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To the Graduate Council:

I am submitting herewith a dissertation written by Rhonda Dale Terry entitled "Diet, Anthropometric Characteristics, and Diabetes-Related Attitudes and Knowledge Among Women Residing in the Eastern Cherokee Township of Snowbird." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Anthropology.

Mary Ann Bass, Major Professor

We have read this dissertation and recommend its acceptance:

Jane R. Savage, William M. Bass, Robert H. Orr, Michael H. Logan

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Jane R. Savage

William M. Bass

Robert H. Ahr

Michael H. Logan

Accepted for the Council:

L. Evan Pattishall

Vice Chancellor
Graduate Studies and Research

DIET, ANTHROPOMETRIC CHARACTERISTICS, AND DIABETES-RELATED ATTITUDES AND KNOWLEDGE AMONG WOMEN RESIDING IN THE EASTERN CHEROKEE TOWNSHIP OF SNOWBIRD

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Rhonda Dale Terry

August 1982

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This dissertation represents the culmination of a project that involved the help and support of many people. Dr. Mary Ann Bass suggested the Cherokee people as a research focus. She, along with the other doctoral committee members—Drs. William Bass, Michael Logan, Robert Orr, and Jane Savage—helped shape the research design and final report.

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Finally, I am most grateful to the Cherokee families in the Snowbird Community. Everywhere I went, I was treated with courtesy and warmth. I especially appreciate the hospitality extended to me by the Boyd and Edna Chekelelee family during my residence in the community.

ABSTRACT

The goal of this study was to gather, analyze, and interpret assessment data related to the problem of diabetes within the Eastern Cherokee township of Snowbird. Information was obtained from 105 Snowbird women, ages 18 to 87, during the spring of 1982. The three specific aims of the study along with related findings are summarized below.

The first specific aim was to assess selected aspects of household and individual food behavior. The 71 women in charge of obtaining and preparing food in each home were interviewed concerning household food behavior, and each subject's previous day's intake of food and nutritional supplements was elicited. Greater than 95 percent of the households augmented their food supply by producing food, obtaining food from the natural environment, or preserving seasonal foods. The types of food eaten in the homes and by individual subjects were not unlike those eaten by the general United States population. Nonetheless, the use of native Cherokee foods illustrated the unique food selection of this group. In addition, the Snowbird women ate fewer dairy products and fruits, and more eggs and legumes than their counterparts in the general United States population. Purchased foods provided the major source of kilocalories in the diet.

When compared with the R.D.A. standards, the nutrients which most frequently fell below recommended levels were vitamin A, iron, calcium, and vitamin C. There was no meaningful association between caloric

intake and obesity indices, illustrating the necessity of a multidimensional approach to this problem.

The second specific aim was to examine height, weight, and triceps skinfold measurements in terms of degree of body fatness. These measurements were compared with various anthropometric standards, percentiles, and data from the Health and Nutrition Examination Survey, the Ten State Nutrition Survey, Seltzer and Mayer, and five groups of American Indian women. Regardless of the standard used, a high prevalence of obesity was demonstrated among the study participants. The obesity prevalence figures may be inflated to some extent due to genetic dissimilarities between the groups compared. However, the obesity rate was consistently too high to discount that a large number of the research population had more body fat than is currently considered physiologically healthy.

The third specific aim was to evaluate diabetes-related attitudes and knowledge. First, an individual and family profile of diabetes was elicited from each subject. In this study, diagnosed diabetes was more prevalent among older women, and women in the upper Indian inheritance quartile. In addition, a larger number of diabetic family members was reported by subjects who were greater than 75 percent Indian inheritance. Among the Snowbird women, a meaningful relationship between diagnosed diabetes and obesity indices was not demonstrated. This finding perhaps was due to the high incidence of obesity among all subgroups, and the probability that undiagnosed cases of the disease existed among these women.

Next, general knowledge of diabetes was assessed. Each subject was asked to list causes, prevention measures, and treatments for diabetes. Both the total number of responses per subject and the number of accurate responses were low. In addition, approximately one-third of the subjects professed no knowledge of the causes of diabetes, or how to prevent the disease. Subjects who had been diagnosed as having diabetes, or who had diabetic family members were as likely to plead incognizance as those with no experience with the disease. These findings indicate that many Snowbird women lacked an appropriate knowledge base on which to build preventive diabetes behaviors.

Last, information was obtained regarding attitudes toward body size. Using a series of body profile drawings ranging from thin to heavy, it was found that the specific body size associated with attractiveness or health differed between subjects, and that the physique chosen as most attractive was not always the one chosen as healthiest. In addition, approximately 75 percent of the women desired a body size smaller than their present physique. The body profile representing a balance between the endomorphic, ectomorphic, and mesomorphic components was chosen most often as most attractive, healthiest, and most desirable for self.

Although a desire to change weight was expressed at all weight levels, heavier subjects were more likely to be dissatisfied with their weight. At the time of the study, 40.0 percent of the women were engaged in weight change activities, and 75.2 percent had attempted weight change in the past.

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CHAPTER 1

INTRODUCTION

Maturity-onset diabetes and its complications are a major health problem for many American Indian groups. The diabetes* rate for the general United States population is approximately 2 percent. However, incidence rates for American Indian populations range as high as 30 percent (Hamman, Bennett, and Miller 1978:57). Despite the prevalence of diabetes among Native Americans, there has been little research aimed at improving diabetes prevention and treatment programs among these people. In response to this problem, the Native American Food and Nutrition Conference of March 1980, recommended an increase in applied diabetes research (Ackerman 1980:24). A key goal set forth at this conference was the implementation of diabetes prevention and treatment programs relevant to the culture and lifestyle of American Indians (Ackerman 1980:24).

Culturally relevant diabetes prevention and treatment programs can be best implemented at the community level. Prerequisite to implementing such programs is a thorough assessment of those attitudes and behaviors within the community that contribute to the disease. The goal of the present study was to gather, analyze, and interpret assessment data related to the problem of diabetes within the Eastern Cherokee township

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*In this report, the word diabetes is used to refer to maturity-onset diabetes.

of Snowbird. Due to certain cultural standards within the community, discussed later in this report, this investigation was limited to adult women, age 18 or older, in the township.

Diabetes occurs frequently among the Eastern Cherokee. A diabetes survey of this group conducted in the early 1960's revealed abnormal glucose tolerance among 24.3 percent of subjects tested (Stein et al. 1965:843). Due to nonrandom sampling, these data do not establish a diabetes prevalence rate for this population. But, they do suggest that diabetes occurs more frequently among the Eastern Cherokee than in the general United States population. In the Snowbird township, clinic staff estimate that approximately 50 percent of the adults have diabetes. In 1975, 24 percent of the outpatient visits at the Snowbird Clinic were for endocrine and metabolic disorders (Program Plan Committee, Cherokee Indian Hospital 1976:74).

Epidemiological studies have suggested three main factors which contribute to the risk of developing diabetes—genetic predisposition, obesity, and advancing age. Of these three, only obesity can be dealt with at the clinical level. Thus, weight control is the most effective method for both preventing and treating diabetes. Yet, clinic staff for the Cherokee Health Care Delivery Systems report that obesity is a prevalent problem among the Cherokee, and that the outpatient treatment of obesity is relatively ineffective. Few Cherokee patients lose weight, and even fewer maintain their weight loss.

Given the pervasiveness of this problem, there is a clear need to investigate factors which can improve the effectiveness of diabetes

prevention and treatment programs among the Eastern Cherokee. In response to this need, three specific aims were established for this investigation of adult women in the Snowbird township.

The first specific aim was to assess food intake in terms of type of food eaten, its source, and its nutritive value, plus other selected aspects of food behavior. Food intake is deeply rooted in culture. Health and nutrition factors are but a few, and often relatively minor, factors influencing food behavior (DeGarine 1972). Thus, nutritionists and health care workers concerned with altering food intake should be aware of foods which are readily available and desirable, and of behaviors which influence food and nutrient intake. Over the short term, a diet which goes against ingrained social practices and personal preferences may be tolerated. However, over the long term it becomes a burden and may not be adhered to (Hinkle 1962).

The second specific aim was to examine height, weight, and triceps skinfold measurements in terms of degree of body fatness. Clinic staff for the Cherokee Health Care Delivery Systems report that obesity is a prevalent problem among the Cherokee. Yet, prior to this study, the pervasiveness of this problem had not been assessed in a controlled group.

The third specific aim was to evaluate diabetes-related attitudes and knowledge. When designing a successful diabetes education program, it is essential to have baseline information concerning pertinent knowledge and attitudes of the target population. For example, the effectiveness of weight loss programs may be improved if cultural

ideals of body weight are integrated into patient goal planning. Goldblatt, Moore, and Stunkard (1965:102) hypothesized that the lack of success in the control and treatment of obesity may stem from the fact that health care professionals have always thought of obesity as an abnormal condition. Yet, in certain populations obesity may be viewed as both normal and desirable.

The specific topics investigated in this study and their relationship to diabetes are depicted in Figure 1.

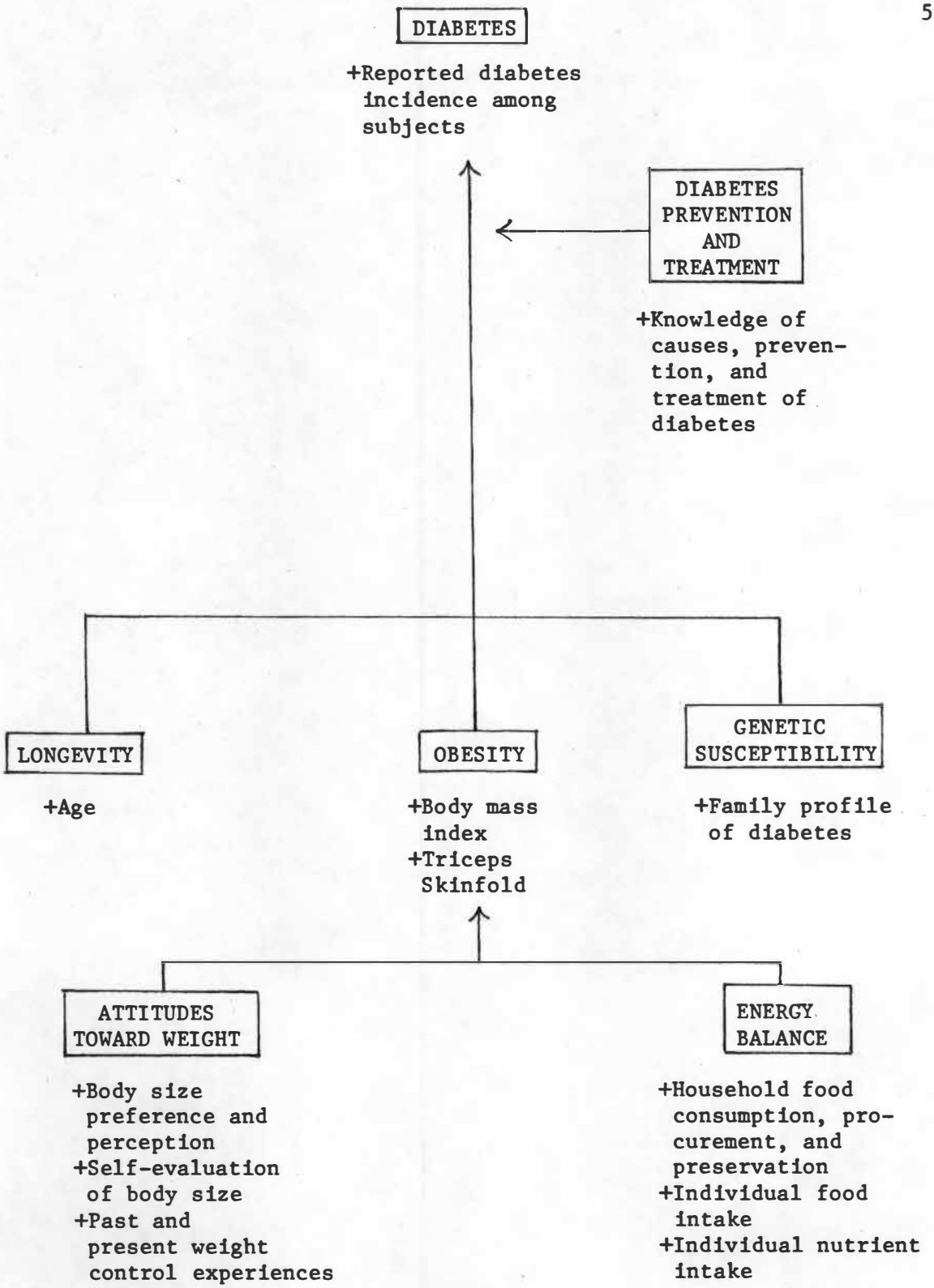

Figure 1. Summary of Topics Investigated in This Research and Their Relationship to Diabetes

CHAPTER 2

GENERAL RESEARCH DESIGN AND METHODOLOGY

I. THE RESEARCH COMMUNITY

Snowbird is one of six townships of the Eastern Band of Cherokee Indians. Yet, it is the only township located outside the Qualla Boundary in Swain and Jackson Counties. Snowbird is located in Graham County, and is composed of scattered tracts of land surrounding the county seat of Robbinsville as shown in Figure 2. Cherokee Indians own 2,249 acres of land in Graham County (Program Plan Committee, Cherokee Indian Hospital 1976:7), and comprise approximately 5 percent of the county's population (Graham County Manager 1982:1). The rugged, mountainous terrain, inadequate road system, and 50 mile distance from the Qualla Boundary have served to minimize the exposure of the Snowbird residents to the commercialism and tourist-centered environment common to the Qualla Boundary.

The Indians who reside in the Snowbird community are descendants of a group of Cherokee who secretly evaded or returned from the "Trail of Tears" to Oklahoma in 1838. The Tribal Enrollment Office reported that in January 1975, 424 Cherokee lived in Snowbird, including 107 males and 120 females age 20 or older (Program Plan Committee, Cherokee Indian Hospital 1976:26).

At the beginning of the historic period, Cherokee Indians were reported to have lived in the Stecoah, Cheoah, and Yellow Creek valleys

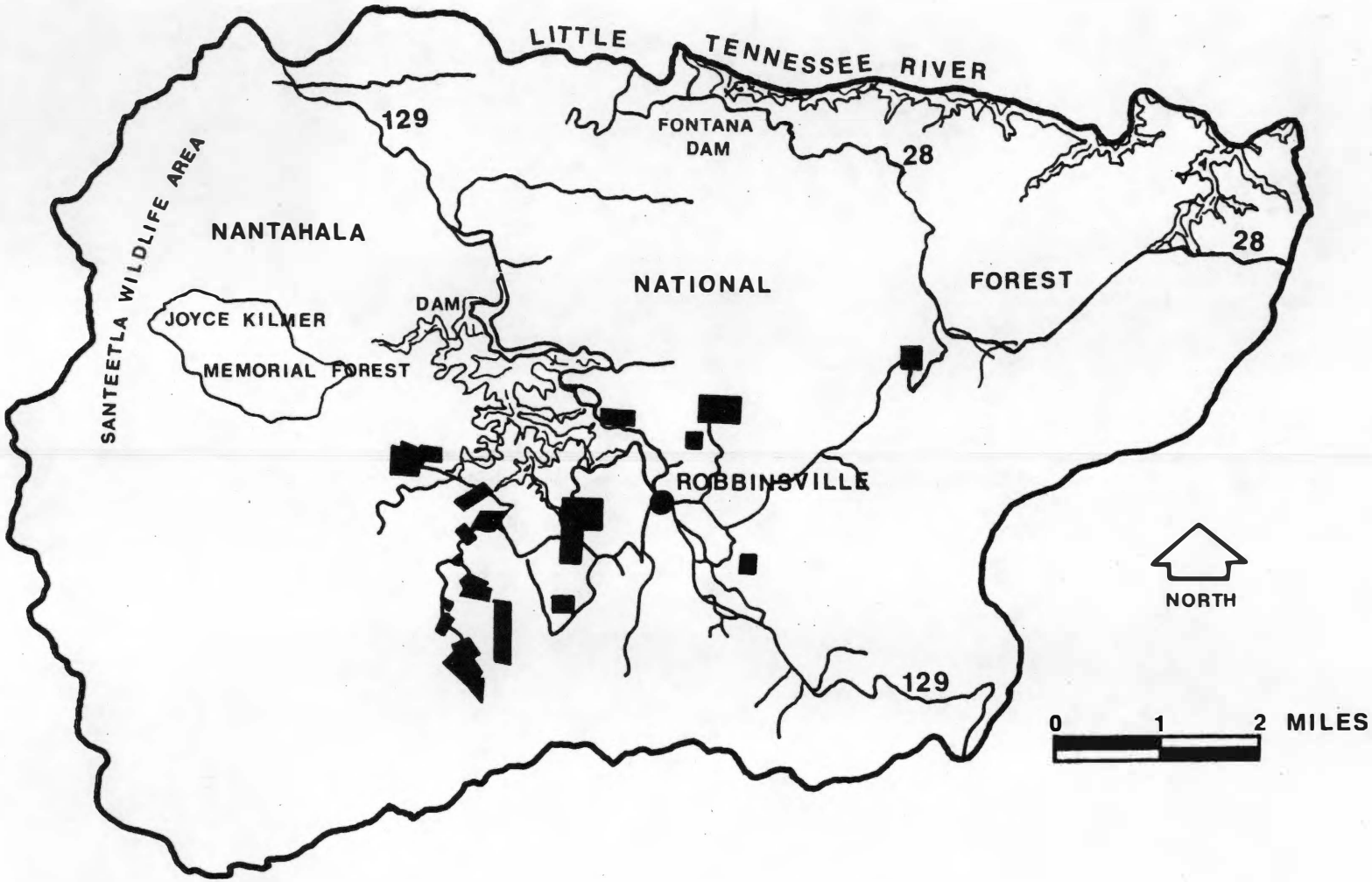

Figure 2. Land Owned by the Eastern Band of Cherokee Indians in Graham County

of the Southern Appalachian Highlands, now part of Graham County (Graham County Centennial, Incorporated 1972:9). However, due to the geography of their habitat, these Indians had little contact with Europeans prior to the 1800's. Not only was the area in which they lived protected under Cherokee treaties, but it also was surrounded by high mountain ridges, with the only breakthrough at the point where the Little Tennessee River enters Tennessee. This area has been described as "the most rugged, inaccessible land in all of eastern America" during the eighteenth and nineteenth centuries (Boyden 1964:10). In preparation for the Indian Removal, an Indian census was taken in western North Carolina in 1835. This census reported 561 Indians living in the Graham County area (Freel 1956:Appendix C).

On May 20, 1830, the Indian Removal Act was passed by Congress to move Eastern Indians west of the Mississippi River. In 1838, President Andrew Jackson ordered the removal of the Cherokee from their tribal lands to Oklahoma. Soldiers under the direction of General Winfield Scott immediately moved into the Graham County area. They built a stockade at Stecoah, and a large fort, called Fort Montgomery, on the Indians' ballfield, which overlooked the present day site of Robbinsville. Local Indian families were taken from their homes and held in these facilities. In order to move the Indians out of the area, the soldiers constructed the county's first road, which connected Fort Montgomery with Valleytown, today known as Andrews.

Not all of the Graham County Cherokee were caught in the roundup. A small number escaped into the mountains of the Snowbird, Buffalo, and

Santeelah areas (Graham County Centennial, Incorporated 1972:11). They remained there until 1842, when Colonel William Thomas secured legal rights for the fugitives to remain in North Carolina. It is reported that the Graham County Cherokee survived during their concealment by sending the women into Tennessee to swap bear and deer hides for cornmeal (Arthur 1914:212). From 1843 until 1861, Colonel Thomas bought land for the North Carolina Cherokee to live on, including those tracts of land presently owned by the Snowbird Indians, using money given to the Indians in return for confiscation of their property (Gulick 1960:12-13). Unfortunately, most of the land sold to the Snowbird Indians was located on mountainous, rocky terrain, with little acreage suitable for farming.

Following the removal, European settlers moved into the area where they, like the Indians, survived by farming, hunting, fishing, and gathering. By 1872, the population of the area was large enough to create a county, and Graham County was established. At that time, transportation was by foot or mule over old buffalo or Indian trails, and there were less than 2,000 acres of land not covered by trees or streams (Boyden 1964:10-11). For the next four to five decades, Graham was referred to as the poorest, most backward, and least progressive of all the counties in North Carolina.

The county progressed economically and became less isolated due to the growth of industry. The lumber industry was the first to bring more people into the area, and provide jobs for both Whites and Indians. This industry has recently been joined by textile and furniture

manufacturers, and dam construction and maintenance. Because these industries needed transportation facilities, new roads were built. A road connecting Robbinsville with the nearest metropolitan area, Knoxville, Tennessee, was opened in 1931 (Sharpe 1961:1330). Nonetheless, the county is still relatively isolated. A statement made in 1942 concerning this isolation is still applicable today: ". . . when you set out to visit Robbinsville, that's exactly where you're going. There is no other town on the route . . ." (North Carolina Department of Commerce 1942:1).

Because of its unique history, the Snowbird township perhaps has had more opportunity for assimilation and acculturation than any other township of the Eastern Band of Cherokee Indians. In Graham County, Indians and Whites have lived in the same communities for over a hundred years, are employed by and work together in the same industries, have attended the same schools since 1963, and work cooperatively on community, social and religious projects. Despite this, the Snowbird Indians are one of the most traditional groups among the Eastern Cherokee. The Cherokee dialect is the primary language in many homes, and traditional behavior, beliefs, medical practices, and styles of dress prevail. Thus, the findings of this study should not be interpreted as "typical" of Eastern Cherokee Indians. The Snowbird Indians display many distinctive characteristics, and it is possible that the food intake patterning, anthropometric characteristics, and diabetes-related attitudes and knowledge reported in this study vary from those found in other Cherokee communities.

II. METHODS AND PROCEDURES

Preliminary Procedures

Preparation for this study involved three major phases. Each phase is described below.

During the first phase, the general topic of investigation, diabetes and food behavior among the Eastern Cherokee, was defined. From the fall of 1980 through the summer of 1981, the author developed this topic by reviewing pertinent literature, and engaging in observation, participant observation, and interviewing among the Cherokee. Many trips were made to the reservation to become familiar with the culture, environment, and health problems of this group. During the summer of 1981, the author resided with a Cherokee family, and was employed by the Eastern Band of Cherokee Indians to help design a nutrition education curriculum for the Cherokee school system.

During the second phase of preparation, the research setting was chosen. Snowbird was selected due to the relative paucity of health assessment data for this township, as well as its unique history and environment. Area health personnel and persons in elected leadership positions were contacted regarding community health problems, and to secure permission to conduct a study in the township. Approval for research involving human subjects later was obtained from The University of Tennessee, Knoxville, Human Subjects Committee (Appendix A).

The third phase consisted of defining the research goal and specific aims, and constructing research instruments to accomplish the aims. The goal of the study was to gather, analyze, and interpret

assessment data related to the problem of diabetes within the Eastern Cherokee township of Snowbird. In order to achieve this goal, the specific aims, in summary, were to evaluate selected aspects of food behavior, anthropometric characteristics, and diabetes-related attitudes and knowledge. Ideally, a survey of all adults in the township would meet the research goal best. However, behavior norms within the group restrict communication between men within the group and females from outside the group, such as the author. Thus, contacts in the township suggested that the survey be restricted to adult women. As a result, the research was conducted with all adult women, age 18 or older, residing in the Snowbird township.

Research tools chosen to accomplish the specific aims were an interview schedule, anthropometric measurements, and an attitudinal test involving body profile drawings. These tools are described in detail in succeeding chapters. The interview schedule and attitudinal test were checked for accuracy and acceptability by a Cherokee informant who had previously lived in Snowbird. The attitudinal test was pretested with 20 women, varying in age and socioeconomic status, living on the Qualla Boundary. Based on the results, minor revisions were made. The interview schedule was composed of items which had been extensively tested in a variety of settings by the author (Terry 1981) or other researchers (Coffey 1977; Story 1980; Jerome 1982). It was pretested for flow and clarity with three women from the Qualla Boundary, and revised accordingly.

Data Collection

For six weeks during March and April of 1982, the author collected data while residing with a Cherokee family in the Snowbird township. This family was typical of others in the area in terms of family composition (three adults and four children) and socioeconomic status. The mother in the household and her adult daughter acted as key informants throughout the study.

A list of potential subjects was constructed by the author and key informants. One hundred fifteen women were identified. Of these, 105 participated in the project. Six potential subjects declined to participate, and four were residing outside the area during the time of the research.

The majority of potential subjects were contacted by a visit to their home. Women who could not be contacted at home were recruited by telephone or at community meetings. The goals of the project, the procedures to be followed, and the time commitment were explained. If the potential subject agreed to participate, then the interview proceeded, or an interview appointment was scheduled. With four exceptions, interviews were conducted in the subject's home. A Cherokee language interpreter from the community was used for three interviews, and the other interviews were conducted in English. At the end of each interview, the subject was given a small kitchen utensil for participating in the project.

Data Reduction and Analysis

Each data item, with the exception of socioeconomic status and food intake, was identified on the data collection schedule by a numeric code (Appendix B). Socioeconomic status was scored using the method outlined by Green (1970). Using this method, a two digit code denoting socioeconomic status was assigned based on occupation. This index, derived from national income and educational distribution associated with occupations, was designed to ordinally classify an individual or family with regard to the socioeconomic status of others in the community. Unfortunately, this index was not sensitive enough to ordinally distinguish differing socioeconomic status in the Snowbird township. For example, one code was given for all self-employed timber cutters. However, a timber cutter who owned his own truck and hauled timber full-time occupied a quite different socioeconomic position than the person who did not own his own truck and cut timber only when the family had no money. Hence, in this study, the index served as a nominal scale to describe occupations. Foods and beverages from the previous day's food intake were coded using the food codes from Home and Garden Bulletin Number 72 (Agricultural Research Service 1977).

Data codes were recorded on optical scan forms by the author, and read directly onto a magnetic computer tape at The University of Tennessee Testing Service, Knoxville. The IBM 360/65 at The University of Tennessee Computer Center was used for most calculations, and a packaged computer program, Statistical Analysis System, was employed.

The women studied in this project represent a research population, not a sample. Therefore, the findings cannot be generalized to other

groups. As a result, all differences revealed in the data are real differences, and statistical tests of significance with probability estimates are not appropriate. However, although all differences are real, they are not all of practical importance. Only those differences of greatest magnitude, or those which are important in health assessment, are reported in this paper. In order to help identify the relative magnitude of variations in the data, statistical tests conventionally used for samples were carried out. The scores for these tests are given for differences in the population which are reported. Data reduction and analysis procedures used for specific sets of data are discussed in detail in the following chapters.

III. CHARACTERISTICS OF THE STUDY POPULATION

Demographic characteristics for the 105 women who participated in the study are presented in Table 1. The mean age was 40.3 years, and one-half of the women were from 18 to 37 years old. These figures reflect the higher death rate in the older age categories. In addition, the relatively large number of 18 to 27 year old women is a reflection of unmarried women living in the parents' home. Key informants reported that many young men and women move from Snowbird after marriage.

The degree of Indian inheritance was verified by checking the degree recorded on each subject's tribal enrollment card. Seventy-seven percent of the women reported greater than three-quarters Indian inheritance. The relationship between age and degree of Indian inheritance was not meaningful. Thus, varying degrees of Indian inheritance were

Table 1. Demographic Characteristics of Survey Respondents.

Characteristic	Frequency	Percent
Age (years)		
18-27	32	30.5
28-37	20	19.0
38-47	20	19.0
48-57	14	13.3
58-67	11	10.5
68-77	4	3.8
78-87	4	3.8
Degree of Indian inheritance		
.00	6	5.7
.01- .25	8	7.6
.26- .50	4	3.8
.51- .75	6	5.7
.76-1.00	81	77.1
Years lived outside of Snowbird		
0	74	70.5
1-10	9	8.6
11-20	14	13.3
>20	8	7.6
Number living in the home		
1- 2	13	12.4
3- 4	25	23.8
5- 6	31	29.5
7- 8	26	24.8
9-10	3	2.9
11-12	7	6.7
Occupation		
Housekeeper (in own home)	60	57.1
Industrial laborer	15	14.3
Nonindustrial laborer	11	10.5
Clerical worker	9	8.6
Skilled or professional worker	6	5.7
Domestic laborer	4	3.8

found in both younger and older groups. The majority of subjects had lived in Snowbird all of their lives (70.5 percent), and had at least two other people living in their home (87.6 percent).

The types of employment held by the group are described using the categories outlined by Green (1970). Sixty of the women, or 57.1 percent, did not work outside the home, while 37.2 percent were employed in unskilled or semiskilled positions in industry, domestic service, or nonindustrial settings, such as the National Park Service. Only 5.7 percent of the women held skilled or professional positions.

Similar employment figures were found for the heads of households. Because many of the households visited had more than one woman who participated in the study, the population of 105 women represented 71 households. Ten of the household heads were women, and 61 were men. Table 2 presents descriptive data concerning employment of the 71 heads of household. Only 5.6 percent of this group were skilled or professional workers. These employment figures reflect the low socioeconomic status of the Snowbird residents relative to the general United States population. However, they are possibly similar to other residents of Graham County, and other townships within the Eastern Band of Cherokee Indians.

Table 2. Occupation of the Head of Household.

Occupation	Frequency	Percent
Nonindustrial laborer	35	49.3
Self-employed, semiskilled worker	14	19.7
Industrial laborer	10	14.1
Housekeeper (in own home)	8	11.3
Skilled or professional worker	4	5.6

CHAPTER 3

FOOD AND NUTRIENT INTAKE

I. REVIEW OF LITERATURE

Foods of the Cherokee

Sustained contact between the Cherokee and Europeans did not begin until the close of the 17th century. At that time, these Indians occupied or utilized the mountain and hill country of Alabama, Georgia, Tennessee, Kentucky, the Carolinas, and the Virginias, and acquired food primarily through farming, hunting, fishing, and gathering. The annual subsistence cycle in an early 18th century Cherokee village is summarized below.

The early Cherokee were primarily horticulturists. They began the farming year in the spring by preparing their fields and planting the crops. Maize was the principal cultigen and the core food in the diet. Organized social relationships, religious rituals, and nonfarming subsistence activities were regulated by the life cycle of the maize plant (Merrill 1974). Other important cultigens were beans, squash, pumpkins, and sunflower (Goodwin 1977:49-55). Sweet potatoes, watermelons, and peas, which had been introduced by early European explorers, were also grown.

After planting was completed, women, children, and older men tended the crops while younger men hunted and fished (Gilbert 1943:316). Many men left the village on expeditions to hunt deer, bear, small mammals,

and birds. The bear was prized not only for its meat, but also for the rendered fat that it provided to the diet (Goodwin 1977:69).

Goodwin (1977:55-60) identified numerous wild fruits, vegetables, seeds, and nuts which were available for gathering during the spring, summer and early fall. Because there were few native cultigens, and these cultigens did not mature until mid- to late summer, it is possible that wild vegetation was a consistent supplement to the spring and early summer diet. In addition, Merrill (1974:30) noted that the heat of spring and summer would encourage the deterioration of food stored from the previous year. If this is true, then use of wild vegetation may have been a necessity.

The maize harvest in August marked the end of the farming season. From late fall through early spring food was derived primarily from hunting, and from stored corn and other stored foods. Wild vegetation and fish were also potential foods during this time (Goodwin 1977:55-60, 73-74).

In the 18th century the body build of the Cherokee was consistently reported as thin, delicate, and slender in both males and females, and the stature as middle to tall (Gilbert 1943:193). If these observations are correct, this indicates that caloric intake balanced caloric expenditure. Caloric needs and expenditure were possibly quite high during planting, harvesting, and hunting due to intense physical activity.

During the 18th and early 19th centuries corn and beans were retained as staples in the diet (Gilbert 1943:361). However, European contact brought about changes in food availability among the Cherokee.

As a result of the use of guns and the alteration of the environment through lumbering, mining, and dams, game and fish became scarce in some areas (Gilbert 1943:190, 361). Many Cherokees adopted animal husbandry and used the meat, eggs, and milk from the stock animals as food. In addition, new European fruits, vegetables, and grains were grown, and commodity foods such as coffee, sugar, and flour were used (Gilbert 1943:361; Kilpatrick and Kilpatrick 1966:20). But the adoption of these items was not uniform throughout the Cherokee country. It was reported that the Cherokee who lived in the more isolated, mountainous areas clung to traditional subsistence patterns (Govan and Livingood 1977:56).

In 1838 many Cherokee were removed to Oklahoma over the "Trail of Tears." Removal efforts concentrated in Georgia. Groups of North Carolina Cherokee escaped the exodus, and attempts to forcefully displace them were eventually abandoned. Several years after the removal, Charles Lanman visited the North Carolina Cherokee. He reported that they practiced agriculture, raised domestic animals, and "have everything they need or desire in the way of food" (Lanman 1849:95). Ziegler and Grosscup, two travelers among the Cherokee in the 1880's, stated that corn was the predominant crop, and that fruit was abundant (Ziegler and Grosscup 1883:36-37).

At the close of the 19th century James Mooney, an anthropologist, visited the Eastern Cherokee. He noted that staple foods included coffee, pork, and bean bread (a mixture of cornmeal and beans) or chestnut bread (a mixture of cornmeal and chestnuts). Each family subsisted by growing crops, fishing, hunting, and raising domestic animals (Mooney 1900:179-180).

Limited information is available on the foodways of the Eastern Cherokee during the first half of the 20th century. In 1932 William Gilbert conducted doctoral fieldwork among this group (Gilbert 1943). He reported an annual subsistence cycle which included farming, animal husbandry, hunting, fishing, and gathering. In the 1950's, Harriet Kupferer conducted doctoral research on acculturation groupings among the Cherokee. She noted that many rural Cherokee families produced their basic food needs through gardening, animal husbandry, and gathering (Kupferer 1966:252).

During the last decade, three studies have focused upon the food intake of the Eastern Cherokee. Perry (1974) investigated the present day food use of wild plants. Seventy-eight wild plants were identified as components of the Cherokees' diet by five informants over age 50. However, there was little recognition of native wild plants and relatively low consumption of indigenous animals among the 288 Cherokee high school students studied by Story (1980:97). Traditional foods which students reported frequently consuming, when available, were beans, wild berries, and wild greens (Story 1980:160-161). Food frequency scales and 24-hour recalls indicated that the nutrients most often deficient in the diet of females were calcium and iron, and for males, vitamin A and iron (Story 1980:98). Slonim, Kolasa, and Bass (1981) obtained 24-hour recalls from 50 Cherokee participants in the Special Supplemental Foods Program for Women, Infants, and Children. The traditional foods most frequently consumed during the previous 24 hours were cornbread (18 percent of sample), hominy or boiled corn (16 percent), pinto beans (18 percent), and greens (16 percent) (Slonim, Kolasa, and Bass 1981:166).

A trend of decreasing reliance on traditional foods and traditional food acquisition strategies is suggested by the studies cited above. Similar trends have been reported for the Pima (Reid et al. 1971), Sioux (Bass and Wakefield 1974), Cocopah (Calloway and Gibbs 1976), and Hopi (Kuhnlein and Calloway 1977).

Food and Nutrient Intake of American Women

A consistent finding of major United States nutrition surveys is that women frequently fail to meet their Recommended Dietary Allowance, or R.D.A., for certain nutrients. While the Ten State Nutrition Survey (United States Department of Health, Education, and Welfare 1972b), the Health and Nutrition Examination Survey (United States Department of Health, Education, and Welfare 1979a), and Nationwide Food Consumption Survey of 1977-78 (United States Department of Agriculture 1980) differed in methodology, they all revealed that the diets of American women were frequently inadequate in iron and calcium. Other nutrients often deficient among certain income or population groups were riboflavin, vitamin A, and ascorbic acid. These surveys indicated that both cultural food preferences and economic buying power influenced food intake and nutritional well-being.

There are several reasons why women have difficulty meeting their R.D.A. for certain nutrients. First, the iron R.D.A. for menstruating women is almost twice that of men and nonmenstruating women. Foods which are a good source of this mineral must be included in the diet frequently in order for the iron R.D.A. to be met. Second, one of the best sources of calcium, milk, often is not consumed by adults. In America, milk

is connotatively associated with children (Bass, Wakefield, and Kolasa 1979:29-30). In addition, some population groups, such as Blacks and American Indians, have a high prevalence of lactase deficiency. Third, most women need less of the energy yielding nutrients than men. Therefore, they must eat nutrient-dense foods in order to receive adequate amounts of vitamins and minerals. In comparing food intake data from the 1965 Nationwide Food Consumption Survey with the Basic Four guidelines, McNutt and McNutt (1978:323) found that women ate less than the recommended number of servings from the bread and cereal, fruit and vegetable, and milk and milk products groups. The only food group for which the recommended number of servings was eaten was the meat, poultry, and fish group.

Recent food and nutrient intake information is available for Native American women from midwestern and southwestern tribes. As one would expect, the nutritional adequacy of the diets varied from tribe to tribe due to differing cultural food patterns, food availability, and economic security. Diets of 277 Pima women met the R.D.A. for those nutrients studied—protein, calcium, iron, and magnesium (Reid et al. 1971). Dry beans, which were eaten in large quantities, made a significant contribution to the adequate calcium and iron intake. Among the Sioux (Bass and Wakefield 1974), Cocopah (Calloway and Gibbs 1976), and Hopi (Kuhnlein and Calloway 1977), the nutrients most often below the 1980 recommended allowance were calcium, iron, vitamin A, and ascorbic acid. Problems cited by these researchers as underlying these low intakes included dependence on purchased food, poverty, declining use of traditional foods, and a lack of variety in the foods eaten.

II. RESEARCH HYPOTHESES AND METHODOLOGY

Research Hypotheses

Demographic characteristics of the woman in charge of obtaining and preparing food in each household, referred to as the head female, were used to test hypotheses regarding food procurement, preservation, and consumption within the home. The following hypotheses were examined:

1. The age and degree of Indian inheritance of the head female are positively correlated with the number of traditional food sources and food preservation methods used.
2. Households in which the head female does not work outside the home or has never lived outside the community differ from opposing households in that a larger number of traditional food sources and food preservation methods are used.
3. Households in which the head female is older, of greater Indian inheritance, does not work outside the home, or has never resided outside the community differ from the opposing households in that they are more likely to:
   - purchase food primarily at small, local grocery stores, as opposed to supermarkets
   - obtain food from traditional sources
   - preserve food
   - eat more of those traditional foods associated primarily with Indians

The following hypotheses were tested regarding the food and nutrient intake of subjects:

1. Age, degree of Indian inheritance, and obesity indices are positively correlated with total caloric intake, the percentage of kilocalories derived from protein and fat, and the number of meals eaten, and negatively correlated with the percentage of kilocalories derived from carbohydrate and the number of snacks eaten.
2. Total caloric intake, the percentage of kilocalories derived from carbohydrate, protein, and fat, and the number of meals and snacks eaten are not significantly different for opposing subgroups based on whether or not the subject is employed outside the home, has lived outside the community, or reports having diabetes.
3. Whether or not the subject takes nutritional supplements is not related to demographic characteristics of age, degree of Indian inheritance, employment outside the home, or past residence outside the community.

Data Collection

The 71 women in charge of obtaining and preparing food in each home were asked questions regarding sources of food for the home, food preservation methods, and the frequency with which 30 types of food were eaten in the home. The 30 food categories were adapted from a similar list used by Story (1980), and the frequency-of-use scale was a modification of an instrument developed by Jerome (1982). The eight frequency gradations on the food use scale were: everyday, at least every other day, at least once per week, at least two to three times

per month, at least once per month, at least several times per year, at least once per year, and seldom or never.

The household availability of 25 traditional foods was assessed using the methods and frequency scale described above. The list of foods was adapted from an instrument developed by Story (1980) to measure the recognition and intake of 58 traditional Cherokee foods. Foods chosen for the current project were those with high recognition and frequency of intake. The inclusion of a food as "traditional" was verified through Goodwin's (1977) manuscript. In addition, based on this manuscript, four foods important in the early Cherokee diet were added to the list—boiled corn, summer squash, winter squash, and deer.

In addition to the data described above, each subject's previous day's intake of food and nutritional supplements was elicited. The time, type, amount, and source of each food or supplement was recorded. Food models and standard household measuring utensils were used for estimating amounts eaten. The limitations of this type of dietary assessment technique have been pointed out by numerous researchers. However, Pekkarinen (1970) stated that the recall method can give reliable data on the food consumption of a group as a whole. Since the emphasis of this research was on group trends, the recall method was judged a suitable technique.

Data Analysis

Tests of association were carried out by calculating Pearson's r or Spearman's r. Meaningful differences between subgroups were investigated using the Wilcoxon or chi-square test.

For testing hypotheses regarding traditional foods, the researcher and an informant familiar with food intake in the Southeastern United States, in Appalachia, and among the Cherokee divided the traditional foods investigated in this study into three groups:

1. Traditional Cherokee foods which have been incorporated into the general American diet—corn, pinto beans, summer squash, winter squash, pumpkin, strawberries, raspberries, blackberries, hickory nuts, black walnuts, trout, and other freshwater fish.
2. Traditional Cherokee foods eaten in many parts of the Southeastern United States and other rural areas—hominy, ramps, creases, wild birds, deer, squirrel, and rabbit.
3. Traditional Cherokee foods eaten primarily by Cherokee Indians—bean bread, chestnut bread, sochan, other wild greens, and bear.

Because of confusion in terminology, information on the frequency of intake of lye dumplings was judged invalid, and was omitted from data analysis.

III. RESULTS AND DISCUSSION

Household Food Procurement and Preservation Techniques

The head female in each household supplied information on how food was obtained and preserved within her home. Demographic characteristics of these 71 women are presented in Appendix C. The major difference between this subgroup and the entire group was age. The mean age of the

head females was 45.4 years, as compared to 40.3 years for the entire research population.

All families reported purchasing a portion of their total food supply from a grocery store. The bulk of food shopping was done at small, local grocery stores for 31.0 percent of households, while 69.0 percent bought their food at supermarkets. There were no meaningful relationships between the type of store chosen and demographic characteristics of the head female. Observation confirmed that the small, local grocery stores offered little variety, and a small to nonexistent selection of fresh fruits, vegetables, and meats. However, personnel at the small stores were familiar and courteous, and many small store owners extended credit.

In addition to the grocery store, 98.6 percent of the households obtained food from traditional food sources. The number and percentage of families using seven traditional sources are shown in Table 3. Gardening, gathering wild foods, and fishing were reported in over 80 percent of the households. From 40 to 50 percent of the families procured food by hunting, harvesting fruit or nut trees, and raising farm animals. The farm animals raised were chickens and pigs. No cows were owned by Snowbird families, perhaps due to the lack of suitable pasture land. The least frequently reported food source was beekeeping, reported in only three households. The total number of traditional food sources used per household is reported in Table 4. The range was zero to six, and the mode was four. In families that gathered wild foods, compared to those that did not, the head females

Table 3. Use of Traditional Food Sources by 71 Families.

Source	Frequency	Percent
Gardening	65	91.5
Gathering wild foods	65	91.5
Fishing	59	83.1
Hunting	33	46.5
Harvesting fruit and nut trees	30	42.3
Raising farm animals	29	40.8
Keeping bees	3	4.2

Table 4. Number of Traditional Food Sources Used per Family.

Number	Frequency	Percent
0	1	1.4
1	2	2.8
2	7	9.9
3	7	9.9
4	28	39.4
5	17	23.9
6	9	12.7

had a higher degree of Indian inheritance (Z = -2.34). Based on demographic characteristics, other meaningful differences in the type or number of traditional food sources used were not found.

These findings demonstrate that most families augmented their food supply by either producing food or obtaining food from the natural environment. Such practices may serve several functions in low socio-economic groups. In addition to providing food and nutrients, these strategies may help families save money, and may provide them with a sense of self-accomplishment and self-worth.

Food preservation methods were used in 97.2 percent of the homes visited. The number of methods reported ranged from zero to seven, with a mode of five (Table 5). More food preservation techniques were used in homes in which the head female was older (Pearson's r = .29) and had not lived outside the community (Z = -2.77). No meaningful differences were found based on the head female's degree of Indian inheritance, or whether or not she worked outside the home.

Seven food preservation techniques were reported for the 71 families (Table 6). The methods most frequently used were canning (88.7 percent of the families) and freezing (77.5 percent of the families). Other methods used in over 50 percent of the households were drying, pickling, and burying. Making jelly was cited for 46.5 percent. Several home-makers stated that they did not make jelly because "Jelly is bad for your health." Salting, or curing, was the least practiced method, used in only 11.3 percent of the households.

Research on food preservation practices in Hancock County, Tennessee, was conducted by Phillips in 1973 (Phillips and Bass 1976). The

Table 5. Number of Food Preservation Techniques Used per Family.

Number	Frequency	Percent
0	2	2.8
1	5	7.0
2	4	5.6
3	6	8.5
4	16	22.5
5	21	29.6
6	14	19.7
7	3	4.2

Table 6. Food Preservation Techniques Used by 71 Families.

Technique	Frequency	Percent
Canning	63	88.7
Freezing	55	77.5
Drying	51	71.8
Pickling	49	69.0
Burying	46	64.8
Making jelly	33	46.5
Salting	8	11.3

mountainous environment, relative seclusion, and low socioeconomic standing of this Appalachian area at the time of the research were similar to the situation in Graham County when this study was conducted. In addition, except for their European heritage, Phillip's sample was socially and economically similar to the Snowbird women. The food preservation methods reported by the two groups are compared in Table 7.

Table 7. Food Preservation Methods Used in 71 Snowbird Homes Compared with Those Used by Homemakers in Hancock County, Tennessee.

Method	Percent Using Method		Percent Difference
	Snowbird Households	Hancock County Homemakers*	
Canning	88.7	96.3	-7.6
Freezing	77.5	61.1	16.4
Drying	71.8	33.3	38.5
Pickling	69.0	90.7	-21.7
Burying	64.8	14.8	50.0
Making jelly	46.5	77.8	-31.3
Salting	11.3	44.4	-33.1

*Phillips and Bass 1976.

Differences between these groups in the use of food preservation methods may reflect differences in cultural heritage. For example, drying was reported by 38.5 percent more, and burying by 50 percent

more, of the Snowbird group than the Hancock County sample. Drying and burying are traditional Cherokee food preservation practices. Prehistorically, these were the primary ways that the Cherokee preserved their food. Canning, pickling, jelly making, and salting, which are not traditional Cherokee practices, were used to a greater extent by the Hancock County sample. Although freezing was reported more frequently by the Snowbird women, this may reflect the increase in availability of home freezers during the nine year span between the studies.

Household Food Intake

In order to investigate the type of foods eaten in the 71 homes, the head female was asked to estimate the average frequency with which foods from 30 categories were consumed in the household. The responses are presented in Appendix D. Table 8 lists the median intake, or the highest frequency at which at least 50 percent of the families reported consuming foods from each category.

According to these data, foods from the milk group were consumed relatively frequently. Milk was drunk daily in 83.1 percent of the homes, and milk products were eaten every other day or more often in 63.4 percent. Because these data do not indicate which individuals in the home drank milk, implications regarding adult lactose intolerance cannot be made.

Meat and meat substitutes eaten most often were eggs, bacon or sausage, beef, and chicken. Certain meats also were among the least frequently consumed foods on the list. The median intake of liver

Table 8. The Highest Frequency at Which at Least 50 Percent of the Families Consumed Foods from 30 Food Categories.

Frequency Category	Food Category	Percent of Households in Given Frequency Category Plus Higher Categories
Every day	Coffee	93.0
	Fats and oils	90.1
	Milk	83.1
	Eggs	78.9
	Wheat bread	70.4
	Biscuits	59.2
	Regular soda pop	59.2
At least every other day	Cereal	76.1
	Citrus fruits and juices	73.3
	White potatoes	63.4
	Milk products	63.4
	Bacon or sausage	56.4
	Other fruits and juices	56.4
	Other vegetables	54.9
	Candy, honey, jelly	53.5
At least once per week	Dark green, leafy vegetables	91.5
	Beef	88.7
	Chicken	85.9
	Corn-, bean, or chestnut bread	81.7
	Dried beans and peas	78.8
	Rice or pasta	77.4
	Salty snack foods	76.1
	Sweets and desserts	69.0
	Pork, fresh or cured	66.2
	Tea	64.8
	Yellow vegetables	56.6
At least two to three times per month	Fish and seafood	69.0
At least once per month	Liver and organ meats	54.8
At least several times per year	Meat from wild animals	53.5
At least once per year	Diet soda pop	54.9

and organ meats was only once per month and, for meat from wild animals, was only several times per year.

Two items from the bread and cereal group—wheat bread and biscuits—were eaten daily in over 50 percent of the homes. In addition, cereal was consumed at least every other day in 76.1 percent.

From the fruit and vegetable group, foods eaten least often were yellow vegetables, and dark green, leafy vegetables, each with a median intake of once per week. Citrus fruits and juices, other fruits and juices, white potatoes, and other vegetables were eaten every day or more often by at least 50 percent of the families.

Three miscellaneous foods were consumed relatively frequently. Coffee was used daily in 93.0 percent of the households, fats and oils in 90.1 percent, and regular soda pop in 59.2. Observation confirmed that fats and oils were used primarily for cooking and seasoning, while regular soda pop often was drunk as a beverage at lunch and supper meals. Diet soda pop was the least frequently consumed item on the list, with a median intake of only once per year.

These data indicate that a variety of foods were eaten in Snowbird households. And, the types of food consumed were not unlike those reported for the general United States population in 1977 (United States Department of Agriculture 1980). However, cultural influences on food selection were demonstrated by this group's use of native Cherokee foods. The intake of these foods was assessed using the head female's estimate for how often 24 traditional foods, when in season, were eaten in the home. The results are listed in Appendix D. The median intake, or

highest frequency at which at least 50 percent of the families consumed each food, is presented in Table 9.

For those traditional foods which have been incorporated into the general American diet, corn, when in season, was eaten at least every other day in 60.5 percent of the homes. The median intake for summer squash, pinto beans, and strawberries was once per week or more often. Pumpkin, blackberries, black walnuts, trout, and other freshwater fish were eaten less frequently. Foods classified as seldom or never eaten were hickory nuts, raspberries, and winter squash. The frequency with which these native foods were eaten in the household was not highly correlated with the head female's age or degree of Indian inheritance, and was not meaningfully related to whether or not she worked outside the home or had lived outside the community.

Of those traditional Cherokee foods eaten in many parts of the Southeastern United States and other rural areas, hominy was the most frequently consumed, with a median intake of once per year. Deer, rabbit, and wild birds were seldom or never eaten. Because these foods were eaten in Graham County both by people of European and of Cherokee descent, a high correlation between Indian inheritance and consumption frequency was not anticipated. However, these data indicated more frequent consumption in homes where the food supply was controlled by women of greater Indian inheritance (Spearman's $r = .37$). Other descriptive characteristics of the head female were not meaningfully related to the intake frequency of these foods.

For this analysis, five foods were classified as eaten primarily by Cherokee Indians. Of these five, bean bread and sochan were eaten at

Table 9. The Highest Frequency at Which at Least 50 Percent of the Families Consumed Traditional Foods When in Season.

Frequency Category	Food Category	Percent of Households in Given Frequency Category Plus Higher Categories
At least every other day	Corn*	60.5
At least once per week	Summer squash*	78.9
	Pinto beans*	70.4
	Strawberries	59.1
At least two to three times per month	Blackberries*	53.5
At least once per month	Hominy**	56.3
At least several times per year	Trout*	84.5
	Bean bread***	76.0
	Pumpkin*	71.8
	Other freshwater fish*	69.1
	Sochan***	67.5
	Creases**	57.7
At least once per year	Chestnut bread***	74.6
	Ramps**	73.1
	Black walnuts*	61.9
	Other wild greens***	56.2
	Squirrel**	54.9
Seldom or never	Bear***	100.0
	Deer**	100.0
	Rabbit**	100.0
	Wild birds**	100.0
	Hickory nuts*	100.0
	Raspberries*	100.0
	Winter squash*	100.0

*Traditional foods which have been incorporated into the general American diet.

**Traditional foods eaten in many parts of the Southeastern United States and other rural areas.

***Traditional foods eaten primarily by Cherokee Indians.

least several times per year in over one-half the homes, and other wild greens and chestnut bread at least once per year. Bear was seldom or never eaten in most homes. There was a positive correlation between how often these foods were eaten and the head female's degree of Indian inheritance (Spearman's r = .57). In addition, the intake of these native Cherokee foods was positively correlated with the household intake of those native foods which are eaten throughout the Southeastern United States and other rural areas, discussed earlier (Spearman's r = .65). The consumption frequency was not highly correlated with other characteristics of the head female.

There was little relationship between the head female's age and the frequency with which any of the three groups of traditional foods were eaten in the home. Thus, traditional foods were used as often by younger head females as by their older counterparts. This indicates that the custom of traditional food use was being perpetuated in the Snowbird township. This is further supported by the finding that the household intake of native foods was not meaningfully related to the head female's exposure to the foodways of other groups through her employment outside the home or past residence outside the township.

In 1979, Story (1980) investigated the native foods eaten by approximately 275 Cherokee high school students living on the Qualla Boundary. Table 10 presents the percentage of Snowbird families consuming selected traditional foods at least once per year compared with these teenagers. Because differing age groups were used (teenagers versus adults) as well as differing research techniques (questionnaires versus interviews), the frequencies were expected to vary between

the groups. However, the Qualla Boundary teenagers reported a notably higher intake of wild animal meat than the Snowbird families. This may represent a greater use of wild animals for food on the Qualla Boundary, and deserves further investigation.

Table 10. Percentage of 71 Snowbird Families Consuming Selected Traditional Foods at Least Once per Year Compared with Cherokee High School Teenagers, Cherokee, North Carolina.

Food	Percentage Consuming at Least Once per Year		Percent Difference
	Snowbird Families	Cherokee High School Teenagers*	
Bean bread	85.9	92.3	-6.4
Sochan	76.1	61.8	14.3
Chestnut bread	74.6	79.4	-4.8
Ramps	73.2	72.0	1.2
Creases	73.2	65.4	7.8
Squirrel	54.9	66.7	-11.8
Rabbit	32.4	61.8	-29.4
Bear	18.3	60.3	-42.0

*Story 1980.

Those categories of food and traditional foods identified in certain households as eaten only on special occasions are listed in Appendix D.

Individual Food Intake

A previous day's food intake recall was obtained from each subject. The 105 women reported consuming 1,387 servings of food. The types of food eaten are presented in Appendix E. The contribution of foods from 10 food groups to the total diet is shown in Table 11.

Ninety-nine percent of the subjects had eaten grain products on the previous day. The most frequently eaten foods in this category were white bread and biscuits. Grain products made a significant contribution to the intake of kilocalories and energy-yielding nutrients. They accounted for almost one-fourth of the total caloric intake, one-third of the carbohydrate intake, and were the primary source of vegetable protein.

The second most frequently consumed foods were from the miscellaneous items category, reported by 98.1 percent of the subjects. This group included such items as coffee, soft drinks, tea, and gravy, and constituted 14.1 percent of the total caloric intake and 22.0 percent of the carbohydrate intake. These figures are of concern because regular soft drinks, which have low nutrient density, were the major source of the kilocalories and carbohydrate in this group.

At least one food from the meat group was eaten by 87.6 percent of the women, and vegetables were eaten by 85.7 percent. Luncheon meats and sausages were the most popular meats, followed by beef and poultry. Meats were the major source of protein and fat in the total diet. Potatoes and tomatoes were the most frequently eaten vegetables. Vegetables in season during the research period—ramps and wild greens—were listed 13 times.

Table 11. Contribution of Foods from 10 Food Groups to the Total Diet.

Food Group	Percent of Subjects Who Ate Foods from Group	Caloric and Nutrient Contribution of Foods from Group to Total Diet			
		Percent Total Kcal.*	Percent Total Carbo.**	Percent Total Protein	Percent Total Fat
Grain products	99.0	22.5	29.8	13.6	16.1
Miscellaneous items	98.1	14.0	22.0	3.3	8.3
Meats	87.6	17.7	1.6	42.2	27.2
Vegetables	85.7	13.9	19.0	9.3	11.0
Eggs	59.0	3.8	.4	6.4	6.4
Fats, oils, related products	59.0	5.2	.1	0	13.7
Dairy products	58.1	10.7	7.2	14.2	13.4
Sugars and sweets	39.0	2.0	4.2	.1	0
Fruits	36.2	3.8	8.1	.9	.1
Legumes, nuts, related products	34.2	6.4	7.6	10.0	3.9

*Kcal. is kilocalories.

**Carbo. is carbohydrate.

Foods from the egg category and from the fats, oils, and related products group were each reported by 59.0 percent of the women. Eggs were most frequently eaten fried or scrambled. The most often used items in the fats category were table fats—margarine, mayonnaise, and salad dressings. Oil, shortening, and lard or fatback were listed 33 times as a seasoning for boiled vegetables and legumes.

Milk and dairy products were eaten by 58.1 percent of the women. Milk, used as a beverage or in coffee, was the most frequently reported, followed by cheese. Because most of the dairy products consumed were composed of whole milk, this category contributed 13.4 percent to the total fat intake.

Approximately one-third of the women reported eating foods from each of the three remaining food categories. The most frequently used item from the sugars and sweets group was sugar for sweetening beverages. The most popular fruits were orange juice, other fruit juices, and bananas. Dried beans and peas were the most often consumed items from the legumes, nuts, and related products category. Although foods from this category were listed least often, they made a relatively substantial contribution of incomplete protein to the total protein intake.

Table 12 compares the types of food eaten by the Snowbird women to those eaten by adult women in the most recent Nationwide Food Consumption Survey (United States Department of Agriculture 1980). In this survey, 24-hour recalls were obtained from a probability sample of United States citizens during Spring 1977. The Snowbird women ate noticeably fewer dairy products and fruits than the U.S.D.A. sample, and more eggs, and

Table 12. Types of Food Eaten by Snowbird Women Compared to Those Eaten by Adult Women in the Nationwide Food Consumption Survey.

Food Group	Percent of Subjects Who Ate Foods from Group	
	Snowbird	Nationwide Survey*
Grain products	99.0	88.7-99.1
Meats	87.6	90.2-93.1
Vegetables	85.7	81.1-89.8
Eggs	59.0	27.2-33.2
Fats, oils, related products	59.0	52.5-69.1
Dairy products	58.1	73.0-84.2
Sugars and sweets	39.0	41.3-57.8
Fruits	36.2	47.7-69.3
Legumes, nuts, related products	34.2	9.6-18.2

*United States Department of Agriculture 1980.

legumes, nuts, and related products. These differences for the Snowbird group may represent cultural food preferences, the economic inaccessibility of certain foods, and/or physiological traits, such as the presence of lactase deficiency.

Foods eaten by the Snowbird women were obtained from various sources, as shown in Table 13. Foods purchased from grocery stores, other stores, restaurants, and vending machines accounted for 94.6 percent of the servings of food, and 94.1 percent of the kilocalories. Key informants reported that gathering, which was the source of 0.9 percent of the foods, was at its peak during the research period, the spring. However, intake of foods from gardening, fruit trees, and fishing were probably at the lowest point of the year. Many of these foods preserved from the previous year had been eaten, and a new supply had not yet been produced. Foods from hunting were reportedly eaten most frequently during the winter, while the supply of foods from farm animals, primarily eggs, was relatively consistent year round.

As shown in Figures 3 and 4, the hours of greatest food and caloric intake were 8 and 9 a.m., 12 and 1 p.m., and 5 and 6 p.m. These were the hours when meals were most frequently eaten by the subjects. The number of meals and snacks eaten, presented in Appendix E, was not meaningfully related to demographic variables or obesity indices.

Individual Nutrient Intake

Food is obviously the major vehicle for the nutrients needed by humans to sustain life. However, within the last century concentrated,

Table 13. Sources of Foods Eaten by the Snowbird Women and the Relative Caloric Contribution per Source.

Source	Servings of Food*	Percent of Total Servings	Percent of Kilocalories
Grocery store	1165	84.0	83.9
Restaurant	132	9.5	7.8
Garden	41	3.0	3.6
Farm animals	13	.9	1.0
Gathering	13	.9	.4
Other stores	9	.6	1.6
Vending machine	7	.5	.8
Fishing and hunting	4	.3	.5
Fruit trees	3	.2	.3

*Total servings of food was 1,387.

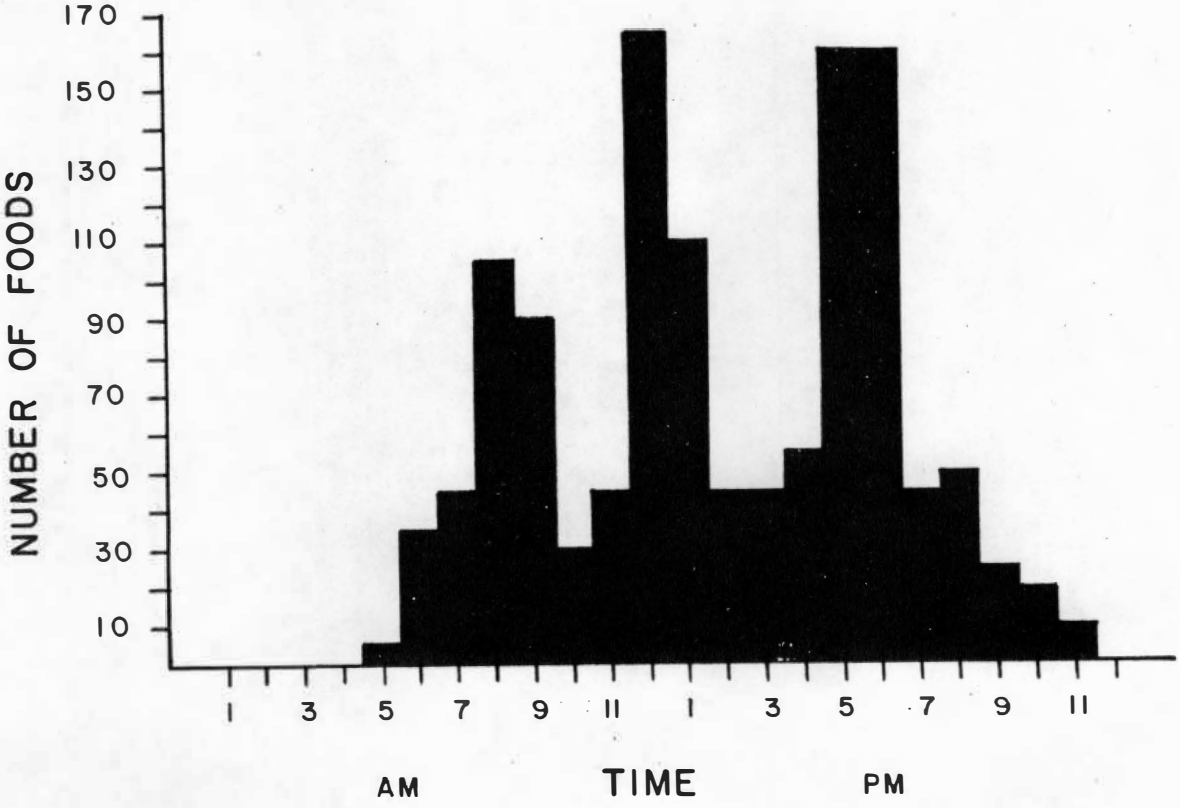

Figure 3. Number of Foods (or, Servings of Food) Eaten by Time of Day

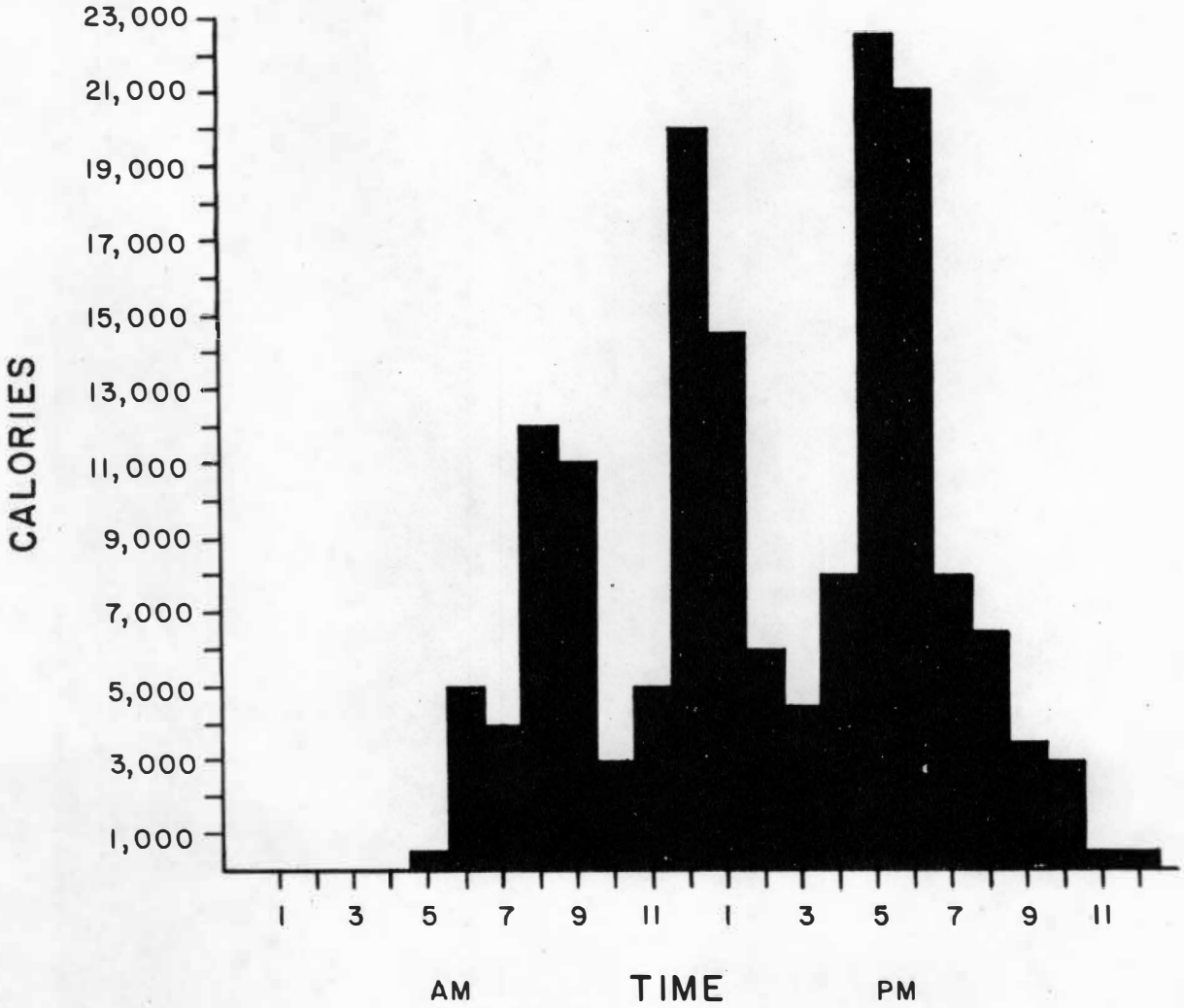

Figure 4. Number of Calories (Kilocalories) Eaten by Time of Day

nonfood nutritional supplements have become available. Nutritional supplements were taken by 15 subjects in this group on the day prior to the interview. All 15 took supplemental ascorbic acid, thiamin, riboflavin, and niacin. Vitamin A was taken by 12 subjects, calcium by 9, and iron by 2. Subjects who took supplements were not meaningfully different from those who did not in terms of demographic characteristics.

The mean, standard deviation, and range for kilocalories and 10 nutrients derived from food and nutritional supplements are shown in Table 14. The intake varied greatly for some nutrients, especially vitamins A and C. The percent of the women with intakes less than 75 and 50 percent of the 1980 R.D.A. (National Academy of Sciences 1980) is presented in Table 15. Using these standards, the nutrients most frequently low in the diets of these women, in order of decreasing magnitude, were vitamin A, iron, calcium, and vitamin C. This reflects a lower than recommended intake of dairy products, fruits and vegetables, and iron-rich foods. Nutrients which were less frequently eaten at levels below 75 and 50 percent of the R.D.A. were protein, thiamin, riboflavin, and niacin. Meats and enriched grain products possibly contributed a substantial proportion of these nutrients.

The percentage of kilocalories derived from carbohydrate was 47 percent, from fat was 38 percent, and from protein was 15 percent. These proportions are similar to those reported for the general United States population and the South (United States Department of Agriculture 1980:75, 81). The correlation between age and caloric intake from fat was positive (Pearson's r = .28), while age was negatively associated

Table 14. Mean, Standard Deviation, and Range of Intake for Kilocalories and 10 Nutrients by Snowbird Women.

Nutrient	Mean	Standard Deviation	Range
Kilocalories	1524	603	175- 3130
Carbohydrate (g)	183.2	80.6	20- 436
Fat (g)	64.5	31.7	7- 165
Protein (g)	56.7	24.1	6- 118
Calcium (mg)	670	487	33- 2245
Iron (mg)*	10.2	5.0	1.2- 37.3
Vitamin A (IU)**	4945	7670	0-56520
Thiamin (mg)	1.16	.71	.12- 4.18
Riboflavin (mg)	1.41	.85	.09- 5.34
Niacin (mg)***	14.2	8.7	1.2- 50.6
Vitamin C (mg)	84	84	0- 390

*Figures reported are for dietary iron, not absorbable iron.

**The 1980 Recommended Dietary Allowance for vitamin A is reported in retinol equivalents, not international units. However, international units are used in this report since food tables which report vitamin A in retinol equivalents are not readily available.

***Values are for preformed niacin only. Food tables which report niacin as niacin equivalents, which include preformed niacin plus oxidized tryptophan, are not readily available.

Table 15. Percent of Subjects with Intakes Less than 75 and 50 Percent of the 1980 R.D.A.

Nutrient	Percent with Intakes <75 Percent of R.D.A.*	Percent with Intakes <50 Percent of R.D.A.*
Protein	15.2	7.6
Calcium	55.2	32.4
Iron	64.8	34.3
Vitamin A**	66.7	51.4
Thiamin	25.7	13.3
Riboflavin	34.3	14.3
Niacin***	33.3	18.1
Vitamin C	42.9	26.7

*National Academy of Sciences 1980.

**The 1973 R.D.A. (National Academy of Sciences 1973) for vitamin A was used for this calculation since it reports vitamin A in international units.

***These values are calculated on the basis of the intake of preformed niacin only. Since the niacin R.D.A. is based on niacin equivalents, which include preformed niacin plus oxidized tryptophan, the percent of subjects with niacin intakes below the 1980 niacin R.D.A. may be less than that reported above.

with caloric intake from carbohydrate (Pearson's r = -.32). These correlations could be due to numerous age-related differences in food patterning. Unfortunately, such an analysis is beyond the scope of this project.

It was anticipated that individuals with more body fat would eat more kilocalories. But caloric intake was not highly associated with obesity indices. Thus, in this group, obesity may have been a reflection of differences in activity level and/or physiology rather than caloric intake. Neither total caloric intake nor the percentage of kilocalories from carbohydrate, protein, and fat was meaningfully related to other demographic variables.

In Table 16 the nutrient intake of the Snowbird women is contrasted with that of adult women in the 1977-78 Nationwide Food Consumption Survey (United States Department of Agriculture 1980:75, 84). Both the mean amount eaten and the mean percent of the 1980 R.D.A. are shown. While the mean values for carbohydrate, calcium, and thiamin were slightly higher for the Snowbird women, the Snowbird values for kilocalories and other nutrients fell within the range for the national sample.

IV. IMPLICATIONS

Three important implications emerge from these findings, as discussed below.

First, the seemingly conflicting dualism of the foodways portrayed in this chapter needs to be recognized and understood by the health

Table 16. Nutrient Intake of Snowbird Women Compared with Adult Women in the 1977-78 Nationwide Food Consumption Survey.

Nutrient	Mean Amount		Mean Percent of 1980 R.D.A.*	
	Snowbird Women	Adult Women from Nationwide Sample** ***	Snowbird Women	Adult Women from Nationwide Sample** ***
Kilocalories	1524	1367- 1621		
Carbohydrate (g)	183.2	151.2-168.8		
Fat (g)	64.5	59.0- 75.9		
Protein (g)	56.7	54.1- 66.7	128	123-148
Calcium (mg)	670	515- 630	83	64- 77
Iron (mg)	10.2	10.1- 10.7	70	58-114
Vitamin A (IU)****	4945	3800- 6220	99	95-136
Thiamin (mg)	1.16	1.01- 1.07	116	93-107
Riboflavin (mg)	1.41	1.27- 1.41	116	104-117
Niacin (mg)*****	14.2	13.8- 17.2	107	106-132
Vitamin C (mg)	84	76- 93	140	123-155

*National Academy of Sciences 1980. **United States Department of Agriculture 1980.

***Range given is highest and lowest mean for six age groups of adult women.

****In both studies, diets were calculated for intake of vitamin A in international units, and the 1973 R.D.A. (National Academy of Sciences 1973) for vitamin A was used as the base figure for adequacy calculations.

*****In both studies, preformed niacin was calculated, not niacin equivalents.

care planner. On the one hand, the general aspects of food selection, procurement, manipulation, and consumption of the Snowbird women were similar to those of the general United States population and other related groups. Yet, a dissection of the specific details of these activities revealed the uniqueness of this group. Only by understanding the unique features of this population's foodways will the change agent overcome barriers to dietary change.

Second, although the food behavior of this population was unique, considerable intragroup diversity did exist. Thus, action to change maladaptive food behavior should be initiated not only at the group level, but also at the household or individual level.

Third, the need to view food intake and disease patterning holistically is illustrated by findings in this chapter such as the absence of a meaningful association between obesity and caloric intake, or the suggestion that food patterning may be different for older women in the community as compared to younger women. As Sanjur (1982:285-316), Logan and Hunt (1978:xiii-xvii), and others have noted, food habits and disease patterns do not exist in isolation and any attempts to modify them must be made within the total ecosystem in which they operate.

CHAPTER 4

ANTHROPOMETRIC CHARACTERISTICS

I. REVIEW OF LITERATURE

Anthropometric Variation in American Indian Women

Population differences in the size and shape of adults are due to differences in gene pools, environment, and culture (Tanner 1976). Studies of anthropometric variability among Native American populations have been carried out by anthropologists since the beginning of the nineteenth century. Additional investigations have been conducted by nutritionists, public health workers, and medical teams. This has resulted in a long list of studies on morphological characteristics of American Indians. In reviewing these studies, Johnston and Schell (1979) found many unsuitable for any scientific purpose. Often ages were not recorded, sample sizes were too small, or measuring techniques were not standardized. Such data masks trends and patterns, and may lead to false conclusions.

Reliable anthropometric data, as judged by Johnston and Schell (1979), are available for American Indian females from the following tribes (excluding Alaskan natives): Navaho (Darby et al. 1956), Blackfoot (Interdepartmental Committee on Nutrition for National Defense 1964a), Assiniboine-Gros Ventre (Interdepartmental Committee on Nutrition for National Defense 1964b), and Seminole (Pollitzer et al. 1970). Comparable data also are available for the Pima (Bennett et al. 1976). These

samples represent two northern tribes, one southeastern tribe, and two southwestern tribes. The ranking of mean height, from highest to lowest, tended to follow geographic divisions. Women from the northern tribes were tallest, and those from the southeastern and southwestern tribes were shortest. The samples revealed a wide variation in mean weight. For example, there was approximately a 20 kilogram difference in the mean weight of the lightest sample, the Navaho, as compared to the heaviest sample, the Pima. In addition to representing environmental and genetic variation, this difference also may reflect the long time span between the two studies cited. The Navaho study was conducted in the early 1950's, while the Pima data were derived in the 1970's. As West (1974) has pointed out, widespread obesity has only recently been noted among many American Indian groups. If the Navaho study was repeated today, it is possible that the mean weight of the women would be greater than that reported in 1956.

Relative weight, or weight/height^2, adjusts body weight for height, and thus is independent of height. As expected, the highest relative weight was found for the Pima, and the lowest for the Navaho. Triceps skinfolds were reported only for the northern tribes. Thus, meaningful comparisons of triceps skinfolds among these tribes are not possible.

Social Factors, Culture, and Obesity

Several social factors have been linked to obesity in Americans. In a study of 1,660 randomly selected adults in New York City, a significant inverse relationship was demonstrated between obesity and socioeconomic status, parental socioeconomic status, social mobility,

and the number of generations the family had lived in the U.S. (Moore, Stunkard, and Srole 1962; Goldblatt, Moore, and Stunkard 1965). In further analysis of these data, Stunkard (1968:1368-1369) demonstrated striking differences in the prevalence of obesity among nine ethnic groups. However, in each ethnic group the highest prevalence of obesity was in the lowest socioeconomic class.

Based on these data, Stunkard (1975:207) proposed a model of the relationship between affluence and the prevalence of obesity. He suggested that the maximum prevalence of obesity occurs among the poorer members of Western urban society and similar class groups. This prevalence decreases with both decreasing and increasing affluence. With decreasing affluence, lack of food causes a decrease in obesity. However, with increasing affluence, fads and fashions constrain obesity.

Garn and Clark (1974) analyzed data from the 1968-70 Ten-State Nutrition Survey. They found that White, Black, and Chicano low income women were systematically more obese than their median income counterparts. Yet, in White, Black, and Chicano males increasing income was associated with increasing obesity. These data suggest that there are sex-related differences in the prevalence of obesity within each socioeconomic class.

Stunkard et al. (1972) studied 3,334 White urban children to establish the age at which the influence of socioeconomic status on weight becomes apparent. They found that obesity was nine times more prevalent in lower class girls by age six than in upper class girls. Similar, though less striking, differences were found among boys.

However, findings from the Ten-State Nutrition Survey, comparing median income and lower income children, suggested that the lower income children did not become more obese until adolescence (Garn and Clark 1975). Prior to adolescence, a greater percentage of median income children were obese. The differences in these findings may be accounted for by the differences in the socioeconomic classes used for comparison (lower vs. upper, and lower vs. middle). Nonetheless, both studies indicate that socioeconomic factors exert their influence on weight prior to adulthood.

Stunkard (1975:206-207) reported the results of a study on the influence of both age and degree of acculturation to Western society on obesity in 690 Navaho boys, ages 6-12. From ages 7 to 11, obesity was significantly more prevalent among acculturated boys than among traditional boys. But by age 12 a greater percentage of traditional boys were obese. In this study, degree of acculturation correlated strongly with affluence. Therefore, Stunkard (1975:207) attributed these results to the influence of economic status on obesity. However, the influence of Western norms of fatness and thinness on the acculturated boys should not be discounted.

These reports indicate that obesity to a large extent may be controlled by an individual's cultural environment. Social factors which have been linked to obesity, such as socioeconomic status, acculturation, length of exposure to Western ideals, childhood socio-economic status, and ethnic affiliation all influence the cultural norms learned by an individual. Unfortunately, few studies have considered differing body weight preferences among cultural and subcultural groups.

Evaluation of Body Fatness

The terms "overweight" and "obese" are often used interchangeably. However, obesity refers to excessive body fat, whereas overweight refers to gross body weight exceeding a standard weight. Numerous laboratory approaches for measuring body fatness have been developed in recent years. Unfortunately, most of these methods are not practical as routine clinical procedures or for field surveys. Therefore, this discussion will be restricted to those approaches most frequently used in clinical and field settings—weight for height indices, which are indications of obesity, and skinfold measurements, which are quantifications of actual body fat.

The most popular clinical evaluation of obesity is based on a person's weight compared to a standard weight. Unfortunately, this simple procedure has a major drawback. Gross body weight may suggest obesity, but is not a direct measure of body fatness. Excessive weight often reflects greater than average muscle tissue, bone mass, or body water, as well as, or instead of, actual obesity. Therefore, an individual may be overweight, but not obese, and vice versa.

In this country, the weight reference standard has long been the tables of average weight for height and age popularized by life insurance companies. Grande and Keys (1980) have discussed the history and numerous limitations of these tables. A more recent standard has been published by the United States Department of Health, Education, and Welfare. This table of "desirable" weights is based on the mean weights for men and women age 20 to 29 years who participated in the

Health and Nutrition Examination Survey (National Center for Health Statistics 1979). This survey assessed a sample of Americans chosen to reflect the variation in the entire population. However, for all of these standards it must be realized that average body weights may not be those weights most conducive to good health.

Percentile height, weight, and weight for height values, such as those used to monitor the growth of children, have not been available for adults until recently. These percentile values were published by the United States Department of Health, Education, and Welfare (1979b, 1979c) based on the Health and Nutrition Examination Survey sample. These values allow an individual's height, weight, or weight for height to be assessed relative to the range of values in the population.

Keys et al. (1972:330) have reasoned that average values for weight and height for a given population do not necessarily apply to other populations, or even to the same population at another time. Therefore, an index which expresses relative weight for height is preferred over simple mean values. The ratio of weight to various powers of height is often used in epidemiological studies, and is increasingly accepted in clinical settings (Thomas, McKay, and Gutlip 1976). Of the various possible indices, weight/height^2, often referred to as the body mass index, perhaps offers the most advantages at present. This index has a high correlation with other measures of obesity such as skinfold thickness; it has a low correlation with height; it is simple to calculate; and, because it is widely used, population comparisons are possible (Keys et al. 1972; Womersley and

Durnin 1977; Lee, Kolonel, and Hinds 1981; Roche et al. 1981). Weight/height^2 percentile values for White and Black adult females have been calculated by Cronk and Roche (1982) based on data from the Health and Nutrition Examination Survey.

While weight for height values only indicate excessive fatness, skinfolds are an indirect measure of actual body fat. The skinfold measurement expresses the millimeters of thickness of the pinched up, folded skin plus the underlying subcutaneous fat. Skinfold values may be obtained from numerous body sites. However, the site most frequently used is the triceps, located on the back of the arm midway between the acromion and olecranon processes. From a practical point of view, this site is readily accessible in most subjects. Statistically, the triceps has proven the best single indicator of percentage body fat in both White and Black women (Roche et al. 1981; Cronk and Roche 1982). Comparable statistical comparisons are not available for American Indian women.

Triceps skinfold standards that aid in classifying adults as obese are available. The forerunner of these classification schemes was presented by Seltzer and Mayer (1965) for Caucasian Americans. The minimum triceps skinfold thickness indicating obesity was established at one standard deviation above the mean, or approximately the 85th percentile. Values indicative of obesity were listed for each year for ages 5 to 29, with one value given for ages 30 to 50 inclusive. In both the Ten State Survey (United States Department of Health, Education, and Welfare 1972a:14) and the Health and Nutrition Examination

Survey (United States Department of Health, Education, and Welfare 1975:6), obesity in adults was defined as a triceps skinfold measurement greater than the 85th percentile of the measurement in young adults. The actual triceps skinfold measurement defining obesity in females was 25.1 mm in the Ten State Survey, and 29.7 mm in the Health and Nutrition Examination Survey.

Percentile values for triceps skinfold measurements, based on data from the Health and Nutrition Examination Survey, have been published by Frisancho (1981) for White females, and by Cronk and Roche (1982) for both White and Black females. However, care must be taken when assessing American Indian populations using skinfold standards developed for other population groups, since genetically determined differences in both skinfold thickness and fat patterning may exist.

II. RESEARCH HYPOTHESES AND METHODOLOGY

Research Hypotheses

Research methodology was designed to test the following hypotheses:

1. The Snowbird women are shorter, heavier, and have larger fatfolds than women in the Health and Nutrition Examination Survey.
2. Age and degree of Indian inheritance are positively correlated with weight and obesity indices, and negatively correlated with height.
3. Higher weight and obesity indices are found for women who are full time homemakers and for women who have lived in Snowbird all of their lives when compared to opposing subgroups.

4. Of the five samples of Indian women for whom anthropometric data are available, Snowbird women who are greater than three quarters Indian inheritance are most similar to the Southeastern sample, the Seminoles, in height, weight, and body mass index.

Data Collection

Anthropometric measurements of height, weight, and triceps skinfold were obtained from each subject with the exception of one elderly woman who declined to be measured. Using an anthropometer, height was taken with the subject standing erect in stocking feet, heels together, and head in approximate Frankfort horizontal plane. Height was recorded to the nearest millimeter. Weight was taken in stocking feet and light clothing using a Health-O-Meter dial scale, model 134, manufactured by the Continental Scale Corporation. The pointer was adjusted to zero before the subject was weighed. Weight was recorded to the nearest half pound. The triceps skinfold was measured on the right arm midway between the acromial process and the olecranon process with a Lange caliper. The skinfold measurement was taken three times, and averaged to the nearest half millimeter.

Data Analysis

Weight and height data for each subject were used to compute a body mass index using this formula:

$$\frac{\text{weight in kilograms}}{(\text{height in centimeters})^2} \times 100$$

In addition to frequency and central tendency statistics, correlation coefficients were calculated for the interrelationships between height, weight, triceps skinfold, and body mass index, and their relationship to demographic factors.

The entire group, as well as those with greater than three-quarters Indian inheritance, were compared with the Health and Nutrition Examination Survey's standards for desirable weight, and percentiles for height, weight, weight-for-height, body mass index, and triceps skinfold. For comparisons such as these, percentiles based on one genetic or ethnic group are preferable, but not always available. While the body mass index and triceps skinfold percentiles used for comparison with data in this study were derived from data on White women, the percentiles for height, weight, and weight-for-height were derived from a combined sample of women representing White, Black, and other population groups in the United States.

The Snowbird women in the upper quartile for Indian inheritance were compared in height, weight, and body mass index to the five samples of American Indian women for whom anthropometric data were available.

III. RESULTS AND DISCUSSION

The mean, standard deviation, and range for the anthropometric measurements and indices are presented in Tables 17 and 18. These are calculated for the entire group of Snowbird women, and for the upper Indian inheritance quartile.

Height

The mean height for the population was 1605 millimeters, and was seven millimeters greater than the mean height of the upper Indian inheritance quartile. The Spearman correlation coefficient for height and degree of Indian inheritance was negative (r = -.25). Hence, height tended to decrease as degree of Indian inheritance increased.

Table 17. Mean, Standard Deviation, and Range of Anthropometric Measurements and Indices for Entire Group of 104 Women.

Variable	Mean	Standard Deviation	Range
Height (mm)	1605	57	1430 -1740
Weight (kg)	74.9	14.7	39.0- 118.2
Body mass index (wt./ht.^{2})	29.0	5.2	18.0- 48.0
Triceps skinfold (mm)	31.1	9.9	10.0- 52.0

Table 18. Mean, Standard Deviation, and Range of Anthropometric Measurements and Indices for the 80 Snowbird Women in the Upper Indian Inheritance Quartile.

Variable	Mean	Standard Deviation	Range
Height (mm)	1597	56	1430 -1727
Weight (kg)	75.0	15.0	39.0- 118.2
Body mass index (wt./ht.^{2})	29.3	5.3	18.0- 48.0
Triceps skinfold (mm)	30.9	10.0	10.0- 52.0

A negative relationship was demonstrated between age and stature. This correlation was meaningful in both the total group (Pearson's r = -.31) and in the upper inheritance division (Pearson's r = -.42). This negative correlation may be due to the decline in adult stature which accompanies aging. It also may reflect a secular trend within this group. Due to better diet and/or better environment, younger women may have more fully attained their genetic potential for height than their older counterparts. Similar trends have been demonstrated for other population groups, summarized by Malina (1975:49-53).

Table 19 compares the height of 18 to 74 year old women in the research population and in the upper inheritance quartile to the Health and Nutrition Examination Survey percentiles (United States Department of Health, Education, and Welfare 1979b). The percentage of individuals in each percentile division was similar for the two Snowbird groups. Although the Snowbird women, overall, were shorter than the women in the Health and Nutrition Examination Survey, the difference was not linear. In both Snowbird groups, greater than 25 percent of the women was found in the first and third quartiles, and less than 25 percent in the second and fourth.

Weight

The mean weight for the two Snowbird groups was approximately the same—75.0 kilograms for the total group and 74.9 kilograms for the upper inheritance quartile. The range of 39.0-118.2 kilograms was the same for each. The correlation between weight and Indian inheritance was not meaningful. However, these women represent a low socioeconomic

Table 19. Comparison of the Height of 18 to 74 Year Old Snowbird Women in the Entire Group and in the Upper Indian Inheritance Quartile to Percentiles from the Health and Nutrition Examination Survey (HANES).

HANES Height Percentile*	Entire Group n = 101		Upper Indian Inheritance Quartile n = 78	
	Frequency	Percentage	Frequency	Percentage
≤5th	4	4.0	3	3.8
>5th, ≤10th	8	7.9	7	9.0
>10th, ≤25th	25	24.8	22	28.2
>25th, ≤50th	12	11.9	10	12.8
>50th, ≤75th	36	35.6	26	33.3
>75th, ≤90th	10	9.9	7	9.0
>90th, ≤95th	2	2.0	1	1.3
>95th	4	4.0	2	2.6

*United States Department of Health, Education, and Welfare 1979b.

group. In such a group one expects a relatively high degree of obesity in subgroups. The influence of socioeconomic status on weight and weight indices may confound the influence of Indian inheritance. There were no meaningful differences in the mean weight of full-time homemakers versus those who worked outside the home, or of those who had lived in the community all of their lives versus those who had resided in other communities.

For adult women in the Health and Nutrition Examination Survey, weight increased with age up to the sixth to seventh decade (United States Department of Health, Education, and Welfare 1979b:17). But for the Snowbird women, there was a low correlation between weight and age in both the entire group and the high inheritance division. Younger women were as heavy as older women. However, younger women also were taller and the correlation between weight and height was meaningful (Pearson's r = .42). Therefore, body mass index, which corrects weight for height, may better distinguish the relationship between age and weight.

The Snowbird women were heavier than their counterparts in the Health and Nutrition Examination Survey. Table 20 compares the Snowbird women with weight percentiles from this national study (United States Department of Health, Education, and Welfare 1979b). The percentage of Snowbird women in the first and second weight quartiles was low, with deficits of 18.0 and 16.1 percent, respectively. However, in the third and fourth quartiles the percentage was high, with an excess of 4.7 and 29.4 percent, respectively. Similar differences were found when these

Table 20. Comparison of the Weight of 18 to 74 Year Old Snowbird Women in the Entire Group and in the Upper Indian Inheritance Quartile to Percentiles from the Health and Nutrition Examination Survey (HANES).

HANES Weight Percentile*	Entire Group n = 101		Upper Indian Inheritance Quartile n = 78	
	Frequency	Percentage	Frequency	Percentage
≤5th	1	1.0	1	1.3
>5th, ≤10th	1	1.0	0	-
>10th, ≤25th	5	5.0	3	3.8
>25th, ≤50th	9	8.9	7	9.0
>50th, ≤75th	30	29.7	26	33.3
>75th, ≤90th	31	30.7	22	28.2
>90th, ≤95th	15	14.8	12	15.4
>95th	9	8.9	7	9.0

*United States Department of Health, Education, and Welfare 1979b.

women were compared to the Health and Nutrition Examination Survey's weight for height percentiles (United States Department of Health, Education, and Welfare 1979c), as shown in Table 21. This indicates that the Snowbird women not only were heavier than women in the national sample, but also were heavier for their height. The results of these comparisons were similar for those women greater than 75 percent Indian inheritance.

Weight for height differences between the Snowbird women and Health and Nutrition Examination Survey sample are further illustrated in Table 22. This table shows the percentage of women in each study who were 10 and 20 percent or more above the Health and Nutrition Examination Survey's desirable weight for height figures (National Center for Health Statistics 1979:2). The occurrence of excess weight among Snowbird women in the entire group and the upper inheritance division were more than twice that of women from the national study.

Body Mass Index

A weight-corrected-for-height index, such as the body mass index, should have little or no correlation with the height of the population to which it is applied, but significant correlation with weight. For the entire Snowbird group as well as those in the upper inheritance quartile, the association between height and body mass index was low, with Pearson's r = .08 and .13, respectively. However, weight was positively associated with body mass index and resulted in the same correlation coefficient for both groups (Pearson's r = .93). Neither age nor degree of Indian inheritance was meaningfully associated with this index. There

Table 21. Comparison of the Weight for Height of 18 to 74 Year Old Snowbird Women in the Entire Group and in the Upper Indian Inheritance Quartile to Percentiles from the Health and Nutrition Examination Survey (HANES).

HANES Weight Percentile*	Entire Group n = 101		Upper Indian Inheritance Quartile n = 78	
	Frequency	Percentage	Frequency	Percentage
≤5th	1	1.0	1	1.3
>5th, ≤10th	1	1.0	1	1.3
>10th, ≤25th	4	4.0	0	-
>25th, ≤50th	9	8.9	8	10.3
>50th, ≤75th	26	25.7	22	28.2
>75th, ≤90th	38	37.6	29	37.2
>90th, ≤95th	14	13.9	10	12.8
>95th	8	7.9	7	9.0

*United States Department of Health, Education, and Welfare 1979c.

Table 22. Comparison of the Percent of Women Aged 20 to 74 in the Entire Snowbird Group and the Upper Indian Inheritance Quartile with the Percent in the Health and Nutrition Examination Survey (HANES) Who Were 10 and 20 Percent or More above Desirable Weight for Height.

Percentage Deviation from Desirable Weight	HANES*	Entire Group n = 93	Upper Indian Inheritance Quartile n = 77
10 percent or more	36.4	75.3	72.7
20 percent or more	23.8	59.1	55.8

*National Center for Health Statistics 1979:2.

was little difference in mean weight when the group was divided according to whether or not the woman was a lifetime resident of the community, or whether or not she was employed outside the home.

The mean body mass index for the entire group and for the upper inheritance quartile was 29.0 and 29.3, respectively. These figures are noteworthy, because Thomas, McKay, and Gutlip (1976:302), based upon insurance company weight tables, suggest that adult women with a body mass index greater than 29 should be classified as obese. Using this number, 49.0 percent of the population of women, and 47.5 percent of those in the upper inheritance quartile were classified as obese.

Table 23 compares the body mass index of 18 to 50 year old Snowbird women to percentiles for White women in the Health and Nutrition Examination Survey (Cronk and Roche 1982). The number of Snowbird women with body mass index in the upper quartile was highly disproportionate. In the entire group 69.7 percent were above the seventy-fifth percentile, and for the upper inheritance quartile, this figure was 73.7 percent. Thus, this comparison, like previous comparisons, reflects the relatively heavy weight of the Snowbird adult women.

Triceps Skinfold

If the variation in weight and body mass index seen in this group is a good indication of differences in body fat, then these measurements should have high correlation with triceps skinfold. The Pearson correlation coefficient between triceps skinfold and weight was .79, and between triceps skinfold and body mass index was .80. Thus,

Table 23. Comparison of the Body Mass Index of 18 to 50 Year Old Snowbird Women in the Entire Group and in the Upper Indian Inheritance Quartile to Percentiles for White Women in the Health and Nutrition Examination Survey (HANES).

HANES Body Mass Index Percentile*	Entire Group n = 76		Upper Indian Inheritance Quartile n = 61	
	Frequency	Percentage	Frequency	Percentage
≤5th	0	-	0	-
>5th, ≤10th	2	2.6	2	3.3
>10th, ≤25th	0	-	0	-
>25th, ≤50th	6	7.9	2	3.3
>50th, ≤75th	15	19.8	12	19.7
>75th, <90th	22	29.0	20	32.8
>90th, <95th	18	23.7	15	24.5
>95th	13	17.0	10	16.4

*Cronk and Roche 1982.

differences in amount of body fat were, to a certain extent, reflected by differences in weight and body mass index. Triceps skinfold was not highly correlated with either age or degree of Indian inheritance, and was not meaningfully different for full-time homemakers or for those who had lived in the community all of their lives, versus the opposing employment and residence subgroups.

The mean triceps skinfold measurement for the entire group was 31.1 millimeters, and for the upper Indian inheritance quartile was 30.9 millimeters. The range for both groups was 10.0-52.0 millimeters. In Table 24, the triceps skinfolds of 18 to 50 year old Snowbird women are compared to percentiles for White women in the Health and Nutrition Examination Survey (Cronk and Roche 1982). As with weight, weight for height, and body mass index, a large proportion of the triceps skinfold measurements fell into the upper percentile ranges. For example, 67.2 percent of the entire group, and 68.8 percent of the upper inheritance quartile had triceps skinfolds greater than the seventy-fifth percentile.

Table 25 shows the percentage of the research participants classified as obese using triceps skinfold standards from the Health and Nutrition Examination Survey (United States Department of Health, Education, and Welfare 1975:6), Ten State Nutrition Survey (United States Department of Health, Education, and Welfare 1972a:14), and Seltzer and Mayer (1965: A105). Although these standards differ, resulting in differing prevalence rates, approximately one-half or greater of the women were classified as obese regardless of the standard used. The prevalence of obesity, based on triceps standards, found for participants in the Health and Nutrition Examination Survey and Ten State Nutrition Survey

Table 24. Comparison of the Triceps Skinfold of 18 to 50 Year Old Snowbird Women in the Entire Group and in the Upper Indian Inheritance Quartile to Percentiles for White Women in the Health and Nutrition Examination Survey (HANES).

HANES Triceps Skinfold Percentile*	Entire Group n = 76		Upper Indian Inheritance Quartile n = 61	
	Frequency	Percentage	Frequency	Percentage
≤5th	2	2.6	2	3.3
>5th, ≤10th	1	1.3	1	1.6
>10th, ≤25th	3	3.9	2	3.3
>25th, ≤50th	6	7.9	4	6.6
>50th, ≤75th	13	17.1	10	16.4
>75th, ≤90th	15	19.8	13	21.3
>90th, ≤95th	10	13.2	8	13.1
>95th,	26	34.2	21	34.4

*Cronk and Roche 1982.

Table 25. Percentage of Snowbird Women in the Entire Group and in the Upper Indian Inheritance Quartile Classified as Obese Using Triceps Skinfold Standards from the Health and Nutrition Examination Survey (HANES), Ten State Nutrition Survey, and Seltzer and Mayer.

	Percentage Classified Obese	
Standard	Entire Group n = 104	Upper Indian Inheritance Quartile n = 80
HANES*	58.7	57.5
Ten State Nutrition Survey**	70.2	68.8
Seltzer and Mayer***	59.6	45.2

*United States Department of Health, Education, and Welfare 1975:6.

**United States Department of Health, Education, and Welfare 1972a:14.

***Seltzer and Mayer 1965:A105.

were reported for age, sex, ethnic, and geographic divisions. However, because of these numerous divisions, the findings from these national studies were not appropriate for comparison with data from this project.

Comparison with Other American Indian Women

The mean height, weight, and body mass index of Snowbird women in the upper Indian inheritance quartile are compared in Table 26 with adult females from other Indian groups (Darby et al. 1956; Interdepartmental Committee on Nutrition for National Defense 1964a, 1964b; Pollitzer et al. 1970; Bennett et al. 1976) and the Health and Nutrition Examination Survey (United States Department of Health, Education, and Welfare 1979b).

In height, the Snowbird Cherokee were taller than all samples except the Blackfoot and United States national sample. The tall stature of the Snowbird Cherokee women relative to women in other Indian tribes may be due to the presence of genes from other population groups in the Snowbird upper inheritance quartile. However, the mean weight and body mass index of the Snowbird women were greater than all samples except the Pima. Thus, the Snowbird women in the upper inheritance quartile were heavy compared not only to the sample of women in the general United States population, but also to most other Indian groups for which data were available.

IV. IMPLICATIONS

The most significant finding of this anthropometric investigation was the high prevalence of obesity among the study participants. Weight,

Table 26. Mean Height, Weight, and Body Mass Index of Snowbird Women in the Upper Inheritance Quartile Compared with Adult Females from Other Indian Groups and the Health and Nutrition Examination Survey (HANES).

Group*	Height (mm)	Weight (kg)	Body Mass Index
Assiniboine-Gros Ventres	1594	69.0	27.2
Blackfoot	1611	69.5	26.8
Cherokee (Snowbird)	1597	75.0	29.4
Navajo	1560	58.1	23.9
Pima	1570**	78***	31.6
Seminole	1572	69.1	28.0
United States HANES	1615	64.9	24.9

*See text for sources of anthropometric data.

**Height reported to the nearest centimeter.

***Weight reported to the nearest kilogram.

weight for height, body mass index, and triceps skinfold measurements all indicated that many of these women were heavier and had larger skinfolds than their counterparts in the general United States population, and in several American Indian tribes. The obesity prevalence figures may be inflated, to some extent, due to genetic dissimilarities between the populations compared. However, regardless of the measurement or standard used to define obesity, the occurrence of obesity was consistently too high, and the upper end of the measurement range too large, to discount that a large number of the research group had more body fat than is currently considered physiologically healthy. In a population considered to be at high risk for diabetes, this high obesity rate constitutes a considerable public health problem.

Simply confirming that obesity is a problem for Snowbird Cherokee women is only one phase of assessment. One must also understand the culture and environment in which it exists. Thus, in order to design effective obesity intervention programs, one must view obesity as a cultural and environmental problem, not a medical disease (Sash 1977: 247), and current behavior must be changed. Foster (1978:305) suggests that people will change traditional behavior only when they perceive the change as advantageous, realistic, and economically and socially affordable. Information concerning food behavior, presented in the previous chapter, and on diabetes-related attitudes and knowledge, in the succeeding chapter, will aid in understanding barriers to changing food intake and activity patterns, thus obesity incidence, in this population.

CHAPTER 5

DIABETES-RELATED ATTITUDES AND KNOWLEDGE

I. REVIEW OF LITERATURE

Diabetes among American Indians

Prior to 1940, diabetes was relatively unknown among American Indians. However, it appears that this disease has increased dramatically since that time in at least 37 tribes (West 1974:844). For example, there was a 33 percent increase from 1955 to 1974 in the mortality rate for American Indians attributed to diabetes (Public Health Service 1978:22). It is projected that if present trends continue, diabetes could eventually affect as many as one-half of American Indian adults (West 1980:8).

Several researchers have attempted to explain the prevalence of diabetes among Native Americans by hypothesizing that the genetic penetrance for this disease is higher among certain Indian groups than in the general population. For example, the relationship between prevalence of diabetes and degree of Indian inheritance in the Three Affiliated Tribes of North Dakota was reported by Brosseau et al. (1979). Full inheritance Indians age 35 or older had a diabetes rate of 22.3 percent; persons between full and half inheritance, a rate of 14.9 percent; and persons less than half inheritance, a rate of 4.1 percent, the same as Whites on the reservation. Unfortunately, this

study utilized no uniform criteria for diagnosing diabetes, used a nonrandom sample, and did not control for obesity.

In a study by Stein et al. (1965) among the North Carolina Cherokee, an increased prevalence of diabetes was found among persons whose degree of Indian inheritance was 50 percent or greater. However, when the data were adjusted for adiposity, the rate of glucose intolerance for the Cherokee was the same as that for Whites on the reservation (West 1974:851). Likewise, West and Kalbfleisch (1970:656) found that although the prevalence of diabetes varied greatly in eleven age matched populations from three continents, differences in rates were insignificant when the populations were matched for adiposity.

In perhaps the most well controlled study of diabetes among an American Indian group, Knowler et al. (1981) found among the Pima that the incidence of diabetes was 2.3 times as high in subjects with one diabetic parent and 3.9 times as high in those with two diabetic parents as in those with two nondiabetic parents. Age and obesity were statistically controlled. Comparison with data from a diabetes survey of Whites in Oxford, Massachusetts, showed a similar relative risk for positive family history of diabetes (Hamman, Bennett, and Miller 1978: 62). These data suggest that a positive family history of diabetes is a risk factor in developing diabetes. In addition, they indicate that the genetic susceptibility to diabetes may be no different for some American Indian groups than for the general population.

An overall association between diabetes and obesity is supported by ample epidemiological evidence, summarized by Berger, Muller, and

Renold (1978). Kalkhoff (1976:295) suggests that overnutrition (obesity) unmasks the diabetic syndrome in genetically susceptible individuals, whereas normal or restricted food intake has a protective effect on such individuals. For the Pima, Hamman, Bennett, and Miller (1978:62) found that when statistically controlling for family history of diabetes and age, heavy individuals had a three times greater risk of developing diabetes than thin individuals. A similar relative risk attributed to obesity was found in a diabetes survey of Whites in Oxford, Massachusetts (Hamman, Bennett, and Miller 1978:62).

Recent research suggests that not only obesity per se, but also the body distribution of excess fat correlates highly with diabetes. In an epidemiological survey of 15,532 obese women, Kissebah and coworkers (1980) found that women with a preponderance of fat in the upper body, such as waist, chest, neck, and arms, were more likely to have diabetes than those with fat concentrated in lower body segments, such as thighs, hips, and buttocks. Statistical analysis of this data indicated that obesity alone represented a diabetes risk of 2.9. However, localization of fat in the upper body increased the risk to 10.7.

A metabolic investigation of this phenomenon was undertaken by these investigators using 16 women with upper body obesity and nine with lower body obesity (Kissebah et al. 1982). None of the women had been diagnosed as having diabetes, and all had normal fasting plasma glucose levels. In subjects with lower body obesity, glucose tolerance test results were normal. However, 62 percent of those with upper body obesity had test results indicating diabetes. These findings have

potential value in the investigation of diabetes among American Indians. If the obesity reported in many American Indian groups is predominantly upper body obesity, then this may help explain the high diabetes incidence rates in these groups.

West (1978:43) feels that modern living conditions are primary contributors to the high rates of obesity and diabetes seen among certain American Indian groups. For example, the caloric intake of the Pima is similar to that for the general population (Reid et al. 1971: 1284). However, the evolution of a cash economy with plentiful food has led to a sedentary lifestyle characterized by little activity (Brody 1980:4). This observation is consistent with Neel's (1962) hypothesis that diabetes results from the introduction of a steady food supply to people who have evolved a "thrifty" genotype to store energy efficiently. According to Neel, such a genotype permitted survival under alternating periods of feast and famine, which characterized the life of early man.

Two interpretations of Neel's hypothesis are possible. First, many people have interpreted this model as indicating that diabetes was prevalent among early humans, and had a selective evolutionary advantage. Several arguments against this interpretation can be made: (1) Diabetes causes a tremendous amount of glucose to be spilled into the urine. Thus, caloric utilization is very inefficient. These spilled kilocalories represent food which an individual ate but was not able to assimilate. It would appear more advantageous for an individual faced with a feast-famine cycle not to have diabetes—he could then efficiently utilize food during periods of plenty, accumulating fat

stores to hedge against leaner periods. (2) Cahill (1978:665) points out that Neel fails to explain how diabetes could have had a selective evolutionary advantage, since the age of the development of diabetes is usually postreproductive. (3) The peak incidence of diabetes occurs between ages 25 and 55. Thus, it is probable that until recently most populations did not survive long enough to develop diabetes.

A second interpretation of Neel's hypothesis is that the "thrifty" genotype represents genetically determined efficient caloric utilization. Many prehistoric populations may have had to contend with periodic or chronic food shortages. During food shortages, those individuals who were metabolically more efficient in utilizing food would have been able to subsist on less food, and may have had greater caloric reserves (fat) to draw on. Thus, due to greater survival rate and/or better health, they may have been able to produce more offspring. An hypothesized association between body fat and fertility has been advanced by Frisch (1980). If such a selection process operated over several centuries in a genetically isolated population group, the end product may have been a group of individuals genetically prone to efficient caloric utilization and fat accumulation. A balance between caloric intake and output may have masked the phenotypic exhibition of this genetic trait, or obesity, during earlier times. However, a more stable, abundant food supply coupled with a more sedentary lifestyle may have upset the caloric balance, resulting in obesity.

In laboratory animals, hereditary obesity is well established. For example, when compared to their genetically normal counterparts, genetically obese mice are characterized by a more efficient conversion

of food to body fat, a slower rate of fat catabolism during fasting, and significantly longer survival during prolonged fasting (Coleman 1979). However, the demonstration of hereditary obesity in man is more difficult. Mayer (1980:726-729) has reviewed investigations of the relationship between genetic factors and obesity in man. He concludes:

> The evidence that genetic factors dictate predisposition to overweight—and to a significant extent its occurrence—in a society where food is abundant and hard physical labor unnecessary is, I believe, convincing, although the data that would permit the elucidation of the mechanism of hereditary transmission are still missing. (Mayer 1980:729)

Thus, it is possible that a greater than average genetic tendency toward efficient caloric utilization exists among certain population groups. Such a trait may have been adaptive during earlier times. However, in an environment characterized by abundant food and little activity, it would serve to promote obesity, and increase the affected individual's risk of developing diabetes.

Although caloric intake in excess of caloric expenditure is correlated with diabetes, the relationship between diabetes and the distribution of carbohydrate, protein, fat, and fiber in the diet remains inconclusive. Kalkhoff (1976:295-297) reviewed research dealing with the influence of dietary carbohydrate, protein, and fat on diabetes prevalence. Epidemiological studies are available which both support and refute the popular view that high fat and/or high sucrose diets promote diabetes. Unfortunately, few of these studies considered the interplay of other factors, such as obesity and longevity. And, only within the last decade has evidence emerged

that plant fibers play an important role in the digestion, absorption and metabolism of nutrients. Thus, the influence of plant fiber ingestion on the development of diabetes has only recently been considered. This relationship has undergone limited scrutiny, and remains highly theoretical (Anderson, Midgley, and Wedman 1979:371-372).

Age appears to be related to diabetes incidence in two ways. First, one must live long enough to develop diabetes. Among the Pima, the peak incidence of diabetes occurs between the ages of 25 and 54 (Hamman, Bennett, and Miller 1978:62), similar to that for the general U.S. population. Considering this relationship of diabetes to age, it is probable that many Indian individuals, until recently, did not survive long enough to develop diabetes.

The second way in which age may be related to diabetes has to do with the duration of obesity. West (1978:44) hypothesized that the risk for developing diabetes rises with each decade of obesity, and that the greatest risk occurs during the second to fourth decade of obesity. Therefore, according to West, the longer that an obese individual lives, the greater the individual's risk of developing diabetes.

Thus, much of the supporting data concerning the etiology of diabetes deal with the general population, or with Indian groups other than the Cherokee. The degree to which these etiological traits occur among the Cherokee has not been investigated. However, for this investigation it was hypothesized that the high prevalence of diabetes among the Cherokee was the result of the same factors as in the general population—genetic susceptibility, obesity, and longevity.

Body Image and Body Build Preference

Body image refers to an individual's evaluation of his own body. This image appears to develop during adolescence (Stunkard and Mendelson 1967; Glucksman and Hirsch 1969), and is influenced by both internal personal factors as well as the external standards of society. Although studies have reported that both obese and extremely thin individuals may possess a disturbed, negative body image, the majority of body image studies have focused on obesity (Nutrition Foundation 1969; Garner et al. 1976). It has been shown that three factors predispose an obese person to the development of a disturbed body image—obesity onset during adolescence, emotional stress, and negative evaluation of obesity by others during the formative years (Stunkard and Burt 1967; Stunkard and Mendelson 1967). Yet, a recent study of 86 college students concluded that mild body image disturbances may occur even in individuals with relatively normal body types (Miller, Coffman, and Linke 1980). Fifty-nine percent of the men and 91 percent of the women studied were dissatisfied with their present body. In general, men desired to weight more and have larger arms, while women desired to weigh less and have smaller hips, thighs, and waists.

Few studies have considered the influence of culture on the development of body image. However, Huenemann et al. (1966) found discernable group differences in satisfaction with height, weight, and specific body dimensions between approximately 900 Negro, Caucasian, and Oriental teenagers. For example, Caucasian and Oriental teens were more likely than Negro teens to express dissatisfaction with their weight, and to overestimate their fatness. This study suggested that

the ideal body image was not the same for the three groups. Unfortunately, potential intervening variables, such as socioeconomic status, were not considered.

An individual's evaluation of his own body has an impact on his assessment of body build in others. Lerner and Gellert (1969) have postulated that a preference for certain body builds is culturally learned. The body build preferences of 60 White, middle class, urban males, five to 20 years old, were studied by Lerner and Korn (1972). Thirty subjects were overweight, and thirty normal weight. At each age level, both overweight and normal weight subjects expressed a preference for muscularity and an aversion to obesity in males. In a similar study of young females, Brenner and Hinsdale (1978) found that the preferences for female body build, in order of descending priority were mesomorphic, ectomorphic, and endomorphic.

Research involving 118 male and 190 female predominately White college students uncovered sex-related body preferences (Lerner, Karabenick, and Stuart 1973). Both males and females agreed that width of shoulders and height were important body characteristics for men, while hips, shape of legs, and thighs were important body characteristics for women.

The relationship of sex, race, age, education, and geographic factors to body preference were investigated by Maddox, Back, and Liederman (1968). In five samples of adults selected to maximize variation in attitudes toward body size, indications of a negative stereotype toward fatness were consistently found. On the basis of

these findings, these authors suggested that a negative evaluation of fatness surmounts cultural boundaries. However, further research on this hypothesis should be conducted.

Thus, body image and body build preference studies suggest that American middle and upper class values favor thinness. Unfortunately, the extent of variation among cultural and subcultural groups has received little attention.

II. RESEARCH HYPOTHESES AND METHODOLOGY

Research Hypotheses

Data reported in this chapter were used to examine several groups of hypotheses. First, hypotheses pertaining to the reported incidence and knowledge of diabetes were tested:

1. A positive relationship exists when the number of family members reported as diabetic is correlated with age and degree of Indian inheritance.
2. Subjects diagnosed as diabetic, compared to those who are not, have higher values for age, degree of Indian inheritance, reported number of diabetic family members, body mass index, and triceps skinfold.
3. Whether or not the subject reportedly has diabetes has no relationship to whether or not she works outside the home or has lived outside the community.
4. Subjects who profess no knowledge of the cause, prevention, or treatment of diabetes, or who incorrectly identify the

relationship between obesity and diabetes have higher values when compared to their opposing subgroups, for age, degree of Indian inheritance, reported number of diabetic family members, body mass index, and triceps skinfold, and are less likely to work outside the home, to have lived outside the community, or to reportedly have diabetes.

Body size preference and perception data were used to test the following hypotheses:

1. A positive relationship exists when age, percentage Indian inheritance, body mass index, and triceps skinfold are correlated with the body size chosen by the subject as most attractive, healthiest, most desirable for self, and most resembling self at present.
2. Women who do not work outside the home, have never lived outside the community, or have been diagnosed diabetic, when compared to their opposing subgroup, perceive larger body sizes as most attractive, healthiest, most desirable for self, and most resembling self at present.
3. Women who perceive the healthiest body size as larger than the most attractive body size, or who perceive the body size most resembling self at present as larger than that most desirable for self have higher values, when compared to their opposing subgroup, for age, degree of Indian inheritance, reported number of diabetic family members, body mass index, and triceps skinfold, and are more likely to be full-time

homemakers, to have never lived outside the community, and to reportedly have diabetes.

The following hypotheses regarding attitudes, perceptions, and experiences related to weight were investigated:

1. Subjects who are younger, have less Indian inheritance, have larger body mass index and triceps skinfold, work outside the home, have lived outside the community, or report having diabetes differ from their opposing subgroup in that they are more likely to:
   - perceive themselves as overweight
   - express dissatisfaction with their present body weight
   - cite improved appearance versus improved health as their primary motivation for trying to lose weight
   - be presently engaged in weight loss activities
   - have engaged in weight loss activities in the past.
2. Subjects who perceive themselves as overweight are more likely to express dissatisfaction with their weight than those who perceive themselves as about average or underweight.

Data Collection

Various forms of diabetes-related attitudinal and knowledge data were obtained. First, a family profile of diabetes was elicited. Questions were asked regarding whether or not the subject or any immediate family members had been diagnosed as having diabetes, and if so, when the diagnosis was made. Next, general knowledge of diabetes was assessed. The subject was asked to list factors which cause

diabetes, factors which help prevent diabetes, and the best treatments for diabetes. She was asked to indicate from the items stated in each category the one she regarded as most important.

Near the end of the interview, data were gathered on the subject's evaluation of her own weight. The subject was asked if she thought of herself as underweight, about average weight, or overweight, and if she was satisfied or dissatisfied with her present weight. If dissatisfied, she was asked to state her desired weight, and her primary reasons for wanting to change her weight, including the reason she regarded as most important. Finally, information on present and past approaches used to change weight was elicited.

A series of five body profile drawings was used to assess body size attitudes, and the perceived association between body size and diabetes (Appendix F). Sheldon's (1954) somatotyping handbook was used as a guide in producing these drawings. Each drawing portrayed a woman clothed in a plain, shirtwaist dress. The head was blocked in order to focus attention on body shape. One of the five drawings illustrated a body considered to be a balance of the endomorphic, ectomorphic, and mesomorphic components. Two of the drawings illustrated a systematic increase in the endomorphic component, while the remaining two drawings illustrated a systematic decrease in this component.

The drawings were displayed for the subject in random order. The subject was told that the drawings represented females the same age as herself. She was asked to indicate the figure she considered most attractive, healthiest, most likely to have diabetes, most desirable for herself, and most like her present body size.

Data Analysis

Frequency and central tendency statistics were calculated for all variables. Depending on the nature of the data, correlations were accomplished with either the Pearson or the Spearman test. Differences between subgroups were investigated using either the Wilcoxon or the chi-square test.

III. RESULTS AND DISCUSSION

Reported Incidence and Knowledge of Diabetes

The number of family members reported as having diabetes per subject is shown in Table 27. While 33.3 percent of the total group reported having no diabetic family members, only 22.2 percent of those in the upper Indian inheritance quartile were in this category. The range was 0 to 10 for both groups. Age was not related to the reported number of diabetic family members. However, there was a meaningful correlation between degree of Indian inheritance and reported number of diabetic family members (Spearman's r = .39).

As expected, subjects who were greater than 75 percent Indian inheritance were more likely to report having diabetes than those in the lower inheritance subgroup (chi square = 7.95). This is illustrated by the finding that, of the 22 subjects who reported having diabetes, 21 were in the upper Indian inheritance quartile. For these 22 subjects, the number of years since diabetes had been diagnosed ranged from 1 to 32, with a mean of 9.2 years.

Table 27. Number of Family Members Reported as Having Diabetes per Subject for the Total Group and for the Upper Indian Inheritance Quartile.

Number of Family Members Reported as Having Diabetes	Total Group n = 105		Upper Indian Inheritance Quartile n = 81	
	Frequency	Percent	Frequency	Percent
0	35	33.3	18	22.2
1	24	22.9	21	25.9
2	17	16.2	16	19.8
3	12	11.4	10	12.3
>3	17	16.2	16	19.8

The 25.9 percent of women in the upper inheritance quartile who reported having diabetes was a lower percentage than anticipated. But, this low proportion may be due to two factors. First, this group, overall, was relatively young. More than 50 percent of these women were under the age of 40. Second, the true incidence of diabetes, in all probability, was higher than the incidence reported by these subjects. Other than routine urinanalysis, most subjects had never been screened for the disease. A typical response to the question, "Do you have diabetes?" was "I don't know because I've never been checked."

Because the majority of reported diabetics had greater than 75 percent Indian inheritance, the upper inheritance quartile was used to examine the relationship between reported diabetes and other variables. For these 81 subjects age was significantly greater for the diabetic group, with a mean of 48.4 years and a median of 44 years, as compared with the reportedly nondiabetic group, with a mean of 38.2 years and a median of 34 years ($Z = 3.02$). There was no meaningful difference between the groups for the reported number of diabetic family members, body mass index, triceps skinfold, or whether or not the subject worked outside the home or had lived outside the community.

Thus, both age and degree of Indian inheritance were important predictors for diabetes. However, the relationship between diabetes and obesity indices was negligible. This finding may be a reflection of the large number of obese individuals who had not yet reached the age at which diabetes is most likely to be diagnosed.

When asked to list the factors which she regarded as causing diabetes, 39 women, or 37.1 percent of the group, replied that they did not know. Of the 66 subjects who answered this question, 45 listed only one factor, while 21 listed two or more. Collectively, these 66 women gave 91 responses, presented in Table 28. The factor most frequently stated as causing diabetes was eating too much of specific foods or types of food. The 84 foods mentioned as causal agents are presented in Table 29. The most frequently mentioned foods were sugar and sweets, listed 30 times; fats and grease, listed 28 times; and starchy foods, listed 14 times. It is noteworthy that two foods often connotatively associated with hypertension—salt and pork—were listed six times as causing diabetes.

Factors generally regarded by the medical community as contributing to or causing diabetes—excess weight, heredity, and an imbalance in caloric intake and output—were listed, collectively, 36 times. Age was not given as a causal agent. Each of the 66 subjects was asked to state the one factor from her list which was the most important cause of diabetes. The most frequent answers were eating too much of specific foods or types of food, and eating too much food, in general. These items are enumerated in Appendix G. Subjects who professed no knowledge of the cause of diabetes were not meaningfully different from the opposing subgroup for those variables tested: age, degree of Indian inheritance, reported number of diabetic family members, body mass index, triceps skinfold, reportedly having diabetes, employment outside the home, and past residence outside the community.

Table 28. Factors Cited by 66 Subjects as Causing Diabetes.

Cause	Frequency*	Percent of 66 Subjects Listing the Cause
Eating too much of specific foods or types of food	51	77.3
Eating too much food, in general	13	19.7
Being overweight	10	15.2
Heredity	9	13.6
Exercising too little	4	6.1
Other	4	6.1

*Total number of responses was 91.

Table 29. Specific Foods or Types of Food Cited by 51 Subjects as Causing Diabetes.

Food	Frequency*	Percent of 51 Subjects Listing the Food
Sugar, sweets	30	58.8
Fats, grease	28	54.9
Starchy foods	14	27.5
Modern, or White man's foods	6	11.8
Salt	4	7.8
Pork	2	3.9

*Total number of foods listed was 84.

Although obesity, per se, was not frequently mentioned as a cause of diabetes, 87.6 percent of subjects correctly identified the relationship between the two when shown the body profile drawings. Only 12.4 percent, or 13 subjects, failed to select the largest body profile as the one most likely to get diabetes. Subjects who failed to identify the association between diabetes and obesity were not meaningfully different from those who did in terms of demographic or descriptive variables, or obesity indices.

When asked to list factors which help a person avoid getting diabetes, 13 subjects replied that diabetes could not be prevented, and 28 said that they did not know. Together, these subjects represented 39.0 percent of the group. Statistical comparison revealed negligible differences between those women who professed no knowledge of the prevention of diabetes, versus those who responded, for demographic and descriptive variables and obesity indices.

Table 30 shows the 88 prevention measures listed by the remaining 64 women. Forty-three women cited one prevention measure, while 21 cited two or more. The factor most frequently cited as helping to prevent diabetes was eating less of specific foods or types of food. The specific foods mentioned are listed in Table 31. Of these 51 foods, sugar and sweets were listed most often, or 24 times; followed by fats and grease, listed 16 times; and starchy foods, listed 7 times. While losing weight or staying slim is generally regarded as the most effective diabetes prevention measure, this factor was stated by only 26 subjects, or approximately one-fourth of the total group. However, methods for

Table 30. Factors Cited by 64 Subjects as Helping to Prevent Diabetes.

Factor	Frequency*	Percent of 64 Subjects Listing the Factor
Eating less of specific foods or types of food	37	57.8
Losing weight or staying slim	26	40.6
Eating less food, in general	11	17.2
Exercising more	6	9.4
Eating more of specific foods or types of food	4	6.3
Getting regular medical check-ups	4	6.3

*Total number of responses was 88.

Table 31. Specific Foods or Types of Food Cited by 37 Subjects as Helping to Prevent Diabetes When Less Are Eaten.

Food	Frequency*	Percent of 37 Subjects Listing the Food
Sugar, sweets	24	64.9
Fats, grease	16	43.2
Starchy foods	7	18.9
Salt	3	8.1
Coffee	1	2.7

*Total number of foods listed was 51.

attaining or maintaining slimness—exercising or eating less food—were cited 17 times. Among the remaining prevention measures, four subjects stated that eating more of specific foods or types of food would help prevent diabetes. These foods were sassafras tea, water, fruit, and special dietetic food.

Each of the 64 women who listed prevention measures was asked to indicate the one measure which she considered most important. The most frequent answers were eating less of specific foods or types of food, given by 42.2 percent; losing weight or staying slim, given by 28.1 percent; and eating less food, in general, given by 14.1 percent. A total list of the prevention measures considered most important is given in Appendix G.

A greater number of subjects responded to inquiry about the treatment of diabetes than responded concerning either cause or prevention. Only 13 subjects, or 12.4 percent of the group, declared no knowledge of diabetes treatment. Because of this small number, tests to discern differences in responders and nonresponders were not carried out.

Factors cited as treatments for diabetes by the 92 responders are shown in Table 32. The majority of the 149 responses dealt with altering food intake. Seventy-one of the 92 women said that a person with diabetes should follow a diabetic diet, and 32 stated that less should be eaten of specific foods or types of food. Forty-four foods were listed—sugar and sweets, 20 times; fats and oils, 16 times; starchy foods, 4 times; and pork and salt, twice each. The next most

Table 32. Factors Cited by 92 Subjects as Treatments for Diabetes.

Factor	Frequency*	Percent of 92 Subjects Listing the Factor
Following a diabetic diet	71	77.2
Eating less of specific foods or types of food	32	34.8
Taking insulin or hypoglycemic agents	19	20.7
Losing weight	14	15.2
Exercising more	10	10.9
Taking native herbal medicine	3	3.3

*Total number of responses was 149.

frequently cited category of responses dealt with medication. Taking modern or native medicine comprised 14.8 percent of the responses. Key informants reported that native medicine is used to treat diabetes more frequently than is documented by this research. The low reporting frequency may reflect a reluctance to discuss native medicine with a person outside the culture. Few women mentioned weight loss as an important treatment for diabetes. This treatment was listed by only 14 subjects, accounting for 9.4 percent of the responses.

Persons who listed multiple treatments for diabetes were asked to state the one which was most important. Of the 92 women, 80.4 percent stated that altering food intake was most important. The next most frequent response was losing weight, given by 9.8 percent. Appendix G contains a complete summary of these responses.

Three major conclusions may be drawn regarding knowledge of diabetes in this group:

1. Persons with diabetes often are asked to restrict their consumption of sugars and sweets, fats and oils, and starchy foods. Because these foods are restricted in diabetes treatment, a large percentage of this group interpreted this to mean that eating these foods caused diabetes, and that eating less of them would help prevent diabetes. Evidence available at present indicates that this interpretation is incorrect, and that these foods, in themselves, do not cause diabetes. Moreover, fats and oils, and starchy foods are core foods in most homes. These foods are both desirable and economically affordable. Since families are not likely to regard a change in these

food behaviors as practical, they may consider diabetes as a disease that they, realistically, can do little to prevent.

2. Subjects who reported having diabetes, as well as those who reported having diabetic family members, were just as likely to profess no knowledge of the cause and prevention of diabetes as those with no immediate experience with the disease. Thus, education is needed not only in the general community, but also for diagnosed diabetics and their immediate family.

3. In a group of people for whom the risk of diabetes is so great, one would expect a greater number of responses per subject, and a greater number of accurate responses concerning the cause, prevention, and treatment of diabetes. Again, this illustrates the need for community diabetes education in the Snowbird township.

Body Size Preference and Perception

The five body size drawings reported upon in this section are referred to by profile numbers, with profile one representing the thinnest body size, and progressing sequentially, profile five representing the heaviest body size. Profile three represents a balance between the endomorphic, ectomorphic, and mesomorphic components. When presented with these five drawings, each subject indicated the one she considered most attractive, healthiest, most desirable for self, and most like self at present. The results are presented in Table 33.

Profile three was chosen as most attractive by 57.2 percent of the women. The remaining 42.8 percent chose the two thinner body sizes, and the two heavier profiles were not selected as most attractive by

Table 33. Body Size Preferences and Selections.

	Body Size									
	Thinnest ←								→ Heaviest	
	1		2		3		4		5	
Choices	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Most attractive	12	11.4	33	31.4	60	57.2	0	-	0	-
Healthiest	9	8.6	26	24.8	63	60.0	6	5.7	1	1.0
Most desirable for self	14	13.3	31	29.5	57	54.3	3	2.8	0	-
Most like self at present	6	5.7	11	10.5	28	26.7	51	48.6	9	8.6

any subject. In comparison, each body size was singled out as healthiest at least once. Profile three was chosen by 60.0 percent of the women, the two thinner profiles by 33.4 percent, and the two heavier profiles by 6.7 percent. There was little association between the body figure chosen as most attractive or healthiest and age, degree of Indian inheritance, body mass index, or triceps skinfold. Body size selections were not meaningfully different for women who worked outside the home, had lived outside the community, or reported having diabetes, when compared to the opposing subgroups.

The body size chosen by each subject as most attractive was compared to that chosen as healthiest. For 13.3 percent, the body figure selected as most attractive was larger, while for 28.6 percent the most attractive was smaller. The remaining 58.1 percent selected the same profile for both categories. Women who perceived the most attractive physique as larger than the healthiest were little different from those who perceived the opposite in terms of demographic or descriptive variables, or obesity indices.

These findings indicate that certain body sizes were connotatively associated with attractiveness and health by individuals in this group. In addition, the physique considered healthiest was not always the same as that chosen as most attractive. Thus, individual values associated with both attractiveness and health should be considered when prescribing weight loss change in this population.

Profile three was singled out as the size most desirable for self by 54.3 percent of the women. The most desirable body figure was

thinner than profile three for 41.8 percent, and heavier for 2.8 percent. In contrast, the drawing selected most often as most resembling self at present was profile four, picked by 48.6 percent of the subjects. The heaviest body size, profile five, was chosen by 8.6 percent, profile three by 26.7 percent, and the two thinner body shapes by 16.2 percent. There were meaningful, positive correlations between the body physique chosen as most like self at present and body mass index (Spearman's r = .57), and triceps skinfold (Spearman's r = .69). This indicates that these women were relatively accurate in selecting a drawing most like their present body shape, and that heavy subjects were likely to perceive themselves as heavy. Other associations and subgroup comparisons carried out regarding the profiles selected as preferable for self and most resembling self at present were not meaningful.

Only 16.2 percent of the women selected the same physique as both most desirable for self and most like self at present. The choice for desirable body size was larger than that for present body size for 10.5 percent, while the reverse was true for 73.3 percent. The subgroup whose choice for desirable body size was thinner than that for present body size had a larger median body mass index (Z = -4.62) and median triceps fatfold (Z = -3.87) than the opposing subgroup. Thus, heavier subjects were more likely to indicate that they preferred to be thinner. Subgroup comparisons for other variables were not meaningful.

Attitudes, Perceptions, and Experiences Related to Weight

Each project participant was asked to evaluate her body weight as under-, about average, or overweight. Of the 105 subjects, 4.8 percent regarded themselves as underweight, 22.9 percent as about average weight, and 72.4 percent as overweight. These evaluations were positively correlated with body mass index (Spearman's r = .49) and with triceps skinfold (Spearman's r = .43). Thus, as found with the body profile test, heavy subjects were likely to perceive themselves as heavy. There was little correlation with either age or degree of Indian inheritance, and no meaningful differences between subgroups defined by whether or not the woman worked outside the community, or whether or not she had lived outside the township.

The majority of subjects, 68.6 percent, indicated that they were dissatisfied with their present weight, while 31.4 percent indicated satisfaction. Women who regarded themselves as overweight were more likely to express dissatisfaction with their weight than those who regarded themselves as under- or about average weight (chi square = 42.73). However, as seen in Table 34, a self-evaluation of overweight did not always imply dissatisfaction, nor did a self-evaluation of about average or underweight imply satisfaction. This is further illustrated by the finding that those who were satisfied with their weight were not meaningfully different from those dissatisfied in terms of body mass index or triceps skinfold. Thus, a desire to change body weight was expressed at all weight levels. Subjects who considered their weight as satisfactory had a higher median age than those giving a response

of unsatisfactory (Z = 3.31). Subgroup comparisons for other variables were not meaningful.

Table 34. The Relationship between Self-Evaluation of Weight and Satisfaction with Weight.

Satisfaction with Weight	Perception of Weight: Underweight Frequency	Underweight Percent	About Average Weight Frequency	About Average Weight Percent	Overweight Frequency	Overweight Percent
Satisfied	2	1.9	21	20.0	10	9.5
Dissatisfied	3	2.9	3	2.9	66	62.9

The weight change desired by the 72 dissatisfied subjects varied from a gain of 9.1 kilograms (20 pounds) to a loss of 43.5 kilograms (96 pounds). The 105 items stated by these subjects as motivations for weight change are listed in Table 35. Forty-two subjects cited only one reason, while 30 cited two or more. Factors dealing with health constituted 52.4 percent of the responses, while appearance factors made up the remaining 47.6 percent. When asked to single out the most important reason, factors dealing with health and appearance were cited in proportions similar to those given above (Appendix G). Those whose primary motivation for weight change was health were little different from those whose primary motivation was appearance in terms of demographic or descriptive variables, or weight indices.

In further evaluation of the findings reported in Table 35, it is of interest that only 12 of the 72 women cited the recommendation of a

Table 35. Reasons for Desiring Weight Change Listed by 72 Subjects.

Reason	Frequency*	Percent of 72 Subjects Listing the Reason
To improve vigor	31	43.1
Body size interferes with buying stylish clothes or clothes that fit	28	38.9
Appearance dissatisfactory to self or others	22	30.6
Recommended by a health professional to improve health	12	16.7
Self desire to improve health	12	16.7

*Total number of responses was 105.

health care professional as a reason for desiring weight change. This finding may be the result of two basic problems. First, it may reflect the modest, treatment-oriented commitment to health care in the Snowbird township. An increased manpower and funding commitment is needed to initiate preventative programs which reach a large segment of the population. Second, it may indicate poor contact and communication between some health care personnel and the Snowbird Cherokee. Based on numerous studies, Rogers and Shoemaker (1971:380, 382) have summarized factors which differentiate successful and unsuccessful change agents. These factors include the extent of effort put forth by the change agent to bring about change; the change agent's client orientation rather than his agency orientation; the extent to which the change agent and client share a common cultural background, interests, and goals; and the credibility of the change agent in the eyes of the client.

At the time of the research, 40.0 percent of the women were reportedly engaged in weight change activities, described in Table 36. Twenty-four persons were either dieting or exercising, and 18 were undertaking a combination of the two. These figures are probably higher than usual. During the research period, a series of diet/exercise classes was being presented for the first time at the Snowbird Community Center, and several respondents were participating. These classes were initiated and directed by several Snowbird women, with the assistance of a public health nutritionist.

Approximately 75 percent of the women reported having engaged in weight change activities in the past, described in Table 36. The number of past activities per subject ranged from one to five, with a mode of

Table 36. Present and Past Approaches Used to Change Weight.

Approach	Present Approaches n = 42		Past Approaches n = 79	
	Frequency*	Percent of Responses	Frequency**	Percent of Responses
Self-prescribed diet	28	46.7	50	26.3
Drugs	0	-	50	26.3
Diet prescribed by health care professional	11	18.3	44	23.2
Exercise	21	35.0	43	22.6
Fasting	0	-	3	1.6

*Total number of present approaches was 60.

**Total number of past approaches was 190.

three. While traditional dieting and exercise were frequently cited in this list, 50 respondents reported having taken drugs to lose weight. Key informants said that this had been a popular mode of weight loss several years earlier, but was less popular at the time of the research.

A higher median age was found both for those who were not presently participating in weight change activities, versus those who were (Z = -2.95), as well as for those who had never engaged in such activities in the past, versus those who had (Z = 2.91). This is in keeping with the earlier finding that those who considered their weight as satisfactory had a higher median age than those who considered it unsatisfactory. This may indicate that younger women were more conscious of conforming to the weight norms in the dominant society than older women.

As anticipated, women who were satisfied with their weight, as compared to those who were dissatisfied, were less likely to report present attempts to change their weight (chi square = 19.16), or to have attempted weight change in the past (chi square = 10.80). In addition, subjects less than three-quarters Indian inheritance were more likely to be participating in weight change activities than those in the upper inheritance quartile (chi square = 9.22). Other differences between subjects based on participation in weight change activities were negligible.

IV. IMPLICATIONS

Diabetes is a disease for which prevention and treatment are largely the responsibility of the individual. Because of this, when

a larger than average prevalence of diabetes is found in a given group, medical personnel are inclined to place the blame solely on the actions of the individuals within that group. For example, regarding diabetes among the Snowbird residents, the researcher noted among several health care providers such explanations as, "They have diabetes because they don't take care of themselves," or "They just eat what they want and refuse to lose weight—there is nothing that can be done for them." However, two points can be made regarding such opinions, as discussed below.

First, in order for diabetes prevention and treatment measures to be properly carried out, an appropriate knowledge base must exist. As Rogers and Shoemaker (1971:98-133) have noted, before an individual engages in new behaviors, he must both be cognizant of the new behaviors, and have formed a favorable attitude toward them. Data presented in this chapter indicate that many Snowbird residents lack an appropriate knowledge base on which to build diabetes-related behaviors. Providing information for and fostering adoption of proper diabetes prevention and treatment behaviors are partially the responsibility of health care personnel.

Second, it should not be assumed that maladaptive behaviors are static. Such an attitude psychologically relieves the health care provider of his or her responsibility as a change agent. The findings that 40.0 percent of the group were engaged in weight change activities at the time of the research, and 75.2 percent had participated in such activities in the past, certainly indicate behavioral flexibility among Snowbird women.

CHAPTER 6

POLICY DIRECTIONS AND PROGRAM NEEDS

The fact that diabetes among Native Americans is a problem of growing proportions and wide-ranging implications has been documented repeatedly. Because this disease results from interrelated factors which are culturally, environmentally, and genetically determined, a simple solution is not possible. The best approach at present appears to be the implementation of diabetes prevention and treatment programs at the community level. However, before such programs are implemented, a thorough assessment of a community should be conducted.

Most community diabetes assessments have concentrated on defining the nature and scope of the disease. Undeniably, such information is important. However, little attention has been directed at identifying the cultural and socioeconomic factors which directly influence human behavior, and which, possibly, will respond to intervention. Because diabetes is a problem deeply imbedded in the surrounding cultural and socioeconomic environment, a holistic approach to community diabetes assessment offers a powerful analytic and programming tool. Such an approach focuses upon the complex, interacting forces within which diabetes arises. From these many, interrelated causes, it identifies those which are major forces, and how they operate. Thus, points where intervention is appropriate are revealed.

The research presented in this report is important for several reasons. First, it represents a holistic approach to the assessment of

diabetes within a specific community. As noted previously, this approach to health planning is relatively new, and few such studies have been conducted. Furthermore, the holistic approach used in this study incorporated ideas and research techniques from the disciplines of cultural anthropology, physical anthropology, food and nutrition science, psychology, and rural sociology.

Second, this research is important as an example of the many, interrelated factors which influence the occurrence of diabetes at the community level. The major research findings, in summary, are:

-While the general aspects of food selection, procurement, manipulation, and consumption for the research population were similar to those of other groups, specific details of these activities disclosed unique patterns of food behavior within the Snowbird community.

-Although the prevalence of obesity among the study participants was high, there was little association between obesity indices and caloric intake.

-Diagnosed diabetes was more prevalent among older women and women in the upper Indian inheritance quartile. However, in this study the relationship between diagnosed diabetes and obesity was not meaningful. This finding perhaps was due to the high incidence of obesity among all subgroups of the women, and the probability that undiagnosed cases of the disease existed among the research participants.

-General knowledge of the causes, prevention, and treatment of diabetes was low.

-Both a desire to change body weight and an interest in weight change activities were expressed by a majority of the women in the study.

Based on these findings, the following policy directions and program needs are offered for the Snowbird township.

1. The culture, environment, and health care problems in the Snowbird township are unique. Health care personnel should accept and work within these unique features, rather than viewing the Snowbird township as a rather "distant cousin" of the Qualla Boundary. Moreover, the "barriers" to improved health care so often attributed to the Snowbird residents may be due to problems within the bureaucracies which deliver that care. As Foster (1978:303) noted,

> . . . I am increasingly struck by the fact that many apparent resistances of health services commonly attributed to villagers' apathy and their cultural barriers are, in fact, the result of administrative and professional inadequacies.

2. This research has demonstrated that excess weight and diabetes are problems in this group, and that many residents are willing to undertake activities to correct these problems. In discussing diabetes with the study participants, it was found, in general, that younger subjects had devoted little thought to the disease, and many did not conceive of it as a reality. However, older subjects said that diabetes was frequently a topic of conversation, and a disease which they feared. For example, one older woman confided that she and her son often spent hours speculating on probable causes of the disease. Another woman stated that one of her prized possessions was a small leaflet on diabetes prevention that she had been given by her employer. In the presence of such deep interest, change agents should not wait for people to seek preventive knowledge and undertake preventive activities on their own, but should actively initiate projects to meet these needs.

3. Research on the diet, anthropometric characteristics, and diabetes-related attitudes and knowledge of other age and sex groups would offer a more complete picture of the health problems and needs in this township. In addition, this township is an ideal setting for an epidemiological study of the incidence of and risk factors contributing to diabetes, and for research on the implementation and evaluation of culturally-relevant community health care programs.

4. A broad commitment to the problems of obesity and diabetes in the Snowbird township is needed. Programs to combat these problems should encompass the following factors:

-A full-time nutrition professional or paraprofessional should be available to work solely in the Snowbird township. It is essential that this person has a client orientation rather than an agency orientation. For this reason, this person should be someone who resides in the area, has a common cultural background with others in the township, and has high credibility in the community.

-The professional described above should be responsible for both preventive and treatment dietary programs. This would ensure continuity of care, and would maintain frequent contact between the professional and the client.

-A strong knowledge component should be included in diabetes prevention and treatment programs in Snowbird. This component should present information on the causes, prevention, and treatment of diabetes, and should employ a variety of communication techniques. Appropriate communication methods might include one-to-one discussions in the home,

audio-visual presentations or group discussions at the Cornsilk Community Center or local churches, and printed materials.

-The action component of a diabetes program for the Snowbird township should include both dietary and exercise modification. Moreover, diet and exercise recommendations should be individualized to the needs and lifestyle of each person. (Shortcuts such as pre-calculated handout diet sheets are not appropriate for use in this community.) Although an individualized approach is time consuming, it is necessary if long-term changes in lifestyle are to be made.

-Food behaviors, exercise habits, and attitudes toward body size begin forming at an early age. Therefore, it is important that the Snowbird diabetes program include preventive education for children and teenagers. It is possible that diabetes education could be included in the activities of community organizations which are currently working with this age group, such as the Snowbird 4-H Club and the Indian education program of the Graham County School System.

-In order for community health programs to be successful, they must meet the perceived needs of the community members. Therefore, Snowbird community leaders should play a role in the decision making process for all health programs in the township.

In conclusion, this study has examined diabetes within the cultural and socioeconomic environment of the Snowbird township. Thus, diabetes has been taken out of the laboratory and viewed as a consequence of human behavior. Specific problems have been identified, and practical courses of action have been suggested. The next step toward combating

diabetes in this community involves both a new level of concern for the health problems of the Snowbird residents, and appropriate intervention. Initiating these actions is the responsibility of those who oversee health care delivery in the area. And, given the prevalence of obesity and diagnosed diabetes identified in this study, health care officials can little afford, economically or morally, to neglect these problems.

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APPENDIXES

APPENDIX A

HUMAN SUBJECTS COMMITTEE APPROVAL

THE UNIVERSITY OF TENNESSEE, KNOXVILLE
KNOXVILLE 37916

OFFICE OF THE VICE CHANCELLOR FOR
GRADUATE STUDIES AND RESEARCH

404 ANDY HOLT TOWER

AREA 615
TELEPHONE 974-3466

October 12, 1981

Dr. L. Evans Roth
Vice Chancellor for Graduate
Studies and Research
404 Andy Holt Tower
CAMPUS

Dear Dr. Roth:

Mary Ann Bass, and Rhonda Dale Terry, Anthropology, submitted a project entitled "The relationship between diet, body fatness, demographic factors, and diabetes-related attitudes among Cherokee women residing in the Snowbird township," CRP# 1279. The departmental human subjects committee has reviewed and approved this project. In their judgment, this project comes within that section of their approved guidelines which permits the Chairperson of the Committee on Research Participation to give approval to the project on behalf of the Committee.

After reviewing this project, I certify that it does conform to Committee and Departmental guidelines. Therefore, acting on behalf of the Committee, I have approved this project.

The responsibility of the project directors includes the following:

1. Prior approval from the Committee must be obtained before any changes in protocol are instituted.

2. Signed consent statements from each experimental subject must be kept for the duration of the project and for at least three years thereafter.

3. The Committee must be informed of any physical or psychological effects on subjects for re-evaluation of the protocol approval.

4. A statement must be submitted (Form D) at 12-month intervals attesting to the current status of the project (protocol is still in effect, project is terminated, etc.).

The Committee wishes the project directors success in their research endeavors.

Sincerely,

L. E. Cebik, Chairman
Committee on Research Participation

SCW

cc: Mary Ann Bass
Rhonda Dale Terry
William M. Bass

APPENDIX B

RESEARCH INTERVIEW FORM

Date:_____1982

Name:_____

First Middle or Maiden Last

		PG	NO
1.	Code 1 for page number one.	1	1
2.	Subject number:___ ___ ___	1	2-4
3.	Age:___ ___ ___	1	5-7
4.	Years of residence in Snowbird:___ ___ ___	1	8-10
5.	Number living in home, including self:___ ___	1	11-12
6.	Occupation:_____ ___ ___	1	13-14
7.	Occupation of spouse/head of household:_____ _____ ___ ___	1	15-16
8.	Degree of Indian inheritance:_____ 0- 0 1- .01-.25 2- .26-.50 3- .51-.75 4- .76-1.00	1	17
9.	Number of people in immediate family, including self, who have (or had, if dead) diabetes (grandparents, parents, siblings, spouse, children, grandchildren):___ ___	1	18-19
10.	Does subject have diabetes which has been diagnosed by a health care provider? 0- Yes 1- No	1	20
11.	How many years since diabetes was first diagnosed by a health care provider?:___ ___	1	21-22
12.	Subject's perception of factors which cause diabetes: 0- overweight 1- eating too much food- general 2- eating too much food- specific food or type 3- too little exercise 4- heredity 5- old age 6- spiritual or moral factors 7- other illness or disease 8- other_____ 9- do not know	1	23-29
13.	Which factor stated above is most important:_____	1	30
14.	Subject's perception of factors which help prevent diabetes: 0- lose weight or stay slim 1- eat less food- general 2- eat less- specific food or type 3- exercise more 4- spiritual or moral factors 5- herbal or folk medicine 6- modern medicine 7- other_____ 8- do not know 9- cannot be prevented	1	31-37
15.	Which factor stated above is most important:_____	1	38

	PG	NO
16. Subject's perception of best treatment for diabetes: 0- lose weight 1- eat less food- general 2- eat less- specific food or type 3- exercise more 4- insulin or hypoglycemic agents 5- herbal or folk medicine 6- spiritual or moral factors 7- other_____ 8- do not know 9- cannot be treated	1	39-45
17. Which factor stated above is most important:_____	1	46
18. Where is most of food for home bought: 0- large supermarket 1- small grocery store 2- "quick" market 3- other_____	1	47
19. Does family procure food by:		
Raising a garden 0- Yes 1- No	1	48
Raising fruit or nuts 0- Yes 1- No	1	49
Raising farm animals 0- Yes 1- No	1	50
Fishing 0- Yes 1- No	1	51
Hunting 0- Yes 1- No	1	52
Gathering wild foods 0- Yes 1- No	1	53
Keeping bees 0- Yes 1- No	1	54
20. Home food preserved by: 0- canning 1- freezing 2- jelly, preserves 3- pickling 4- salting 5- smoking 6- drying 7- other_____ 8- food not preserved	1	55-62
21. Amounts of the following nutrients taken as supplements on the previous day:		
Calcium ___ ___ ___mg	2	
Iron ___ ___.___mg	2	
Vitamin A ___ ___ ___ ___ ___IU	2	
Thiamin ___.___ ___mg	2	
Riboflavin ___.___ ___mg	2	
Niacin ___ ___.___mg	2	
Ascorbic Acid ___ ___ ___ ___mg	2	

22. Previous day's food intake:

Time Eaten	Amount	Food	Original Source

Source:
0- grocery store
1- other store
2- vending machine
3- restaurant
4- garden
5- fruit trees
6- farm animals
7- fishing
8- hunting
9- gathering

23. How often are the following foods, when in season, eaten by someone who lives in the home:
0- everyday
1- at least every other day
2- at least once per week
3- at least two or three times per month
4- at least once per month
5- less than monthly, but several times per year
6- at least once per year
7- seldom or never prepared or served

Food Item	Frequency		PG	NO
Milk, to drink			1	63-64
Milk products- ice cream, cheese, yogurt			1	65-66
Butter, margarine, fatback, other fats and oils			1	67-68
Eggs			1	69-70
Beef, veal			1	71-72
Pork, fresh or cured			1	73-74
Bacon or sausage			1	75-76
Chicken or turkey			1	77-78
Meat from wild animals, for example birds, deer, bear, rabbit, squirrel			1	79-80
Fish or seafood			1	81-82
Liver or organ meats			1	83-84
Dried beans or peas			1	85-86
White or whole grain bread			1	87-88
Biscuits			1	89-90
Cornbread, beanbread, chestnutbread			1	91-92
Cereal			1	93-94
Rice, macaroni, noodles, spaghetti			1	95-96
White potatoes			1	97-98
Dark green, leafy vegetables			1	99-100
Yellow vegetables			1	101-102
Other vegetables, for example tomatoes, corn, peas, cabbage, beans, beets			1	103-104
Citrus fruits and juices			1	105-106
Other fruits and fruit juices			1	107-108
Sweets and desserts			1	109-110
Diet soda pop			1	111-112
Regular soda pop			1	113-114
Candy, honey, jam, jelly			1	115-116
Coffee			1	117-118
Tea			1	119-120
Potato chips, corn chips, salty snack foods			1	121-122

Code from above list

Code "0" if usual, "1" if eaten on special occassions only

24. How often are the following traditional foods, when in season, eaten by someone who lives in the home:
0- everyday
1- at least every other day
2- at least once per week
3- at least two or three times per month
4- at least once per month
5- less than monthly, but several times per year
6- at least once per year
7- seldom or never prepared or served

Food Item	Frequency		PG	NO
Boiled corn			1	123-124
Hominy			1	125-126
Beanbread			1	127-128
Chestnutbread			1	129-130
Pinto beans			1	131-132
Lye dumplings			1	133-134
Summer squash			1	135-136
Winter squash			1	137-138
Pumpkin			1	139-140
Strawberries			1	141-142
Raspberries			1	143-144
Blackberries			1	145-146
Ramps			1	147-148
Creases			1	149-150
Sochan			1	151-152
Other wild greens			1	153-154
Hickory nuts			1	155-156
Walnuts			1	157-158
Trout			1	159-160
Other fish			1	161-162
Wild birds			1	163-164
Bear			1	165-166
Deer			1	167-168
Squirrel			1	169-170
Rabbit			1	171-172

Code from above list

Code "0" if usual, "1" if eaten on a special occassion only

25. Selection from body size drawings:

	Picture No.					Do Not Know		
Most attractive	1	2	3	4	5	6	1	173
Healthiest	1	2	3	4	5	6	1	174
Most likely to get diabetes	1	2	3	4	5	6	1	175
Which would you like to look like	1	2	3	4	5	6	1	176
Which do you look like now	1	2	3	4	5	6	1	177

	PG	NO
26. Think of self as: 0- underweight 1- about average weight 2- overweight	1	178
27. Satisfaction with body weight: 1- satisfied 2- dissatisfied	1	179
28. If dissatisfied, desired body weight: ___ ___ ___ pounds	1	180-182
29. Primary reason(s) for wanting to change weight: 0- Appearance makes self conscious 1- Significant others are dissatisfied with appearance 2- To improve "energy" or "feeling tired" 3- To improve health- recommended by health professional 4- Self desire to improve health 5- Body size interferes with buying stylish clothes or clothes that fit 6- Others tease or criticize present body size 7- Body size is physically uncomfortable 8- Other_____	1	183-185
30. Which factor stated above is most important:_____	1	186
31. Present approaches to change weight: 0- None 1- Diet- recommended by health professional 2- Diet- self prescribed 3- Fasting 4- Drugs 5- Exercise 6- Psychological treatment 7- Other_____	1	187-189
32. Past approaches to change weight: 0- None 1- Diet- recommended by health professional 2- Diet- self prescribed 3- Fasting 4- Drugs 5- Exercise 6- Psychological treatment 7- Other_____	1	190-194
33. Anthropometric measurements: Height: ___ ___ ___ ___mm	1	195-198
___ ___in.	1	199-200
Weight: ___ ___ ___.___kg	1	201-204
___ ___ ___.___lbs.	1	205-208
Triceps skinfold: ___ ___.___mm	1	209-211
Code from information obtained: Wt/Ht for Age Percentile: (see coding instr. sheet)_____	1	212
Body Mass Index ___ ___	1	213-214
Took supplements on previous day: 0- Yes 1- No	1	215
Number of meals on previous day: ___ ___	1	216-217
Number of snacks on previous day: ___ ___	1	218-219
Weight Percentile: ___	1	220
Height Percentile: ___	1	221

APPENDIX C

DEMOGRAPHIC CHARACTERISTICS OF WOMEN IN CHARGE OF OBTAINING AND PREPARING FOOD IN EACH HOUSEHOLD

Table 37. Demographic Characteristics of the 71 Women in Charge of Household Food Procurement and Preparation.

Characteristic	Frequency	Percent
Age (years)		
18-27	9	12.7
28-37	14	19.7
38-47	18	25.4
48-57	14	19.7
58-67	10	14.1
68-77	4	5.6
78-87	2	2.8
Degree of Indian inheritance		
.00	6	8.5
.01- .25	8	11.3
.26- .50	2	2.8
.51- .75	2	2.8
.76-1.00	53	74.6
Years of residence outside Snowbird		
0	50	70.4
1-10	4	5.6
11-20	11	15.5
>20	6	8.5
Number living in the home		
1- 2	10	14.1
3- 4	22	31.0
5- 6	22	31.0
7- 8	13	18.3
9-10	2	2.8
11-12	2	2.8
Occupation		
Housekeeper (in own home)	41	57.7
Industrial laborer	12	16.9
Clerical worker	8	11.3
Skilled or professional worker	4	5.6
Nonindustrial laborer	3	4.2
Domestic laborer	3	4.2

APPENDIX D

HOUSEHOLD FOOD INTAKE FREQUENCY

Table 38. Percent of Households Consuming Foods from 30 Food Groups.

Food Group	Frequency							
	Every day	At least every other day	At least once per week	At least two to three times per month	At least once per month	At least several times per year	At least once per year	Seldom or never
Milk	83.1	12.7	2.8	1.4	-	-	-	-
Milk products	39.4	23.9	26.8	8.5	-	-	-	1.4
Fats and oils	90.1	5.6	4.2	-	-	-	-	-
Eggs	78.9	12.7	7.0	1.4	-	-	-	-
Beef, veal	2.8	32.4	53.5	8.5	2.8	-	-	-
Pork, fresh or cured	1.4	12.7	52.1	18.3	9.9	-	1.4	4.2
Bacon or sausage	33.8	22.5	25.4	11.3	2.8	1.4	-	2.8
Chicken or turkey	-	16.9	69.0	8.5	4.2	-	1.4	-
Meat from wild animals	-	-	5.6	2.8	11.3	33.8	21.1	25.4
Fish and seafood	-	2.8	36.6	29.6	12.7	18.3	-	-

Table 38 (Cont'd)

Food Group	Frequency							
	Every day	At least every other day	At least once per week	At least two to three times per month	At least once per month	At least several times per year	At least once per year	Seldom or never
Liver and organ meats	-	-	14.0	22.5	18.3	18.3	5.6	21.1
Dried beans and peas	15.5	23.9	39.4	16.9	1.4	1.4	1.4	-
Wheat bread	70.4	16.9	11.3	1.4	-	-	-	-
Biscuits	59.2	12.7	22.5	4.2	1.4	-	-	-
Corn-, bean, and chestnut bread	21.1	16.9	43.7	12.7	2.8	2.8	-	-
Cereal	47.9	28.2	22.5	-	1.4	-	-	-
Rice, pasta	4.2	23.9	49.3	16.9	5.6	-	-	-
White potatoes	25.4	38.0	33.8	1.4	1.4	-	-	-
Dark green, leafy vegetables	25.3	19.7	46.5	4.2	4.2	-	-	-
Yellow vegetables	5.6	15.5	35.2	12.7	21.1	8.5	-	1.4

Table 38 (Cont'd)

Food Group	Frequency							
	Every day	At least every other day	At least once per week	At least two to three times per month	At least once per month	At least several times per year	At least once per year	Seldom or never
Other vegetables	32.4	22.5	35.2	5.6	4.2	-	-	-
Citrus fruits and juices	46.5	26.8	12.7	9.9	-	4.2	-	-
Other fruits and fruit juices	28.2	28.2	26.8	7.0	5.6	2.8	-	1.4
Sweets and desserts	15.5	12.7	40.8	11.3	11.3	4.2	-	4.2
Diet soda pop	14.1	14.1	9.9	-	4.2	5.6	7.0	45.0
Regular soda pop	59.2	18.3	11.3	4.2	1.4	-	-	5.6
Candy, honey, jelly	40.8	12.7	25.4	7.0	4.2	2.8	-	7.0
Coffee	93.0	1.4	4.2	1.4	-	-	-	-
Tea	26.8	21.1	16.9	4.2	15.5	5.6	1.4	8.5
Salty snack foods	14.1	19.7	42.3	11.3	2.8	4.2	-	5.6

Table 39. Percent of Households Consuming Traditional Foods When in Season.

Food Group	Frequency							
	Every day	At least every other day	At least once per week	At least two to three times per month	At least once per month	At least several times per year	At least once per year	Seldom or never
Corn	22.5	38.0	29.5	7.0	1.4	-	1.4	-
Pinto beans	12.7	21.1	36.6	21.1	5.6	1.4	-	1.4
Summer squash	15.5	32.4	31.0	4.2	1.4	4.2	4.2	7.0
Winter squash	-	1.4	1.4	1.4	4.2	16.9	8.5	66.2
Pumpkin	-	-	1.4	1.4	1.4	67.6	12.7	15.5
Strawberries	19.7	18.3	21.1	14.1	7.0	8.5	8.5	2.8
Raspberries	7.0	5.6	8.5	1.4	-	2.8	7.0	67.6
Blackberries	11.3	5.6	22.5	14.1	15.5	21.1	5.6	4.2
Hickory nuts	-	-	-	2.8	-	5.6	7.0	84.5
Black walnuts	1.4	-	2.8	7.0	1.4	31.0	18.3	38.0

Table 39 (Cont'd)

Food Group	Frequency							
	Every day	At least every other day	At least once per week	At least two to three times per month	At least once per month	At least several times per year	At least once per year	Seldom or never
Trout	-	-	11.3	15.5	16.9	40.8	5.6	9.9
Other fresh water fish	-	-	18.3	8.5	12.7	29.6	7.0	23.9
Hominy	2.8	2.8	8.5	19.7	22.5	22.5	11.3	9.9
Ramps	2.8	4.2	21.1	5.6	2.8	12.7	23.9	26.8
Creases	1.4	4.2	15.5	12.7	1.4	22.5	15.5	26.8
Wild birds	-	-	-	-	-	2.8	9.9	87.3
Deer	-	-	-	-	1.4	11.3	18.3	69.0
Squirrel	-	2.8	5.6	8.5	5.6	15.5	16.9	45.1
Rabbit	-	-	2.8	1.4	2.8	11.3	14.1	67.6
Bean bread	-	-	5.6	14.1	16.9	39.4	9.9	14.1

Table 39 (Cont'd)

Food Group	Frequency							
	Every day	At least every other day	At least once per week	At least two to three times per month	At least once per month	At least several times per year	At least once per year	Seldom or never
Chestnut bread	-	1.4	5.6	-	1.4	32.4	33.8	25.4
Sochan	1.4	7.0	15.5	16.9	2.8	23.9	8.5	23.9
Other wild greens	2.8	2.8	7.0	4.2	4.2	11.3	23.9	43.7
Bear	-	-	-	-	1.4	2.8	14.1	81.7

Table 40. Categories of Food Identified in Certain Households as Eaten Only on Special Occasions.

Food Category	Number of Households	Percentage of Households
Sweets	4	5.6
Meat from wild animals	3	4.2
Candy	2	2.8
Cornbread	1	1.4
Tea	1	1.4
Snack foods	1	1.4

Table 41. Traditional Foods Identified in Certain Households as Eaten Only on Special Occasions.

Traditional Food	Number of Households	Percentage of Households
Pumpkin	42	59.2
Chestnut bread	19	26.8
Bean bread	18	25.4
Hominy	5	7.0
Black walnuts	4	5.6
Deer	3	4.2
Bear	2	2.8
Hickory nuts	2	2.8
Winter squash	1	1.4
Sochan	1	1.4
Trout	1	1.4

APPENDIX E

INDIVIDUAL FOOD INTAKE FREQUENCY AND PATTERNING

Table 42. Foods Eaten by Subjects on Day Prior to Interview.

Food	Number of Servings Reported	Mode Amount
Dairy products		
Whole milk, to drink	42	1 cup
Whole milk, in coffee	34	1 tablespoon
Cheese	13	1 ounce
Other milk, to drink	10	1 cup
Ice cream	6	1 cup
Pudding	5	1/2 cup
Other	4	-
Eggs		
Fried or scrambled	54	1 egg
Hard boiled	18	2 eggs
Fats, oils, related products		
Margarine	26	1 teaspoon
Mayonnaise	26	1 teaspoon
Vegetable oil, for seasoning	14	1 teaspoon
Salad dressing	10	1 tablespoon
Vegetable shortening, for seasoning	10	1 teaspoon
Lard or fatback, for seasoning	9	1 teaspoon
Butter	3	1 teaspoon
Meats		
Luncheon meats and sausages	60	1 and 2 ounces
Beef	42	3 and 4 ounces
Poultry	34	3 ounces
Pork	18	3 ounces
Fish and shellfish	13	2 and 4 ounces
Bacon	13	2 slices
Fruits and fruit juices		
Orange juice	13	1/2 cup
Other fruit juices	8	1/2 and 1 cup
Bananas	7	1/4 and 1 whole
Apples	5	1 whole
Canned applesauce	5	1/2 cup
Other canned fruit	3	1/2 cup

Table 42 (Cont'd)

Food	Number of Servings Reported	Mode Amount
Grapefruit	3	1 whole
Lemonade	3	1 cup
Other	3	-
Grain products		
White bread	75	2 slices
Biscuits	69	1 and 2 whole
Rolls	29	1 whole
Cake, cookies, pie	27	-
Cornbread	22	1 and 2 pieces
Pasta and rice	15	1/2 cup
Oatmeal	11	1/2 cup
Dry breakfast cereals	10	1 cup
Crackers	9	4 crackers
Grits	8	1/2 cup
Salty snack foods	6	-
Pancakes	5	1 cake
Bean bread	4	1/2 piece
Legumes, nuts, and related products		
Dried beans and peas	34	1/2 cup
Peanut butter	5	1 and 2 tablespoons
Nuts	2	2 tablespoons
Sugars and sweets		
Sugar	39	1 teaspoon
Candy	10	-
Jelly	9	1 tablespoon
Syrup	3	2 tablespoons
Vegetables		
Potatoes	80	1/2 and 1 cup
Tomatoes	25	1/3 cup
Green beans	18	1/2 cup
Cabbage	17	1/2 cup
Lettuce	16	1 cup
Greens	13	1/2 cup
Corn	11	1/2 cup
Ramps	10	1/3 cup
Miscellaneous yellow vegetables	8	-

Table 42 (Cont'd)

Food	Number of Servings Reported	Mode Amount
Other	8	-
Peas	7	1/4 cup
Miscellaneous items		
Coffee	123	1 cup
Regular soft drinks	73	8 ounces
Kool-aid	24	10 ounces
Tea	19	10 ounces
Gravy	18	2 tablespoons
Other	6	-
Diet soft drinks	5	12 ounces

Table 43. Meal and Snack Patterns of the Research Population.

Number of Feedings	Frequency	Percent
Meals		
1	15	14.3
2	48	45.7
3	42	40.0
Snacks		
0	28	26.7
1	51	48.6
2	21	20.0
3	5	4.8
Meals plus snacks		
1	2	1.9
2	19	18.1
3	42	40.0
4	35	33.3
5	3	2.9
6	4	3.8

APPENDIX F

BODY PROFILE DRAWINGS

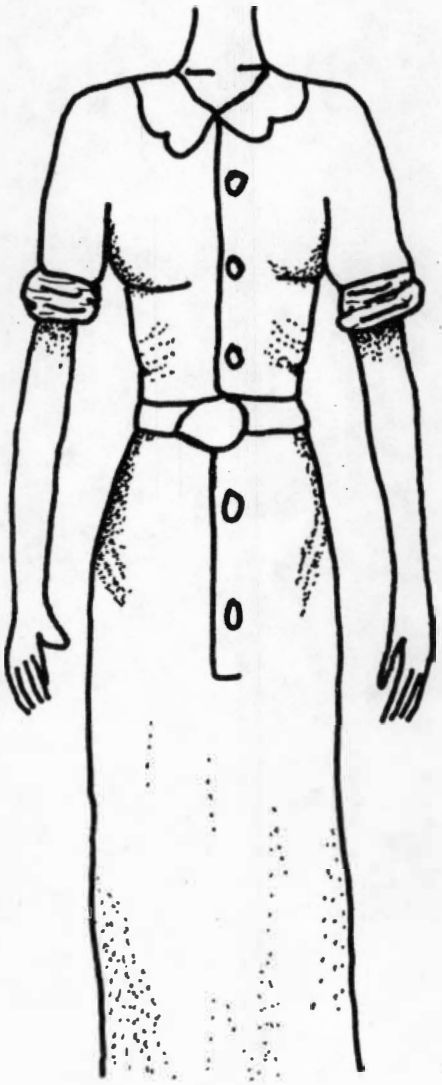

Figure 5. Drawings Used for Body Profile Test.

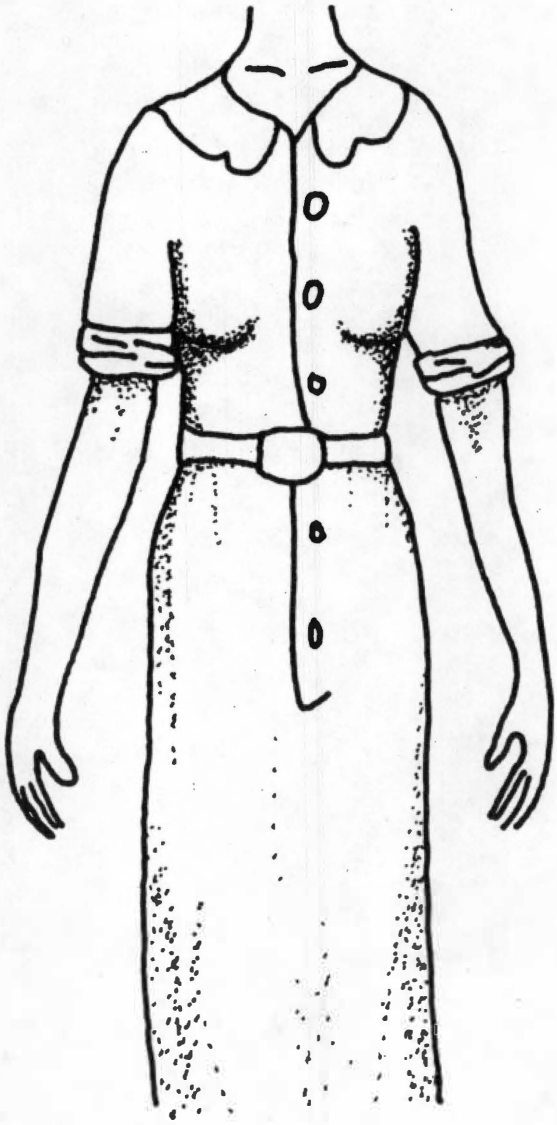

Figure 5 (Cont'd)

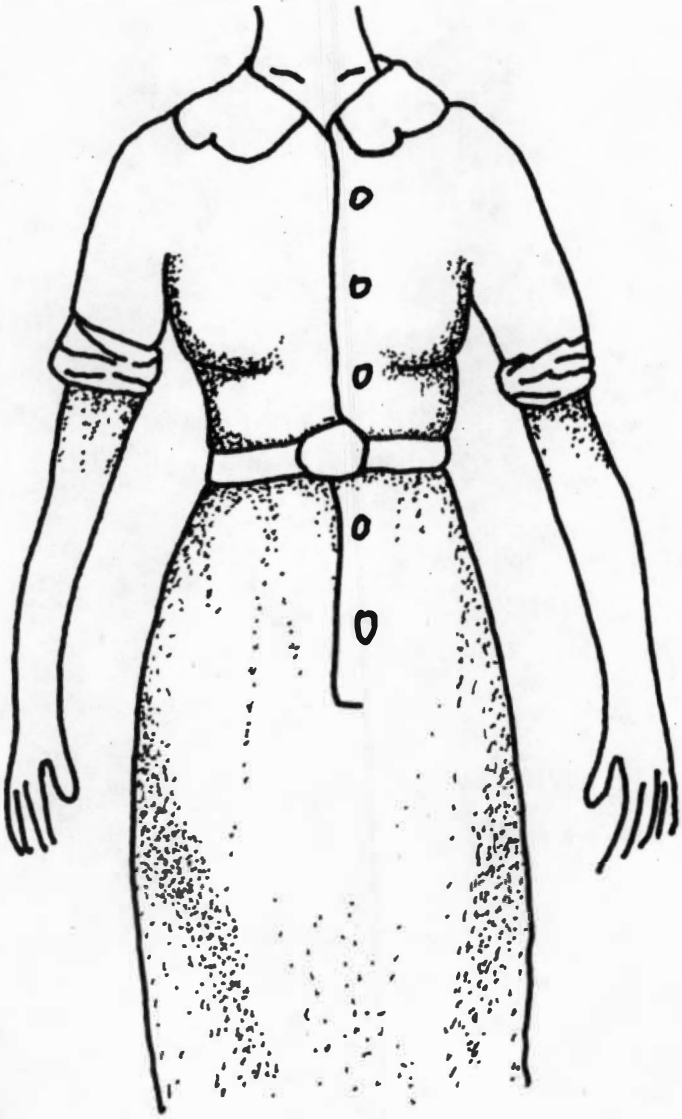

Figure 5 (Cont'd)

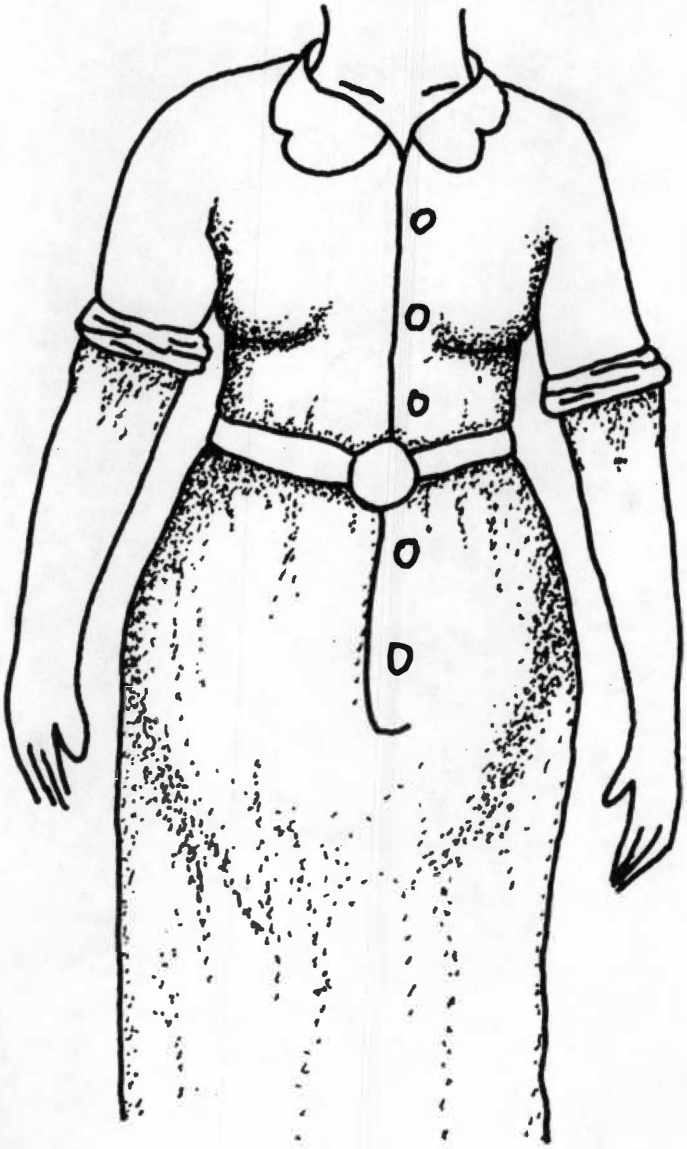

Figure 5 (Cont'd)

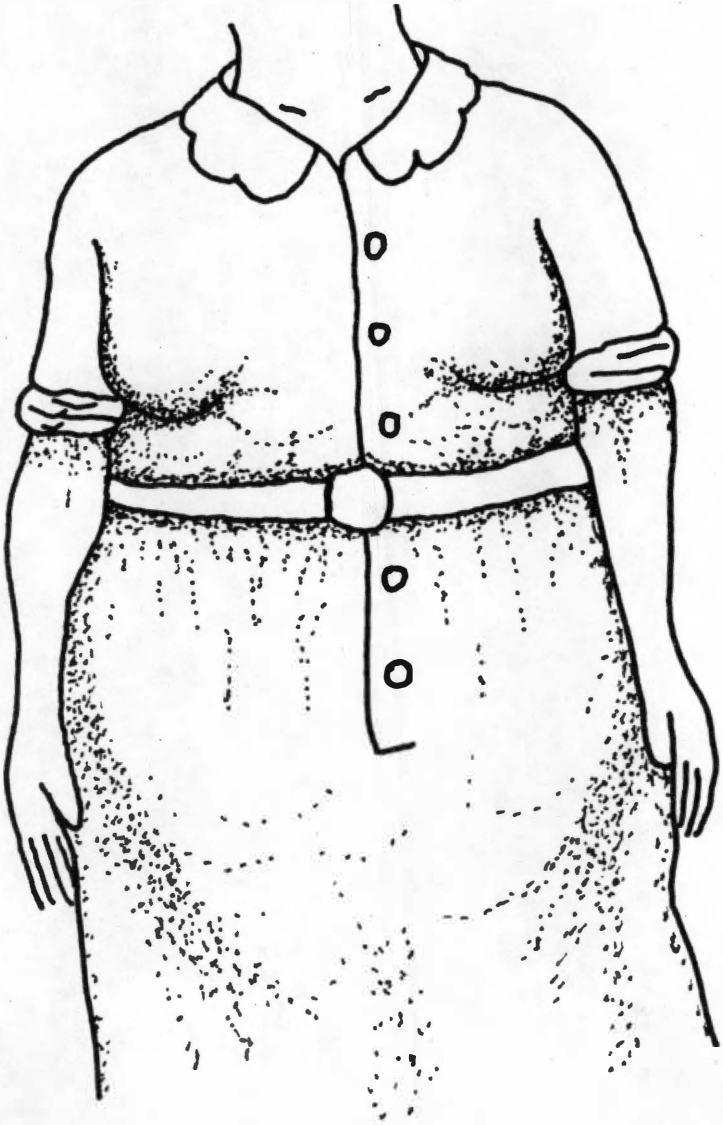

Figure 5 (Cont'd)

APPENDIX G

DIABETES-RELATED KNOWLEDGE AND ATTITUDES DATA

Table 44. Factors Cited by 66 Subjects as the Most Important Cause of Diabetes.

Cause	Frequency	Percent of 66 Subjects Citing Cause
Eating too much of specific foods or types of food	40	60.6
Eating too much food, in general	10	15.2
Heredity	6	9.1
Being overweight	4	6.1
Other	4	6.1
Exercising too little	2	3.0

Table 45. Factors Cited by 64 Subjects as the Most Important for Preventing Diabetes.

Factor	Frequency	Percent of 64 Subjects Citing Factor
Eating less of specific foods or types of food	27	42.2
Losing weight or staying slim	18	28.1
Eating less food, in general	9	14.1
Eating more of specific foods or types of food	4	6.2
Getting regular medical checkups	4	6.2
Exercising more	2	3.1

Table 46. Factors Cited by 92 Subjects as the Most Important Treatment for Diabetes.

Factor	Frequency	Percent 92 Subjects Citing Factor
Following a diabetic diet	60	65.2
Eating less of specific foods or types of food	14	15.2
Losing weight	9	9.8
Taking insulin or hypoglycemic agents	5	5.4
Exercising more	2	2.2
Taking native herbal medicine	2	2.2

Table 47. The Most Important Reason for Desiring Weight Change Listed by 72 Subjects.

Reason	Frequency	Percent of 72 Subjects Citing Reason
To improve vigor	23	31.9
Body size interferes with buying stylish clothes or clothes that fit	15	20.8
Appearance is dissatisfactory to self or others	15	20.8
Recommended by a health professional to improve health	10	13.9
Self desire to improve health	9	12.5

VITA

Rhonda Dale Terry was born in Union County, North Carolina, in 1953. She attended public schools in Chesterfield County, South Carolina, and was graduated from Pageland High School in 1971. In June 1975, she was graduated magna cum laude from the University of North Carolina at Greensboro. Her major was Home Economics Education with an emphasis in Communication Arts. She received a Master of Science degree in Nutrition from The University of Tennessee, Knoxville, in March 1977.

Dale's professional career has included positions as Nutritionist, Midwest Research Institute, Kansas City, Missouri; Head of Nutrition Programs, Diabetes Research and Training Center, Vanderbilt University, Nashville, Tennessee; Part-time Faculty, Carson-Newman College, Jefferson City, Tennessee; and Nutritionist, Cherokee Health Care Delivery Systems, Cherokee, North Carolina.

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