.084; p < .05) and that of both their biological fathers (r = -.05; p = .05) and their adoptive fathers (r = -.086; p = .05). A multivariate regression model, including age, sex, and social class of the adoptee, confirmed the significant independent influence of the social
class of both adoptive and biological fathers. The research reveals that both familial
environmental and genetic factors contribute to the relationship of parental social class and
adult fatness, and they are partly independent of the effect of an individual's own social
class.

Family Feeding Practices

Parental feeding practices may contribute to the risk of childhood obesity. Kramer,
Barr, Leduc, Boisjoly, & Pless (1983) found that children whose mothers try to feed the
child more food than the child seemed to want were more at risk for obesity than those
whose mothers did not. Klesges, Coates, Brown, Sturgeon-Tillisch, Moldenhauer-
Klesges, Holzer, Woolfrey, and Vollmer (1983) investigated the relationship between
selected feeding practices and infant weight. Fourteen subjects, who varied in age from 12
to 30 months, and their parents were observed during the dinner meal. They found
significant correlations between child relative weight and: (1) parental prompts to eat
(r = .81; p < .001), (2) parental food offers (r = .51; p < .05), and (3) parental
encouragement to eat (r = .82; p < .001). Thus, the study suggests a relationship between
certain parental feeding variables and the relative weight of their child.

In a study of parental influence on food selection in young children, Klesges, Stein,
Eck, Isbell, and Klesges (1991) evaluated the impact of parental influences on children's
food selections, and the impact of childhood obesity on these food choices. They studied
53 children, from ages four to seven years of age, of various weight status. Results
indicated that parental influences have a significant multivariate effect on food choice
(F [2,100] = 85.91; p < .001). Both the threat of parental monitoring and actual parental
monitoring lowered the number of non-nutritious foods chosen and total caloric content of
the meal. When children were allowed to freely choose foods, they selected a large amount
of food of poor nutritional value. The obesity status of the mothers and children had no impact on these results.

Anliker, Laus, Samonds, and Beal (1990) assessed the early nutrition-related knowledge and attitudes of preschool children and the types of messages that their parents gave to them about nutrition. They studied 104 children aged three years and their mothers. The quantity and specificity of nutrition-related messages about food given by parents were significantly and positively correlated to the children's nutrition knowledge scores. Children whose parents provided more information about these topics scored significantly higher on the concepts of food groups (p < .05), the role of foods in energy balance (p < .01), food origins (p < .001) and the total nutrition knowledge score (p < .001).

Communication between mother and child can also influence food intake and dietary preference. Mothers of overweight children have been found to talk less and give more food feedback to their offspring than mothers of normal weight. In a controlled study of families with an obese child, Kinston, Loaker and Miller (1987) found that the family is the agent or context for many factors associated with obesity, such as eating habits or amount and type of food eaten. They view the family as a logical starting place to consider the prevention of obesity.

Summary

This chapter presented a review of the literature relevant to the conceptual framework. Obesity is usually defined as 120% of normal body weight or body fat. The cause of obesity is thought to be multi-factorial. Family factors include genetic factors, family type, family membership, socioeconomic status, and feeding practices of the
family. Genetic factors were reviewed relevant to the child's birth weight and maternal weight; family type was reviewed in terms of maternal marital status; family membership was reviewed relevant to family size and the child's birth order; family socioeconomic status was reviewed by levels of socioeconomic groups; family feeding practices were reviewed in terms of the child's age at introduction of solid foods, child’s snack patterns, and number of persons in the family who feed the child. The literature review provided an overview of family factors related to obesity and also identified the significance of the conceptual framework of family factors to preschool obesity.
CHAPTER III
METHODOLOGY

The purpose of this secondary analysis of data was to investigate the relationship between family factors and obesity in Mexican American and Anglo preschool children. The research questions, research design, subjects, setting, protection of human subjects, instruments, data collection procedures, data analysis plan, assumptions, and limitations are discussed in this chapter.

Research Questions

The research questions investigated by this study were as follows.

1. Is there a difference between the two groups, Mexican American and Anglos, in the extent to which obesity in preschool children is related to the family factors of:
   a) genetic factors as indicated by the child’s birth weight and maternal weight (BMI)?
   b) family type as indicated by maternal marital status?
   c) family membership as indicated by the child’s family size and the child’s birth order?
   d) family socioeconomic status as indicated by mothers’ education and occupation, and family income status?
   e) family feeding practices as indicated by child’s age at introduction of solid food, child’s snack pattern and the number of persons who feed the child?

2. To what extent is obesity in Mexican American and Anglo preschool children related to the family factors of:
   a) genetic factors as indicated by the child’s birth weight and maternal weight (BMI)?
   b) family type as indicated by maternal marital status?
c) family membership as indicated by the child's family size and the child's birth order?

d) family socioeconomic status as indicated by mothers' education and occupation, and family income status?

e) family feeding practices as indicated by child's age at introduction of solid food, child's snack pattern and the number of persons who feed the child?

Research Design

Secondary analysis involves studying data previously collected in another study. Data are reexamined using different organizations of the data than those previously used (Burns & Grove, 1987). In this secondary analysis study, data were obtained from an ongoing three year project, "Obesity in Mexican American Children" (Alexander & Sherman, 1991). The goal of the original study was to compare subjects from two cultures to determine the degree to which maternal nutritional knowledge, maternal feeding practices, maternal values, socioeconomic status, level of acculturation and other select demographic variables are related to obesity in Mexican American and Anglo preschool children.

This secondary analysis study, "Family Factors Related to Obesity in Preschool Children", focused on the relationship between family factors and childhood obesity. The specific aim of this study was to determine the degree to which certain family factors are related to obesity in Mexican American and Anglo preschool children. Instruments used for data collection were the Demographics Questionnaire and Maternal Feeding Practices Questionnaire. A correlational design was used to describe the relationship between family factors and childhood obesity in this study.

The dependent variable, obesity of the preschool children, was indicated by the child's score of weight for height, age and sex. Triceps and subscapular skinfolds
measurements were used to confirm the child's diagnosis of obesity which is made by the weight for height, age, and sex index. The relationship of specific independent variables were selected from the literature review and included; genetic factors, family type, family membership, socioeconomic status and family feeding practices. Operational indicators for the independent variable of genetic factors were the child's birth weight and maternal weight (BMI); for the variable of family type is the maternal marital status; for the variable of family membership are the child's family size and the child's birth order; for the variable of family socioeconomic status is mothers' education and occupation, and family income status; for variables of family feeding practices are introducing solid food into the child’s bottle before 12 months of age, child's snack patterns and the number of people who feed the child. Data were obtain from portions of the demographic and maternal feeding practices questionnaires of Alexander and Sherman's (1991) study.

Sample

The convenience sample consisted of 341 mothers and their children, of which 180 were Mexican Americans and 161 were Anglo Americans. The criteria for inclusion of the subjects in this study were:

1. Mothers who had preschool children between 3 to 5 years of age.
2. Mothers who were able to read or write in English or Spanish.
3. Family income below the figure of 185% of Poverty, Guideline of the WIC program.
4. Mothers who identified themselves as being either Mexican Americans or Anglo Americans.
5. Only one preschool child per mother was used.
Setting

Subjects were recruited from the Women, Infants, and Children (WIC) clinics, Well-Child Clinics and preschools in Tucson, Arizona. Mothers and their children were interviewed and measured in these clinics or in the subject’s home.

Protection of Human Subjects

The research study proposal was reviewed for approval by the University of Arizona Human Subjects Committee (Appendix A). Written permission to conduct this secondary analysis of data was obtained from the College of Nursing Ethical Review Committee (Appendix B). Prior to participating in the study, each participant signed a written disclaimer form to assure them of confidentiality in the collection of data and anonymity in the reporting of findings. The children signed or marked an "x" on an assent form. All the subjects gave their consent to participate in this study, and only those subjects who voluntarily agreed to participate in this study were included. Subjects were assured that their participation in the study would be voluntary and that there were no hazards or costs beyond time involvement. They were told that they could withdraw from the study at any time and any questions regarding the study were answered.

Instruments

Demographic Questionnaire

The Demographics Questionnaire (Appendix C) was developed by Alexander and Sherman (1991) to ascertain the relationship of obesity in children to the variables of socioeconomic status, sex of child, birth order, birth weight, maternal Body Mass Index, marital status of mother, presence of male in household, and number of people responsible
for child's food intake. Instruments were developed in both English and Spanish using the translation-back translation strategy with two translators. The questionnaire had been submitted to testing for relevance and clarity in a pilot study using 30 Mexican- and Anglo-American mothers.

Green's Socioeconomic Scale (Green, 1970) was developed for assessing socioeconomic status in public health research and evaluation. Green suggests both a conceptual approach and methodological procedures for scoring attributes of social status in samples or populations in the United States. From a statewide sample (N=1,592) of California families with at least one child under 5 years of age, stepwise regression analysis on data was used to develop the scale.

Education of the female head of household is recommended in this scale because the educational level of the woman of the house has been found to be more highly correlated with family health behavior than the education of the male head of the household (Green, 1970). Use of region-specific income scores is recommended for all but nationwide samples. Nationally standardized scores for occupations are given in a list based on a classification scheme of the U.S. Bureau of the Census.

Maternal Feeding Practices Questionnaire

Questions to assess the family feeding practices were selected from the Maternal Feeding Practices Questionnaire of Alexander and Sherman (1991). The Maternal Feeding Practices Questionnaire consisted of nine items asking the mother what kind of feeding behavior she would exercise. Validity of the questionnaire was addressed by a panel of six experts in nutrition and in the Mexican American culture. A Cronbach's alpha reliability coefficient of .71 was calculated following a pilot study of 30 subjects. Higher scores
indicate control over the child's feeding and eating practices. Two questions from the Maternal Feeding Practices Questionnaire were chosen for this secondary analysis of data (Appendix D).

For estimating maternal control of feeding, the mother was asked the question: "When your child was less than 12 months old, did you sometimes put cereal or other foods in his or her bottle along with the formula or milk? [a] Yes, [b] No." In this question, "Yes" represents control, and "No" represents lack of control. For estimating family snack pattern, the mother was asked the question: "Circle three examples of snacks your child has MOST OFTEN: [a] chips, or crackers, or popcorn, or french fries. [b] cookies, or donuts, or snack cakes, or pastry. [c] carrot, or apple, or orange, or other fruit or vegetable. [d] peanut butter or cheese sandwich. [e] taco or tostado. [f] ice cream or pudding. [g] cereal and milk. [h] candy bar. [i] Kool-Aid, punch, soda pop or other sweetened drink". Each answer was given 10, 20, or 30 scores depending upon the food's nutrient density. Higher scores represent more healthy nutrient density. Answer [b], [h] and [i] were scored by 10; answer [a], [c], [d], [e] and [f] were scored by 20; and answer [c] was scored by 30.

Data Collection Protocol

Each mother was interviewed in the clinic's waiting room or in her home. Mothers' and their children's weight and height were measured in the measurement room. A balance beam scale was used to weight subjects and their children without outer clothing and shoes. A standard ruler was used to measure their height without shoes. Three research assistants were trained to measure children's triceps and subscapular skinfolds. The interrator reliability correlation coefficient was 0.88.
Jaccard and Becker (1990) stated that a standard score yields considerable information about the relative position of a score in a distribution. Such scores are even more meaningful when they occur in a normal distribution. Hence, a standard z-score is used in the data analysis. Each child’s triceps and subscapular skinfolds were measured by one of the three research assistants with one of the three skinfold calipers which had been calibrated. The child’s percentile of triceps, subscapular skinfold, and weight for height, age and sex were submitted to the Center for Disease Control Anthropometric Analysis System Computer Program to convert the child’s measurements of obesity to a z-score. Nomograms for triceps and subscapular skinfolds values were used to convert the child’s measurements to percentage of body fat. Questionnaires were completed in the presence of trained research assistants. Data of the completed questionnaires were entered into a computer by research assistants.

Data Analysis Plan

All data were analyzed by use of the Statistical Package for Social Sciences (SPSS). Measures of central tendency and frequencies were computed to describe the study group. Obesity was determined by both criteria of body weight and skinfolds measurements greater than or equal to the eighty-fifth percentile. Both measurement criteria were used to determine childhood obesity; the correlation between the measurements was $r = .75$, $p < .01$. The 85th percentile corresponds to 120% of ideal body weight, an accepted definition of obesity (National Institutes of Health Consensus Development Conference Statement, 1985). The Body Mass Index (BMI) was calculated for each mother. BMI is weight of mother in kilograms divided by her height in meters squared. The National Institutes of Health Consensus Development Conference Statement (NCHS, 1985)
recommended this measurement as an approximation of the magnitude of fatness in adults. The BMI of 27.3 for women corresponds to 20% above desirable weight (NCHS, 1985).

To answer research question 1 a), "Is there a difference between Mexican American and Anglos preschool children in genetic factors as indicated by the child’s birth weight and maternal weight (BMI)?", correlated groups t tests were used to determine if there were differences between the two groups in the genetic factor. Significance was preset at the .05 probability level for all analyses.

To answer research question 1 b), "Is there a difference between Mexican American and Anglos preschool children in family type as indicated by maternal marital status?", the Chi-square test was used to assess if there were differences between the two groups in family type. The family type included:
1. complete family (maternal marital status was married)
2. incomplete family (maternal marital status of separated, divorced, widowed, single-never married, and not married but living with partner).

To answer research question 1 c), "Is there a difference between Mexican American and Anglos preschool children in family membership as indicated by the child’s family size and birth order?", correlated groups t tests were used to tell if there were differences between the two groups in family membership. The meaning of the numbers in birth order are 0 = the only born, 1 = the first born, 2 = the second born, 3 = the third born, etc.

To answer research question 1 d), "Is there a difference between Mexican American and Anglos preschool children in socioeconomic status as indicated by mothers’ education, occupation and family income status?", correlated groups t tests were used to determine if there were differences between the two groups in socioeconomic status.
To answer research question 1 e), "Is there a difference between Mexican American and Anglos preschool children in family feeding practices as indicated by introducing solid food into the child's bottle before 12 months of age, child's snack patterns and the number of persons who feed the child?", the Chi-square test was used to determine if there was differences between the two groups in introducing solid food into the child's bottle before 12 months of age. Correlated group t tests were used to determine if there were differences between the two groups in child's snack patterns and the number of persons who feed the child.

The relationship data were submitted to analysis using the Lisrel Regression Model. Correlation coefficients were calculated to assess the relationship between family factors and z-scores of the child's TSF, SSF and current weight for height, age and sex (the dependent variables), and to answer research question 2: "To what extent is obesity in Mexican American and Anglo preschool children related to the family factors of:

a) genetic factors as indicated by the child's birth weight and maternal weight (BMI)?
b) family type as indicated by maternal marital status?
c) family membership as indicated by the child's family size and the child's birth order?
d) family socioeconomic status as indicated by mothers' education and occupation, and family income status?
e) family feeding practices as indicated by child's age at introduction of solid food, child's snack pattern and the number of persons who feed the child?

Assumptions

1. The subjects who participated in this study answered the questionnaires honestly and to the best of their ability.
2. The research assistants measured the subjects and their children accurately and to the best of their ability.

Limitations

1. The subjects were not selected randomly.
2. The results also could be confounded by research assistants' personal biases.

Summary

This study used a descriptive correlational design to investigate the relationships between family factors and obesity in the secondary analysis of data from a convenience sample of Mexican American and Anglo preschool children in the Southwest. A demographic questionnaire and feeding practice questionnaire items were used to collect the data. The data analysis plan included frequencies, means, and percentages to describe the study group. Correlated groups t test were used to describe the difference between the Mexican American and the Anglo study group in select variables. Pearson correlation coefficients were computed to analyze and describe the relationships between obesity and family factor indicators of the child's birth weight, maternal BMI, family size, the child's birth order, socioeconomic status, snack pattern and the number of persons who feed the child. Chi-square test was used to analyze and describe the relationships between obesity and other family factor indicators: maternal marital status and introducing solid food before the child's was 12 months old. The significance level was preset at the .05 probability level.
CHAPTER IV
RESULTS

The results of this secondary analysis of data are presented in this chapter. The characteristics of the sample and selected family factors are described. Chi-square and correlated groups t tests were used to determine differences between the Mexican American and Anglo study groups for selected variables. The Pearson product moment correlation coefficient was used to describe the relationship between family factors and preschool obesity of the two study groups. The results of the data analysis in response to the research questions are also presented.

Demographic Characteristics of the Sample

A convenience sample of 341 mother-child pairs were recruited in this study. Interview sites of the sample are shown in Table 1. Mothers of 140 (41.1%) children were interviewed in the WIC Clinics; 91 mothers (26.7%) were interviewed in the Food Plus Program; 64 mothers (18.7%) were interviewed in their homes and 46 mothers (13.5%) were interviewed in the Well-Child Clinic.

Demographic characteristics of 180 (52.8%) Mexican American and 161 (47.2%) Anglo children categorized by gender and age are shown in Table 2. There were 164 boys (48.1%) and 177 girls (51.9%) aged from three to five; 153 (44.87%) children aged three; 113 (33.14%) children aged four; and 75 (21.99%) children aged five.
Table 1. Interview Sites of the Sample (n = 341)

<table>
<thead>
<tr>
<th>Interview Site</th>
<th>Absolute Frequency (n)</th>
<th>Relative Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIC</td>
<td>140</td>
<td>41.1</td>
</tr>
<tr>
<td>Food Plus</td>
<td>91</td>
<td>26.7</td>
</tr>
<tr>
<td>Home Visit</td>
<td>64</td>
<td>18.7</td>
</tr>
<tr>
<td>Well-Child Clinic</td>
<td>46</td>
<td>13.5</td>
</tr>
<tr>
<td>Total</td>
<td>341</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 2. Demographic Characteristics of the Children for Total Sample

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Absolute Frequency (n)</th>
<th>Relative Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnic Background</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexican American</td>
<td>180</td>
<td>52.8</td>
</tr>
<tr>
<td>Anglo</td>
<td>161</td>
<td>47.2</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>164</td>
<td>48.1</td>
</tr>
<tr>
<td>female</td>
<td>177</td>
<td>51.9</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>153</td>
<td>44.87</td>
</tr>
<tr>
<td>4</td>
<td>113</td>
<td>33.14</td>
</tr>
<tr>
<td>5</td>
<td>75</td>
<td>21.99</td>
</tr>
</tbody>
</table>
Table 3 shows demographic characteristics of the mothers. Ages of the mothers ranged from 18 to 45 years. Most were within 20 to 29 (62.8%) years of age. There were 226 (66.5%) married mothers and 114 (33.5%) single mothers. The single mother status included separated, divorced, widowed, single - never married, and not married but living with a partner. Regarding working status, there were 257 mothers not working (75.4%). Of the education status, 6 (1.8%) mothers had no formal education; 34 (10%) were within junior high school level; 193 (56.6%) were within senior high school level; 20 (5.9%) were trade school level; 85 (24.9%) were within college level; and 3 (.9%) were graduate school level.

The physical measurement characteristics of the sample are shown in Table 4. The body weight of the children ranged from 24 to 83 pounds (mean = 39.92, S.D. = 9.04); body height was from 30.5 to 49 inches (mean = 40.81, S.D. = 3.24). The child's triceps skinfold measurement ranged from 4.0 to 27.17 mm (mean = 10.21, S.D. = 3.61). The subscapular skinfold measurement ranged from 3.33 to 27.83 mm (mean = 6.78, S.D. = 3.47). Mothers' weights ranged from 96 to 320 pounds (mean = 155.05, S.D. = 37.33).

The mean z-score of weight for height, age and sex of Mexican American children (mean = .76, S.D. = 1.69) were higher than the mean z-score of Anglo children (mean = 0.37, S.D. = 1.24). The Mexican American children's skinfolds z-score (TSF: mean = .23, S.D. = 1.35; SSF: mean = .68, S.D. = 1.54) were higher than z-scores of Anglo children (TSF: mean = -.07, S.D. = .86; SSF: mean = -.05, S.D. = .70). The results mean that Mexican American children were not only heavier but also had more body fat than the Anglo counterparts (see Table 5).
### Table 3. Demographic Characteristics of the Mothers for Total Sample

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Absolute Frequency (n)</th>
<th>Relative Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (n = 341)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20</td>
<td>9</td>
<td>2.6</td>
</tr>
<tr>
<td>20-29</td>
<td>214</td>
<td>62.8</td>
</tr>
<tr>
<td>30-39</td>
<td>111</td>
<td>32.5</td>
</tr>
<tr>
<td>39 &lt;</td>
<td>7</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Marital Status (n = 340)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>226</td>
<td>66.5</td>
</tr>
<tr>
<td>Separated</td>
<td>30</td>
<td>8.8</td>
</tr>
<tr>
<td>Divorced</td>
<td>29</td>
<td>8.5</td>
</tr>
<tr>
<td>Single, never married</td>
<td>36</td>
<td>10.6</td>
</tr>
<tr>
<td>Widowed</td>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>Not married, living with partner</td>
<td>14</td>
<td>4.1</td>
</tr>
<tr>
<td><strong>Working Status (n = 341)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>84</td>
<td>24.6</td>
</tr>
<tr>
<td>No</td>
<td>257</td>
<td>75.4</td>
</tr>
<tr>
<td><strong>Education Status (n = 341)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Formal Education</td>
<td>6</td>
<td>1.8</td>
</tr>
<tr>
<td>Grade 1 - 8</td>
<td>34</td>
<td>10.0</td>
</tr>
<tr>
<td>Grade 9 - 12</td>
<td>193</td>
<td>56.6</td>
</tr>
<tr>
<td>Trade school</td>
<td>20</td>
<td>5.9</td>
</tr>
<tr>
<td>College 1 - 4</td>
<td>85</td>
<td>24.9</td>
</tr>
<tr>
<td>Graduate School</td>
<td>3</td>
<td>.9</td>
</tr>
</tbody>
</table>
Table 4. Physical Measurement Characteristics of the Sample

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean</th>
<th>S.D.</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (pound)</td>
<td>39.33</td>
<td>9.04</td>
<td>83</td>
<td>23</td>
</tr>
<tr>
<td>Height (inch)</td>
<td>40.81</td>
<td>3.24</td>
<td>49</td>
<td>30.5</td>
</tr>
<tr>
<td>TSF (mm)</td>
<td>10.21</td>
<td>3.61</td>
<td>27.17</td>
<td>4.0</td>
</tr>
<tr>
<td>SSF (mm)</td>
<td>6.78</td>
<td>3.47</td>
<td>27.83</td>
<td>3.33</td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (pound)</td>
<td>155.05</td>
<td>37.33</td>
<td>320</td>
<td>96</td>
</tr>
<tr>
<td>Height (inch)</td>
<td>63.61</td>
<td>2.63</td>
<td>72</td>
<td>54</td>
</tr>
</tbody>
</table>

note: The norm for children from three to five: 36.2 pounds, 40.2 inches, TSF of 9.5 mm, and SSF of 5.4 mm (NCHS Growth Charts, 1976).
Table 5. Differences Between Mexican American and Anglo in Dependent Variables

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mexican American</th>
<th>Anglo</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>S.D</td>
<td>n</td>
</tr>
<tr>
<td>Weight for Height,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age and Sex</td>
<td>178</td>
<td>.76</td>
<td>1.69</td>
<td>160</td>
</tr>
<tr>
<td>TSF</td>
<td>157</td>
<td>.20</td>
<td>1.35</td>
<td>121</td>
</tr>
<tr>
<td>SSF</td>
<td>157</td>
<td>.68</td>
<td>1.54</td>
<td>119</td>
</tr>
</tbody>
</table>

* p < .05
The correlation among triceps skinfold (TSF) measurement, subscapular skinfold (SSF) measurement, and weight for height, age and sex (WHAS) are calculated by conversion to z-scores shown in Table 6. The results reveal that the relationship between the child's TSF and SSF was strong in Mexican American children ($r = .83$, $p < .00$), Anglo children ($r = .74$, $p < .00$) and total sample ($r = .80$, $p < .00$). The correlation was not significant between TSF and WHAS ($p > .05$) in the study group. A weak correlation was found between SSF and WHAS in the total children group. In this study, children with higher TSF z-score did have higher SSF z-scores, but TSF or SSF of the children could not be used to estimate the weight for height, age sex z-score.

Measurement of characteristics of selected family factors are shown in Table 7. For the genetic factor, the child's birth weight ranged from 12.63 to 2.06 pounds (mean = 7.58, S.D. = 1.28). Maternal BMI ranged from 58.65 to 16.86 (mean = 27.04, S.D. = 6.42). For the family membership, the family size ranged from 2 to 14 persons (mean = 4.79, S.D. = 1.60). The education status was scored from 0 to 24, with 0 representing no formal education; numbers 1 to 12 represent 1 to 12 grades; numbers 13 to 14 represent business, trade or technical school years; 15 to 18 represent college or university years; and numbers 19 to 24 represent master, Ph.D, or post-grade years. Mothers' education levels ranged from 0 to 24 (mean = 12.35, S.D. = 3.30).
Table 6. The Correlation Coefficient Among TSF, SSF, and Weight for Height, Sex and Age (z-score)

<table>
<thead>
<tr>
<th>(z-score) Indicators</th>
<th>Mexican American</th>
<th>Anglo</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>r</td>
<td>p</td>
</tr>
<tr>
<td>Z-TSF and Z-WHAS</td>
<td>157</td>
<td>.08</td>
<td>.31</td>
</tr>
<tr>
<td>Z-SSF and Z-WHAS</td>
<td>157</td>
<td>.15</td>
<td>.07</td>
</tr>
<tr>
<td>Z-SSF and Z-TSF</td>
<td>157</td>
<td>.83</td>
<td>.00*</td>
</tr>
</tbody>
</table>

Z-TSF: z-score of triceps skinfold.
Z-SSF: z-score of subscapular skinfold.
Z-WHAS: z-score of weight for height, age and sex.
*p < .05
Table 7. Characteristics of Family Factors for Total Sample

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean</th>
<th>S.D.</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child's Birth Weight (n = 328)</td>
<td>7.58</td>
<td>1.28</td>
<td>12.63</td>
<td>2.06</td>
</tr>
<tr>
<td>Maternal BMI (n = 336)</td>
<td>27.04*</td>
<td>6.42</td>
<td>58.65</td>
<td>19.86</td>
</tr>
<tr>
<td>Family Size (n = 340)</td>
<td>4.79</td>
<td>1.60</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Education Years of Mother (n = 339)</td>
<td>12.45</td>
<td>3.47</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Green's Occupation Score of Mother* (n = 288)</td>
<td>46.98**</td>
<td>9.78</td>
<td>70</td>
<td>24</td>
</tr>
<tr>
<td>WIC Income level (n = 297)</td>
<td>1.57***</td>
<td>1.00</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>N. of Feeders (n = 341)</td>
<td>4.45</td>
<td>2.49</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

* 25-30: overweight, >30: obesity.
** equal to operative or skilled worker.
*** < 2: low income status.
Occupational status was scored according to Green's standardized scores for specific occupations. Mothers' occupations ranged from 24 (labor) to 70 (professional and technical worker) with the mean equal to 46.98 (S.D. = 9.78) (operative or skilled worker). Fathers' occupations ranged from 21 to 66 (mean = 47.64, S.D. = 8.65). According to the WIC income criteria (Appendix E), the family income status was scored. The income status ranged from one to five (mean = 1.57, S.D.= .99). This reveals that most of the children were from the low income families. For the family feeding practice, the number of persons who feed the child ranged from one to ten persons (mean = 4.45, (S.D. = 2.49).

Findings Related to the Research Questions

The Pearson product moment correlation coefficient was calculated to determine the relationship between family factors and obesity in the Mexican American and Anglo preschool children study groups. A correlation coefficient of .26 - .49 is considered to be a low correlation; .50 - .69 is considered to be a moderate correlation; any value greater than .70 is considered to be a high correlation (Munro, Visintainer & Page, 1986). Jaccard and Becker (1990) stated that a standard score yields considerable information about the relative position of a score in a distribution. Such scores are even more meaningful when they occur in a normal distribution. Hence, a standard score (z-score) was calculated to represent the child's TSF, SSF and weight for height, age and sex distribution in the population. The Chi-square and correlated groups t tests were calculated to tell the difference between the two groups in selected variables. The level of significance is set at .05.
Research Question 1 - a

Is there a difference between the Mexican American and Anglo children in the extent to which obesity in preschool children is related to the genetic factor as indicated by the child’s birth weight and maternal weight (BMI)?

The results indicated the average child’s birth weight of Mexican American children (mean = 7.47 lbs, S.D. = 1.39) was a little lower than that of Anglo children (mean = 7.69 lbs, S.D. = 1.14), but there was no statistical difference between the two groups (t = -1.60, p > .05). Regarding maternal BMI, Mexican American mothers had a higher BMI (mean = 28.09, S.D. = 6.82) than Anglo mothers (mean = 25.84, S.D. = 5.71), and the difference between the two study groups was statistically significant (t = 3.25, p < .05) (Table 8).

Research Question 1 - b

Is there a difference between the Mexican American and Anglo children in the extent to which obesity in preschool children is related to the family factor of family type as indicated by maternal marital status?

The family type was separated into complete and incomplete family. Maternal marital status except married all belong to incomplete family, including separated, divorced, widowed, single, and not married living with partner. The married mothers of Mexican American were 108 and of Anglo mothers were 118. Chi-square test was used to tell the difference between the two ethnic groups. The result showed that the difference in childhood obesity between the two groups was statistically significant (x² = 87.19, d.f. = 1, p < .05) (Table 9).
Table 8. Differences Between the Mexican American and Anglo in the Genetic Factor

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mexican American</th>
<th>Anglo</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>S.D</td>
<td>n</td>
</tr>
<tr>
<td>Child's Birth Weight</td>
<td>169</td>
<td>7.47</td>
<td>1.39</td>
<td>159</td>
</tr>
<tr>
<td>Maternal BMI</td>
<td>177</td>
<td>28.09</td>
<td>6.82</td>
<td>159</td>
</tr>
</tbody>
</table>

* p < .05

Table 9. Differences Between the Mexican American and Anglo in Family Type Factor

<table>
<thead>
<tr>
<th>Family Type</th>
<th>Mexican American (n)</th>
<th>Anglo (n)</th>
<th>Total (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Family</td>
<td>71</td>
<td>43</td>
<td>114</td>
</tr>
<tr>
<td>Noncomplete Family</td>
<td>108</td>
<td>118</td>
<td>226</td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
<td>161</td>
<td>340</td>
</tr>
</tbody>
</table>

\(\chi^2 = 87.19, \text{ d.f.} = 1, \ p < .05\)
Research Question 1 - c

Is there a difference between the Mexican American and Anglo children in the extent to which obesity in preschool children is related to the family factor of family membership as indicated by the child’s family size and the child’s birth order?

In the family membership, the number of persons in the families of Mexican American children (mean = 4.96, S.D. = 1.73) was higher than in the families of Anglo children (mean = 4.60, S.D. = 1.42). The difference between the two groups is statistically significant (t = 2.05, p < .05). The Mexican American family tended to have more people living together than the Anglo family. For the child’s birth order, Mexican American children had higher scores (mean = 1.98, S.D. = 1.39) than the Anglo children (mean = 1.66, S.D. = 1.20), and the difference is statistically significant (t = 2.3, p < .05). The result suggests that more Anglo children tended to be the only or elder children of families than their Mexican American counterparts (Table 10).

Research Question 1 - d

Is there a difference between the Mexican American and Anglo children in the extent to which obesity in preschool children is related to the family factor of family socioeconomic status as indicated by mothers' education, occupation, and family income status?

Anglo parents' average education status (mother: mean = 13.86, S.D. = 2.79; father: mean = 14.98, S.D. = 4.05) (Table 11) were higher than Mexican American counterparts' (mother: mean = 11.11, S.D. = 3.43; father: mean = 12.07, S.D. = 4.83) and the difference was statistically significant (mother: t = -8.08, p < .05; father: t = -5.14,
Table 10. Differences Between the Mexican American and Anglo in Family Membership

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mexican American</th>
<th></th>
<th>Anglo</th>
<th></th>
<th></th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>S.D</td>
<td>n</td>
<td>Mean</td>
<td>S.D</td>
</tr>
<tr>
<td>N. of Person in Family</td>
<td>180</td>
<td>4.96</td>
<td>1.73</td>
<td>161</td>
<td>4.60</td>
<td>1.42</td>
</tr>
<tr>
<td>Child's Birth Order</td>
<td>180</td>
<td>1.98</td>
<td>1.39</td>
<td>161</td>
<td>1.66</td>
<td>1.20</td>
</tr>
</tbody>
</table>

* p < .05

Table 11. Differences Between the Mexican American and Anglo in Socioeconomic Status

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mexican American</th>
<th></th>
<th>Anglo</th>
<th></th>
<th></th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>S.D</td>
<td>n</td>
<td>Mean</td>
<td>S.D</td>
</tr>
<tr>
<td>Education: Mother</td>
<td>180</td>
<td>11.11</td>
<td>3.43</td>
<td>161</td>
<td>13.86</td>
<td>2.79</td>
</tr>
<tr>
<td>Father</td>
<td>122</td>
<td>12.07</td>
<td>4.83</td>
<td>126</td>
<td>14.98</td>
<td>4.05</td>
</tr>
<tr>
<td>Occupation: Mother</td>
<td>41</td>
<td>44.66</td>
<td>9.59</td>
<td>43</td>
<td>49.19</td>
<td>9.55</td>
</tr>
<tr>
<td>Father</td>
<td>97</td>
<td>45.14</td>
<td>8.79</td>
<td>97</td>
<td>50.12</td>
<td>7.83</td>
</tr>
<tr>
<td>Income level</td>
<td>156</td>
<td>1.44</td>
<td>8.59</td>
<td>149</td>
<td>1.71</td>
<td>1.12</td>
</tr>
</tbody>
</table>

* p < .05
Anglo parents' average occupation status according to Green's index (mother: mean = 49.19, S.D. = 9.55; father: mean = 50.12, S.D. = 7.83) was also higher than their Mexican American counterparts' (mother: mean = 44.66, S.D. = 9.59; father: mean = 45.14, S.D. = 8.79). The difference was statistically significant (mother: t = -2.17, p < .05; father: mean = -4.17, p < .00). In addition, the family income status according to WIC criteria of the Anglo family (mean = 1.71, s.d. = 1.12) was found to be higher than that of the Mexican American family (mean = 1.44, S.D. = 8.59). The difference was statistically significant (t = -2.3, p < .05). The results indicate that the Mexican American families had a lower socioeconomic status than the Anglo families.

Research Question 1 - e

Is there a difference between the Mexican American and Anglo children in the extent to which obesity in preschool children is related to the family factor of family feeding practices as indicated by introduction of solid food into child's bottle before 12 months of age, child's snack pattern and the number of persons who feed the child?

The question regarding the age at introducing solid food into the child's bottle was: "When your child was less than 12 months old did you sometime put cereal or other food in his/her bottle along with the formula or milk?" There were 60 Mexican American and 51 Anglo mothers who answered yes. The result of Chi-square test indicated a significant difference ($x^2 = 39.15, \text{d.f.} = 1, p < .05$) (Table 12). For snack nutrient density issue, the higher score means the better snack pattern of children. It was found that the difference between Mexican American children (mean = 63.31, S.D. = 12.27) and Anglo children (mean = 62.92, S.D. = 9.28) was not statistically significant (t = .32, p > .05). For the number of persons who feed the child, the Mexican American child
Table 12. Differences Between the Mexican American and Anglo in Family Feeding Practices

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mexican American</th>
<th>Anglo</th>
<th>( x^2 ) or t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introducing Solid Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Into Bottle &lt; 12 months</td>
<td>178 (Yes: 60, No: 118)</td>
<td>161 (Yes: 51, No: 110)</td>
<td>( x^2 = 39.15 )</td>
<td>&lt;.05*</td>
</tr>
<tr>
<td>2. Snack Nutrient Density</td>
<td>177 63.31 12.27</td>
<td>161 62.92 9.28</td>
<td>t = 0.32</td>
<td>.75</td>
</tr>
<tr>
<td>3. N. of Feeders</td>
<td>180 4.27 2.59</td>
<td>161 4.71 2.34</td>
<td>t = -1.67</td>
<td>.10</td>
</tr>
</tbody>
</table>

* p < .05
(mean = 4.27, S.D. = 2.59) had fewer feeders than the Anglo counterpart (mean = 4.71, S.D. = 2.34). However, the difference between the two study groups was not statistically significant (t = -1.67, p > .05). The result reveals that there were no differences between the two study groups in the number of persons who feed the child (Table 12).

Research Question 2 - a

To what extent is obesity in Mexican American and Anglo preschool children related to the genetic factor as indicated by the child’s birth weight and maternal BMI?

Of the genetic factor, the Anglo children group demonstrated a weak positive relationship between the child's birth weight and TSF (r = .18, p = .05) in Table 13. Both ethnic groups had a weak correlation between maternal BMI and TSF and SSF (Mexican American: maternal BMI and TSF: r = .32, p = .00; maternal BMI and SSF: r = .27, p = .00; Anglo: maternal BMI and TSF: r = .29, p = .00; maternal BMI and SSF: r = .28, p = .00). The Anglo children's birth weight was positively correlated with the child's TSF with a weak correlation. No other correlations were found between the child's birth weight and TSF, SSF or weight for height, age and sex in the Mexican American and Anglo children groups. Maternal BMI of both Mexican American and Anglo children had a weak relationship with TSF and SSF of the children, but were not related to their weight for height, age and sex.
Table 13. The Correlation Coefficient of the Genetic Factor and TSF, SSF, and Weight for Height, Sex and Age (z-score)

<table>
<thead>
<tr>
<th>z-score</th>
<th>Mexican American</th>
<th>Anglo</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>r</td>
<td>p</td>
</tr>
<tr>
<td>Child's Birth Weight</td>
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<td></td>
</tr>
<tr>
<td>Z-WHAS</td>
<td>169</td>
<td>-.03</td>
<td>.68</td>
</tr>
<tr>
<td>Z-TSF</td>
<td>148</td>
<td>-.01</td>
<td>.89</td>
</tr>
<tr>
<td>Z-SSF</td>
<td>148</td>
<td>.12</td>
<td>.88</td>
</tr>
</tbody>
</table>

Maternal BMI

| Z-WHAS      | 177  | -.02 | .76  | 159  | .00  | .97  | 336  | .01  | .92  |
| Z-TSF       | 154  | .32  | .00* | 119  | .29  | .00* | 273  | .32  | .00* |
| Z-SSF       | 154  | .27  | .00* | 117  | .27  | .00* | 271  | .30  | .00* |

Z-TSF: z-score of triceps skinfold.
Z-SSF: z-score of subscapular skinfold.
Z-WHAS: z-score of weight for height, age and sex.
* p < .05
Research Question 2 - b

To what extent is obesity in Mexican American and Anglo preschool children related to the family factor of family type as indicated by maternal marital status?

The results showed that the family type had a weak positive correlation with TSF (r = .27, p = .00) and SSF (r = .25, p = .01) of the Anglo children (Table 14). For the Mexican American children a weak positive correlation was noted between the family type and both SSF (r = .18, p = .03) and weight for height, age and sex (r = .17, p = .02). In the total sample group, family type was found to be weakly correlated with weight for height, age and sex (r = .11, p = .05); TSF (r = .20, p = .00); and SSF (r = .21, p = .00). The response to this research question is that Mexican American children who were living in single mother families were heavier and had higher TSF and SSF than children living with both parents. Anglo children living in single mother families had both TSF and SSF measurements higher than those living with both parents.

Research Question 2 - c

To what extent is obesity in Mexican American and Anglo preschool children related to the family factor of family membership as indicated by the child's family size and the child's birth order?

There were three weak negative correlations between the family membership and Anglo childhood obesity (Table 15): 1) the number of persons in the child's family and child's TSF (r = -.19, p = .03); 2) the number of persons in the child's family and child's SSF (r = -.20, p = .03); and 3) the child's birth order and the child's SSF (r = -.18, p = .05). In the Anglo group, children living with more persons were leaner, and the
Table 14. The Correlation Coefficients of Family Type and TSF, SSF, and Weight for Height, Sex and Age (z-score)

<table>
<thead>
<tr>
<th>z-score</th>
<th>Mexican American</th>
<th>Anglo</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>r</td>
<td>p</td>
</tr>
<tr>
<td>Z-WHAS</td>
<td>179</td>
<td>.17</td>
<td>.02*</td>
</tr>
<tr>
<td>Z-TSF</td>
<td>156</td>
<td>.15</td>
<td>.07</td>
</tr>
<tr>
<td>Z-SSF</td>
<td>156</td>
<td>.18</td>
<td>.03*</td>
</tr>
</tbody>
</table>

Z-TSF: z-score of triceps skinfold.
Z-SSF: z-score of subscapular skinfold.
Z-WHAS: z-score of weight for height, age and sex
* p < .05
Table 15. The Correlation Coefficients of Family Membership and TSF, SSF, and Weight for Height, Sex and Age (z-score)

<table>
<thead>
<tr>
<th>z-score</th>
<th>Mexican American</th>
<th>Anglo</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>r</td>
<td>p</td>
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<tr>
<td>Family Size</td>
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<tr>
<td>Z-WHAS</td>
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<td>.07</td>
<td>.37</td>
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<tr>
<td>Z-TSF</td>
<td>157</td>
<td>.05</td>
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<tr>
<td>Z-SSF</td>
<td>157</td>
<td>.01</td>
<td>.89</td>
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<td>Child's Birth order</td>
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<tr>
<td>Z-WHAS</td>
<td>180</td>
<td>-.02</td>
<td>.77</td>
</tr>
<tr>
<td>Z-TSF</td>
<td>157</td>
<td>-.10</td>
<td>.24</td>
</tr>
<tr>
<td>Z-SSF</td>
<td>157</td>
<td>-.12</td>
<td>.12</td>
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</table>

Z-TSF: z-score of triceps skinfold.
Z-SSF: z-score of subscapular skinfold.
Z-WHAS: z-score of weight for height, age and sex.
* p < .05
only or elder children tended to have more body fat. There was no significant relationship between family membership and obesity in the Mexican American children.

Research Question 2- d

To what extent is obesity in Mexican American and Anglo preschool children related to the family factor of family socioeconomic status as indicated by mothers' education, occupation, and family income status?

No significant relationship was found between educational status of mothers and childhood obesity in the two groups. However, in the total children group, education was negatively and weakly correlated with SSF (Table 16). A negative correlation was found between the occupational status of mothers and their children's weight for height, age and sex in the Mexican American group (r = -.18, p = .04) and in the total sample (r = -.13, p = .02). The relationship between family WIC income status and SSF of their children was also negatively correlated in the Mexican American group (r = -.18, p = .04). Hence, in family socioeconomic status, the Mexican American mothers who had lower Green's occupation scores tended to have children with higher weight for height, age and sex scores. Mexican American children from lower income status also tended to have higher SSF z-score. No significant relationship was found between socioeconomic status and weight or body fat in the Anglo children.
Table 16. The Correlation Coefficients of Socioeconomic Status and TSF, SSF, and Weight for Height, Sex and Age (z-score)

<table>
<thead>
<tr>
<th>z-score</th>
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<th>Anglo</th>
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<tbody>
<tr>
<td></td>
<td>n</td>
<td>r</td>
<td>p</td>
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<td>r</td>
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<td>p</td>
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<td>r</td>
<td>p</td>
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<td>r</td>
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<tr>
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<td>161</td>
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<tr>
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<td>-.01</td>
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<td>119</td>
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<tr>
<td>Z-SSF</td>
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<td>-.18</td>
<td>.04*</td>
<td>107</td>
<td>.05</td>
<td>.58</td>
<td>243</td>
<td>-.11</td>
<td>.09</td>
<td></td>
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</tr>
</tbody>
</table>

Z-TSF: z-score of triceps skinfold.
Z-SSF: z-score of subscapular skinfold.
Z-WHAS: z-score of weight for height, age and sex.
* p < .05
Research Question 2- e

To what extent is obesity in Mexican American and Anglo preschool children related to the family factor of family feeding practices as indicated by child's age at introduction of solid food, child's snack pattern, and the number of persons who feed the child?

Mothers who put cereal or other foods along with the formula or milk in their children's bottles when children were less than 12 months old were considered to show more control in feeding practice. In Table 15, maternal control feeding practice was positively correlated to the child's body fat both in Mexican American children (TSF: \( r = .17, p = .04 \); SSF: \( r = .16, p = .05 \)) and in Anglo children (SSF: \( r = .19, p = .04 \)). In Table 17, the snack nutrient density is negatively correlated to the SSF of the Anglo children \( (r = -.24, p = .01) \). Number of feeders, in Table 18, is positively correlated to SSF of Mexican American children, but is negatively correlated to SSF of Anglo children \( (r = -.19, p = .04) \). The responses to this research question are: 1) Mexican American mothers who used more control in feeding practice before their children were 12 months old tended to have children with more body fat. Anglo mothers who used more control in feeding practice tended to have children with more body fat, 2) Anglo children with lower nutrition density snack patterns tended to have more body fat, 3) There was no significant relationship between snack patterns and body weight and fat in Mexican American children, 4) In the Mexican American group, the child with more feeders was heavier; in the Anglo group, the child with more feeders was leaner.
Table 17. The Correlation Coefficients of Family Feeding Practices and TSF, SSF, and Weight for Height, Sex and Age (z-score)

<table>
<thead>
<tr>
<th>z-score</th>
<th>Mexican American n</th>
<th>r</th>
<th>p</th>
<th>Anglo n</th>
<th>r</th>
<th>p</th>
<th>Total n</th>
<th>r</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Z-WHAS</td>
<td>178</td>
<td>.12</td>
<td>.10</td>
<td>161</td>
<td>-.05</td>
<td>.54</td>
<td>339</td>
<td>.07</td>
<td>.23</td>
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<td>Z-TSF</td>
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<td>.17</td>
<td>.04*</td>
<td>121</td>
<td>.17</td>
<td>.06</td>
<td>276</td>
<td>.21</td>
<td>.00*</td>
</tr>
<tr>
<td>Z-SSF</td>
<td>155</td>
<td>.16</td>
<td>.05*</td>
<td>119</td>
<td>.19</td>
<td>.04*</td>
<td>274</td>
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</tr>
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<td>275</td>
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<td>Z-SSF</td>
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<td>-.24</td>
<td>.01*</td>
<td>273</td>
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<td>Z-WHAS</td>
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<td>.00*</td>
<td>276</td>
<td>.80</td>
<td>.04*</td>
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</tbody>
</table>

Z-TSF: z-score of triceps skinfold.
Z-SSF: z-score of subscapular skinfold.
Z-WHAS: z-score of weight for height, age and sex.
* p < .05
Summary

The results of the data analysis were presented in this chapter. The sample characteristics and statistical analyses of the research questions were presented. This study included 341 children and their mothers. Of the 180 Mexican American and 161 Anglo children group, there were 164 boys and 177 girls aged from three to five years of age. The average age of mothers was 29.97 years old. There were 114 mothers who were single parents and 124 mothers who were working. The z-score of the Mexican American child's TSF, SSF, weight for height, age, and sex, and maternal BMI were statistically higher than that of the Anglo counterparts. More Mexican American children lived in single mother families than Anglo children. It was found that Mexican American families had more children and more people living together than their Anglo counterparts. Parents of Mexican American children had lower education, occupation and income status than Anglos. There was a strong correlation between the TSF and SSF. Being in a single mother family had a weak correlation with the child's TSF and SSF in the Anglo group.
CHAPTER V
DISCUSSION AND CONCLUSION

This chapter contains discussion of the findings of the study. Conclusions, limitations of this study, implications for nursing, and recommendations for further study are also presented.

Findings Related to the Conceptual Framework

The purpose of this secondary analysis of data was to identify the relationship between the family factor and obesity in Mexican American and Anglo preschool children. The dependent variable of this study was obesity. The independent variables of the family factors include the genetic factor, family type, family membership, family socioeconomic status and family feeding practices. Since Mexican Americans may be at high risk for obesity (Yanochik-Owen and White, 1977), they were compared with Anglos to learn the difference between the two groups in terms of the relationship of family factors and obesity.

Demographic Characteristics of Mexican American and Anglo Groups

In this study, the child's obesity status were indicated by z-scores of TSF, SSF and weight for height, age and sex. There was a weak correlation between SSF and weight for height, age and sex, but a high correlation between TSF and SSF for the two groups and the total sample. The results suggest that children with greater TSF thickness tended to have higher SSF thickness.

By measuring triceps and subscapular skinfold thickness and weight for height, age and sex, this study concluded that the Mexican American children were heavier ($t = 2.39$, $p < .05$) and had more body fat (TSF: $t = 2.15$, $p < .05$; SSF: $t = 4.39$, $P < .00$) than their
Anglo counterparts. The maternal BMI of the Mexican American group was also higher than that of the mothers of Anglo children ($t = 3.25$, $p < .05$). In this study, both Mexican American children and their mothers were heavier than the Anglo counterparts.

Many other studies have compared ethnic differences in anthropometric characteristics of children and their parents. Kautz and Harrison (1981) found that Mexican American children had greater weight for length and subscapular skinfold thickness than Anglo children. However, there was no significant difference in triceps skinfold thickness between the two groups of children. Haffner, Stern, Hazuda, Pugh, Patterson and Malina (1986) found that BMI of Mexican American females (mean = 30.1) were significantly greater than that of non-Hispanic white females (mean = 27.4). Zavaleta and Malina (1980) stated that Mexican American children were significantly shorter and lighter than the reference data for American children. Nevertheless, triceps skinfold thickness and estimated fat areas of Mexican American children were equal to the reference data during childhood and adolescence. Greaves, Puhl, Baranowski, Gruben and Seale (1989) concluded that Mexican American mothers were heavier but had more body fat than Anglo mothers. They found no differences in overall and compartmental fat between Mexican American and Anglo children.

Results of this study agree with the findings of Kautz and Harrison (1981) and Haffner, Stern, Hazuda, Pugh, Patterson and Malina (1986), and have the same conclusion as that of Yanochik-Owen and White (1977) that Mexican American children are obese more frequently than children in the Anglo group in the United States.

Regarding the factor of the family type, it was found that 71 (39.66%) Mexican American children and 43 (26.71%) Anglo children lived in single mother families, and the difference is significant. Anglo mothers were more likely to be married than Mexican
American mothers. The finding was similar to that of Alarming Trends (1990) which reported that 31% of all births in Arizona were from unwed mothers. The child's birth order of Mexican American children was significantly greater than Anglo children. Anglo children were more likely to be the only children or first born. Results of this study indicated that the Mexican American family had a larger family size with lower parent education levels, occupation and income status.

**Genetic Factor and Obesity**

For the first indicator of genetic factor, there was only one statistically significant correlation found, the child's birth weight and TSF thickness in the Anglo group. The studies of Crisp, Duglas, Ross, and Stonehill (1970); study of Mossberg (1987); and Alexander, Sherman and Clark (1991) all found significant correlations between birth weight and the child's weight. The result of the relationship between birth weight and the child's weight in this study was different from their findings. However, Brooke and Abernathy (1985) found heritability to be particularly important in obese children over ten years of age; whereas in children under ten, environmental factors are probably more important. Birth weight alone is a poor indicator for predicting future obesity. According to the results, higher birth weight Anglo babies had higher TSF thickness during their preschool age. In the Mexican American preschool children, there was no correlation between birth weight and body fat.

Maternal BMI was positively related to the child's TSF and SSF in Mexican American children (TSF: $r = .32$, $p = .00$; SSF: $r = .27$, $p = .00$); in Anglo children (TSF: $r = .29$, $p = .00$; SSF: $r = .27$, $p = .00$), and in the total sample (TSF: $r = .32$, $p = .00$; SSF; $r = .30$, $p = .00$). The relationships between maternal BMI and child's skinfold thickness was weak. The results support the study of Mossberg (1989) who reported the
same relationship between mothers and their children in obesity. For the genetic factor, analysis of the data regarding the family system in the conceptual framework suggested that maternal BMI has a stronger relationship with the child's percentage of body fat than birth weight.

Family Type and Obesity

Regarding family type, children living in single mother families had higher TSF and SSF thickness measurements in the Anglo group. These results agreed with the study of Mellbin and Vuille (1989) that obesity may be increased among children whose parents were separated or divorced. The reason obesity of Mexican American children did not relate to the single mother status may have been their larger family size. Mexican American children might have care or support from family members other than fathers, for example the male partner of the mother or grandparents may take care of the children instead of their fathers.

Family Membership and Obesity

For the family membership factor, the family size was negatively correlated to the child's TSF and SSF thickness in the Anglo group. This indicates that the fewer persons that lived in the family, the higher the TSF and SSF in the Anglo child. Being an only child or first born was statistically significantly related to higher percentage of body fat in Anglo children. The result was similar to the report of Revelli and Belmont (1979) who found that obesity rates declined with increasing family size. In preschool age, children are affected by the influence of parents or other family members. Parents act as intermediates helping the child to approach the outside environment (Whaley & Wong, 1987). If the family had fewer members, children may not get the correct information about health or
nutrition. The other consideration may be that in a smaller family, children may have more food available than they want or need. If children feel lonely or stressful and have no one to talk with, they might comfort themselves by eating food (Zakus, 1982).

Family Socioeconomic Status and Obesity

The mother's level of education was negatively related to the child's SSF thickness in the entire sample, but was not significantly related in each individual ethnic group. The mother's occupation was negatively correlated to the child's weight in the Mexican American children. Mexican American children of labor working class mothers were heavier than children of professional workers. The family income status was found to be negatively correlated with the child's SSF thickness in the Mexican American child. Mexican American children of poorer families had higher SSF thickness than the other children.

There was no significant relationship between education, occupation and income status of the Anglo mothers and their children's weight or body fat. The results do not support the statement of Saltzer and Golden (1985) that within the lower socioeconomic status population, weights of mothers and their children were positively correlated. According to the study of Crisp, Douglas, Ross and Stonehill (1970), in younger age groups only (younger than seven years old) there was no statistically significant relationship between socioeconomic status and childhood obesity.

Family Feeding Practices and Obesity

In both groups, children who were fed solid food before 12 months of age were found to have higher TSF and SSF than children who were not. The result indicates that mothers introducing solid food into the bottle in the first year of their children's lives could
induce a trend toward higher body fat in their children. Olvera-Ezzell, Power and Cousins (1990) stated that Mexican American mothers may use controlling strategies when their children do not follow maternal directives regarding eating. They found that child age was negatively correlated with mother’s use of commands, reasoning, threats, and bribes, and positively correlated with maternal nondirectives, servings and child compliance.

The child who had more feeders was found to have a higher SSF thickness in the two groups. In the Anglo group, children who had lower nutrient snack patterns had higher SSF thickness. The preschool child, who does not have adequate nutrition knowledge, would choose preferred food only. According to preference, vegetables, in particular, are often poorly received by the child. In the study of Klesges, Stein, Eck, Isbell, and Klesges (1991), they found that parental influences had a significant effect on food choice. Olvera-Ezzell, Power and Cousins (1990) found Mexican American mothers with more years of formal education served healthier foods and were more likely to report using reasoning strategies, prohibiting consumption of unhealthy food, monitoring child food consumption away from home, and allowing child input into the eating situation than were less educated mothers.

Limitations of this Study

The limitations of this secondary analysis of data may have affected the outcome responses to the research questions. One major limitation of this study was the sample selection. Since the sample was not selected randomly, the study groups might not reflect the general ethnic population of Mexican American and Anglos in the study sites. The second limitation of this study was missing data. Some lost information might produce more precision in the results. The third limitation might be the personal bias of data
collectors. The data collectors might have had influence on the mothers who were selected to answer the questionnaires.

**Recommendations for Further Study**

For more understanding of the relationship of genetic factors and childhood obesity, a study should be done that includes both parents and all the children in the family. The study could include also the interaction between family members, such as father / mother, father / son, mother / daughter, etc. A qualitative study which includes family interaction variables may expand the investigation. Family feeding practices can be studied qualitatively to determine such practices as meal schedule, person who prepares the meal, the frequency of eating out, interaction during meals. Other family types could be studied for effect on childhood obesity.

**Implications for Nursing**

In the United States, obesity is becoming a health problem of epidemic proportion. Childhood obesity is among the most prevalent nutritional disorders affecting the pediatric population. It is known that increasing prevalence of childhood obesity together with the morbidity of its consequences are serious problems. Moreover, obese children face a much greater risk of developing psychological and social problems than their nonobese peers. Hence, the prevention of childhood obesity is critical. Preschool ages, from three to five, is the best time to conduct obesity prevention programs because parental influences have the greatest impact on children in this period (Dailey, 1985). Crisp, Douglas, Ross and Stonehill (1970) stated that there is a significant correlation between body weight in early childhood and the body weight in puberty and even in the early adult life.
Public health nurses should recognize that Mexican Americans are at high risk for obesity, not only for their ethnic background, but also for their more frequent single parent family type. Hertzler (1979) stated that single parent families have members with less nutritionally adequate food habits. It is suggested that nutrition educators providing nutritional information to families should initially focus more attention on families with only one parent. Providing information about food selection and preparation for the Mexican American population might be one of the ways to prevent their obesity.

This study is aimed at the relationship between family factors and preschool children in order to provide information and suggestions for nurses to deal with this problem. Family factors associated with obesity may help to identify children at risk. The maternal BMI is an effective indicator of the tendency toward childhood obesity. Nolte, Smith and O'Rourke (1983) mentioned that children in single parent families tend to have more psychosocial problems which induce health problems, such as obesity. For the purpose of preventing psychosocial problems for the child, it is suggested that public health nurses should recognize the importance of family function as a threat to health practices.

Summary

This chapter presented a discussion of the findings of this secondary analysis of data. Limitations and recommendations were also included. It revealed that the family factors of genetic factor, family type, family membership, socioeconomic status and family feeding practice are related to preschool obesity. In Mexican American children, the results showed that: 1) maternal BMI, a genetic factor, had the most significant correlation to the child's body fat; 2) single mother families had children with thicker subscapular skinfolds; 3) children living in low income families had greater subscapular body fat; 4) children who had been fed solid food in their bottles before 12 months of age had a tendency to have
more body fat; 5) and the greater the number of persons feeding the child, the greater the percentage of body fat. In Anglo children, the results showed that: 1) birth weight was positively related to the child’s percent of body fat; 2) maternal BMI had a statistically significant correlation with the child’s body fat; 3) single mother families had children with more body fat; 4) the greater the number of persons in the family, the leaner the child; 5) only and oldest children had more subscapular fat than the other children; 6) children who had been fed solid food in their bottle before 12 months had a tendency to have more body fat; and 7) children who ate snacks of lower nutrient value had higher subscapular skinfold measurement. The results of this study suggest areas for assessment and intervention by nurses for the prevention of childhood obesity.
APPENDIX A

OBESITY IN MEXICAN AMERICAN CHILDREN

HUMAN SUBJECTS APPROVAL
Dear Dr. Sherman:

I am pleased to inform you that your project, Obesity in Mexican/American Children, has been approved by the Arizona Department of Health Services' Human Subjects Review Committee (HSRC) on August 1, 1990. This approval means that the HSRC feels that the proposed project appears to reasonably protect the subjects' personal privacy and safety. The attached confidentiality statement must be returned prior to first release of data.

This approval should not be construed as granting or providing funds, nor that the requested data must be made available. These decisions are the responsibility of the entities having either the data or funds.

Sincerely,

Stan Kleiner
Chairman

Attachment: Confidentiality Statement

cc: Renee Gaudino
APPENDIX B

HUMAN SUBJECTS APPROVAL BY
UNIVERSITY OF ARIZONA COLLEGE OF NURSING
ETHICAL REVIEW COMMITTEE
TO:        Yen-Chi Liao  
        Graduate Student  

FROM:     Leanna Crosby, D.N.Sc., R.N.  
          Director of Intramural Research  

DATE:     October 30, 1991  

SUBJECT:  Human Subject's Approval for Thesis Research .  

Your research, "Family Factors Related to Obesity in Children", has received prior approval as part of a larger study entitled "Obesity in Mexican/American Children". The project was approved and requires no further approval for secondary analysis of data.  

Best wishes with your research.  

LC/ga
APPENDIX C

DEMOGRAPHIC QUESTIONNAIRE
Anthropometrics

Mother:
1. weight without shoes ______ lbs.
2. height without shoes ______ in.

Child:
1. TSF on three consecutive readings on right arm _____ , _____ , _____.
2. SSF _____ , _____ , _____.
3. weight without shoes ______ lbs.
4. height without shoes ______ in.

Questions

1. Mother’s age in years: ______.
2. Maternal marital status a) married, b) separated, c) divorced, d) single, never married
e) widowed, f) not married, living with partner
3. How many persons in your household? total household number ______.
4. What was the last year of school you completed?
   no formal education
   grades: 1 2 3 4 5 6 7 8 9 9 10 11 12 GED
   college or university: 1 2 3 4
   business, trade or technical school: 1 2
   post-graduate: 1 2 3 MS/MA PhD
5. What was the last year of school your husband (if married) completed?

- no formal education
- grades: 1 2 3 4 5 6 7 8 9 10 11 12 GED
- college or university: 1 2 3 4
- business, trade or technical school: 1 2
- post-graduate: 1 2 3 MS/MA PhD

6a. Are you working now at a paying job? Yes  No

6b. (if yes) What kind of work do you do? __________.

7a. Is your husband or partner working now? Yes  No

7b. (if yes) What kind of work does he do? __________.

8. What is your child's birthdate? ___/___/______.

9. sex of child    M  F

10. Is your child your: a) only child, b) first born, c) second born, d) third born, e) other.


12. How many persons feed your child? __________.

13. WIC Income Criteria: 1 2 3 4 5

14. Are you Mexican American? Yes  No
Maternal Feeding Practices Questionnaire

1. When your child was less than 12 months old did you sometimes put cereal or other foods in his/her bottle along with the formula or milk?
   a. Yes
   b. No

2. Circle three examples of snacks your child has MOST OFTEN:
   a. chips, or crackers, or popcorn, or french fries.
   b. cookies, or donuts, or snack cakes, or pastry.
   c. carrot, or apple, or orange, or other fruit or vegetable.
   d. peanut butter or cheese sandwich.
   e. taco or tostada.
   f. ice cream or pudding.
   g. cereal and milk.
   h. candy bar.
   i. Kool-Aid, punch, soda pop or other sweetened drink.
APPENDIX E

WIC INCOME CRITERIA
**UTAH WIC PROGRAM**
**INCOME CRITERIA SCHEDULE**
Federal FY 1991
Effective July 1, 1990 - June 30, 1991

**INCOME CRITERIA**

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Additional Member

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</table>

(All Dollar figures are "Countable Monthly Income" taken from the Back of the Utah WIC Certification form.)

**CRITERIA 1** = The Poverty Guideline established by O.M.B. is the maximum figure for all families.
**CRITERIA 2** = The maximum figure is 125% of the Poverty Guideline.
**CRITERIA 3** = The maximum figure is 150% of the Poverty Guideline.
**CRITERIA 4** = The maximum figure is 175% of the Poverty Guideline.
**CRITERIA 5** = The maximum figure is 105% of the Poverty Guideline, and is the ceiling for qualification.
REFERENCES


