CHAPTER I

INTRODUCTION

Statement of the Problem

Osteoporosis is an age-related health problem characterized by a decrease in bone mineral density (BMD) leading to bone frailty and increased fracture risk in the elderly population. Postmenopausal osteoporosis affects women 10-15 years after the onset of menopause and senile osteoporosis usually affects both men and women over the age of 70 years (Wardlaw, 1993).

In 1995, U.S. Bureau of the Census reports indicated that almost 20 million women in the United States were aged 65 and older. This population is expected to increase dramatically as the baby boomer generation, those born between 1946 and 1964, matures and as life expectancy continues to increase. By the year 2025, the U.S. Bureau of the Census estimates an increase to over 33.5 million women over the age of 65. Osteoporosis related health care costs reached $10 billion in 1991 (Avioli, 1991) and will increase dramatically as the number of elderly adults increases. In addition to the growing national expense, osteoporosis related fractures can lead to fear, loss of independence, and depression in the elderly (Osteoporosis-Consensus Conference, 1984).

Sufficient intake of calcium is necessary to offset increased bone loss in the elderly. Calcium enhances bone building and decreases parathyroid hormone secretion which is associated with increases in bone turnover. The Recommended Dietary Allowance (RDA) for calcium intake in women over 24 is 800 mg/day but elderly individuals are encouraged to consume at least 1000 mg/day of calcium. The National Academy of Sciences (1997) recommended that adults 51 years and older consume 1,200 mg of calcium for optimal health. The National Institute of Health (NIH, 1994) stresses the importance of meeting the RDA at all life stages and stated that individuals with a regular intake of dairy food can meet the minimum requirements.

Unfortunately, national research indicates that women are not consuming sufficient amounts of dairy products or calcium. The Third National Health and Nutrition Evaluation Survey (NHANES III) is an important source of dietary information in the United States. Preliminary analysis of data show that both mean and median calcium intakes were below the RDA for almost all female race and ethnic groups over the age of 12 years (Alaimo et al., 1984). The 1977-1978 National Food Consumption Survey (NFCS) reports indicated that the RDA of 800 mg was not met by any group of adult women (USDA, 1984). The Ross Laboratories Elderly Dietary Survey (RLEDS), representative of the national free-living elderly population, indicated that over 16% of women aged 65-74 years and almost 12% of women over 74 years old ate less than one item from the dairy group each day (Ryan et al., 1990).

In light of the consistently low intakes of calcium and dairy products and the increasing rates of osteoporosis, nutrition education programs aimed at increasing dairy food consumption and subsequently increasing calcium intake could be an essential component in the prevention of osteoporosis. Dawson-Hughes et al. (1990) reported that healthy postmenopausal women can significantly reduce bone loss by increasing calcium intake from 400 to 800 mg/day. Wardlaw (1993) reported that calcium intakes of 1,000 mg or more appear to retard and sometimes cease bone loss later in the life cycle.

Purpose Statement

The purpose of this research was to explore the beliefs and motivations of elderly women relating to dairy food consumption in order to make recommendations for the promotion and development of more suitable dairy products and more effective education programs.

Research Questions

The target population was independently living, Caucasian women 65 years of age or older living in retirement communities in Virginia Beach, Charlottesville and Blacksburg, Virginia. Pertinent research questions were:

1) What are older women's attitudes towards different dairy foods?
2) What do older women perceive as barriers to consumption of dairy foods?
3) Who/what influences women's intake of dairy foods?
4) What product improvements would women like to see?

Answers to these questions will aid nutritionists and dietitians in developing effective education programs and help manufacturers develop dairy products more acceptable to the elderly. Focus groups are a qualitative research technique that can be used to help answer these questions.

The use of focus groups is a qualitative data collection technique that employs carefully planned discussions to gather information on perceptions, feelings, opinions, and thoughts on a topic without coming to consensus (Krueger, 1988). Focus groups are useful in exploring opinions and attitudes in a permissive non-threatening atmosphere where participants can respond to comments and ideas of fellow group members (Krueger, 1988). The qualitative data generated can be used alone to generate behavioral theories or used to assist in the design of quantitative research tools such as a questionnaire (Stewart et al., 1994). Focus group methods have been used successfully in exploring both food intake and health promotion issues (Brug et al., 1995; Treiman et al., 1996). Brug et al. (1995) utilized this technique to assess the psychosocial determinants of fruit and vegetable consumption. Focus groups were conducted with the target population in this study to identify attitudes and perceptions associated with dairy food. Based on themes identified, recommendations were made for nutrition educators and the dairy industry for the promotion and development of dairy foods.

CHAPTER II

LITERATURE REVIEW

Demographics of Women Aged 65 Years and Older

In 1995, there were almost 20 million women aged 65 and older in the United States (U.S. Bureau of the Census, 1995). Approximately 10.5 million women were aged 65-74, while 6.8 million were aged 75-84 years, and almost 2.6 million were 85 years or older. This number is increasing rapidly. By the year 2025, the U.S. Bureau of the Census estimates an increase to over 33.5 million women over 65 years of age. This breaks down to 18.6 million aged 65-74 years, 7.8 million between 75 and 84 years and almost 3.6 million women aged 85 or older. By the year 2050, the number of women aged 65 -74 is expected to remain constant while the number of women aged 75-84 is expected to increase to over 14 million, and the number of women 85 and older is expected to increase to almost 12 million. This means the number of women aged 65 and older will more than double in the next 60 years to reach a total of over 44 million older women in the United States. In Virginia, there were approximately 742,000 adults aged 65 or older in 1995, over half of these were women (U.S. Bureau of the Census, 1995). This number is expected to increase to 967,000 adults over age 65 by the year 2010 (U.S. Bureau of the Census, 1995).

Income is one of the most important determinants of inadequate nutrient intake in the elderly (Briley, 1989). In 1993, median income of householders 65 and older was $17,751 compared to persons aged 25-34 years who had a median income of $31,281 and persons aged 45-54 years who had a median income of $46,207 (U.S. Bureau of the Census, 1995). Over 65% of adults aged 65 and older earned less that $25,000 in 1993 while only 20.9% of adults over 65 earned over $35,000 (U.S. Bureau of the Census, 1995).

Household composition can also be a determinant of food choices. Davis et al. (1985) reported that elderly individuals were more likely to have a balanced diet if they lived with their spouse. The U.S. Bureau of the Census (1995) reports that among the noninstitutionalized population aged 65 and older in 1994, 40.2% of women were living alone. Forty-six percent of women were widowed while another 12.1 % were single, divorced or separated. In this same year, only 9.4% of women had finished four years of college while 37.6% only finished high school. Thirty-seven percent of women aged 65 or older did not finish high school and 21.5% attended school for eight years or less.

Osteoporosis

Osteoporosis is an age-related problem characterized by a decrease in bone mineral density (BMD) leading to bone frailty and increased fracture risk. A total of 1.5 million osteoporosis-related fractures occur each year and by the age of 90 years, 32% of women will have experienced a hip fracture (Wardlaw, 1993). Fifty to 75% of hip fracture patients will never regain their previous level of day-to-day functioning (Avioli, 1991). The 3.8 billion dollar osteoporosis related health care cost estimated in 1984 (Osteoporosis-Consensus Conference, 1984) reached 10 billion in 1991 (Avioli, 1991) and will continue to increase as the number of elderly individuals increases in America. In addition to the growing national expense, these fractures lead to loss of independence, fear, and depression in the elderly (Osteoporosis-Consensus Conference, 1984).

Postmenopausal and senile osteoporosis are the two primary types of osteoporosis. Postmenopausal osteoporosis (Type I) occurs in the 10-15 year period following menopause and is linked with estrogen decreases. This type of osteoporosis is characterized by increased resorption of trabecular bone leading to up to three times the rate of normal bone loss (Wardlaw, 1993). Effects are most often seen in bones consisting predominantly of trabecular bone such as the lumbar vertebrae and the distal radius. Senile osteoporosis (Type II) is the result of a gradual loss of both trabecular and cortical bone during aging. Senile osteoporosis affects both men and women over 70, but occurs in a 2:1 ratio of women to men (Wardlaw, 1993). Age related factors such as the decrease in intestinal calcium absorption observed in adults over 65 and a decreased capacity of osteoblasts or bone building cells result in a bone imbalance. A net loss of bone occurs as bone continues to be resorbed into the body but is no longer fully replaced. An inadequate calcium intake and lack of exercise further contribute to this bone imbalance.

Sufficient intake of calcium is necessary to offset increased bone loss in the elderly. As the primary component of bone, calcium enhances bone building and decreases parathyroid hormone secretion which is associated with increases in bone turnover. Dawson-Hughes et al. (1990) performed a double-blind, placebo controlled, randomized trial to determine the effects of calcium intake on bone losses in healthy postmenopausal women. Half of the 301 women included in the study had regular calcium intakes that were lower than 400 mg per day and the other half consumed 400-650 mg per day. Women were given either a placebo, 500 mg calcium carbonate, or 500 mg calcium citrate malate every day for two years. Among women receiving the placebo who had undergone menopause six or more years prior to the study, greater bone loss was seen in the women with the lower daily intake of calcium. In the lower calcium intake group, calcium citrate malate prevented bone loss during the two years of the study at the femoral neck, radius and spine. Furthermore, the calcium citrate malate maintained bone density in the femoral neck and the radius. Dawson-Hughes et al.(1990) concluded that healthy postmenopausal women can significantly reduce bone loss by increasing calcium intake from 400 to 800 mg/day.

In a study reported by Riggs and Melton (1992), calcium supplementation at doses of 1000 mg or more per day decreased postmenopausal bone loss by as much as 50% in the midradius and the metacarpals, non-vertebral sites. The effects were most pronounced when baseline calcium intakes were low. Wardlaw (1993) reported that calcium supplementation of 1,000 mg or more appears to retard and in some people cease bone loss later in the life cycle. Furthermore, an intake of 500 mg/day was reported to be an inadequate amount of calcium for bone maintenance. Wardlaw (1993) recommended that American women consuming less than 500 mg of calcium daily increase calcium intake by foods or supplementation in efforts to treat osteoporosis.

Effects of Calcium on Hypertension and Colon Cancer Risk

While the link between calcium intake and osteoporosis has been repeatedly proven, some research suggests that increased calcium intake may decrease hypertension and risk of colon cancer. Hypertension is a widespread problem among older Americans. In non-institutionalized, civilian populations between 1988-1991, hypertension was present in 54% of adults aged 60-69 and 64% of adults 70-79 (Miller et al., 1995). U.S. Department of Health and Human Services' Healthy People 2000 calls for a reduction in high blood pressure and reports that adults with high blood pressure are 3-4 times more likely to develop Coronary Heart Disease and 7 times more likely to have a stroke. Miller et al. (1995) reported that experimental animal studies, such as conducted by Oparil et al. (1991), found that the

beneficial effects of calcium intake are only shown when a normal to high intake of sodium is present. This indicates that calcium's beneficial effects may only be seen in reducing sodium induced hypertension. Miller et al. (1995) further reported that epidemiological human studies, such as conducted by McCarron et al. (1991), support an inverse relationship between calcium intake and hypertension with the strongest associations found between low calcium intake and high blood pressure. This association, however, does not imply that a low calcium intake caused the high blood pressure as other health factors and dietary practices may be present. Pooled analysis from randomized controlled trials have found a small decrease in systolic blood pressure (Osteoporosis Consensus Conference, 1994). Researchers speculate that only certain subgroups of people respond to calcium with decreases in hypertension and suggest additional research to identify which populations may benefit (Consensus Conference, 1994). Lyle et al. (1988), reported that older men with high blood pressure and low calcium intake are most likely to respond.

High calcium intake has also been associated with a lower risk of developing colon cancer (Osteoporosis Consensus Conference, 1994). However, NIH reported that findings are inconsistent and data are insufficient to establish the role of calcium in colon cancer (Osteoporosis Consensus Conference, 1994). Miller et al. (1995) reported that epidemiological, experimental animal, in vitro, and clinical studies do support the hypothesis that increases in calcium and vitamin D reduce hyperproliferation of cells in the colon. Based on these studies, Miller et al. (1995) suggested that increasing intake of calcium and vitamin D rich dairy foods would be a prudent measure to reduce colon cancer risk. Firm conclusions have yet to be reached about the effects of calcium in lowering blood pressure and decreasing colon cancer risk. However, evidence does represent potential benefits of a diet high in calcium containing dairy foods.

Calcium Intake

The RDA for calcium intake in women over 24 is 800 mg/day but elderly individuals are encouraged to consume at least 1000 mg/day of calcium. In older women, it is recommended that estrogen replacement therapy be taken in conjunction with calcium intakes of 1,000 mg/day (NIH, 1994). While oral calcium intake alone does not prevent postmenopausal bone loss caused by estrogen deficiency, low calcium intake can exacerbate the effects of this hormone deficiency (NIH, 1994). Women who are sedentary, are not taking estrogen after menopause or are at additional risk of developing osteoporosis are encouraged to consume 1,500 mg/day (NIH, 1994). The National Academy of Sciences (1997) recommended that adults 51 years and older consume 1,200 mg of calcium for optimal health. This newly released Dietary Reference Intake (DRI) value was derived after a thorough review of scientific literature and is believed to be sufficient to meet the nutrient requirements of nearly all individuals in this age category (National Academy of Sciences, 1997). Nutritional surveys and smaller intake studies demonstrate that women are not consuming even the RDA for calcium, so the higher recommendations discussed above are certainly not being met.

The Third National Health and Nutrition Examination Survey (NHANES III) was conducted by the National Center for Health Statistics (NCHS) and Centers for Disease Control and Prevention (CDC). NHANES III covered two consecutive three year periods between 1988 and 1994 and is an important source of dietary information for the U.S. during these periods. A micronutrient analysis of Phase I (1988-1991) data shows that both mean and median calcium intakes were lower than the current RDA for almost all female race and ethnic groups over the age of 12 years (Alaimo et al., 1984). Females aged 60-69 years had a mean

intake of 711 mg/day; women aged 70-79 had a mean intake of 636 mg; and women 80 years of older had a mean intake of 626 mg/day (Alaimo et al, 1984).

Results from the 1977-1978 National Food Consumption Survey (NFCS) indicated that the RDA of 800 mg was not met by any group of adult women (1984). Similar results were obtained ten years later in the 1987-1988 NFCS (Murphy et al., 1992). Women aged 60-69 reportedly met only 70-79% of the RDA for calcium (Peterkin et al., 1987). A comparison of the elderly intake data from the 1977-1988 and the 1987-1988 NFCS shows an increase in consumption of lowfat milk and milk products and a decrease in consumption of high fat milk and milk products, but the overall intake of total dairy products remained unchanged (Popkin et al., 1992). Popkin et al. (1992) suggested that the elderly population is responding to risk-avoidance suggestions about lowering fat and cholesterol intake while they fail to respond to protective health messages about increased calcium intake.

Aiken et al. (1986) used data from the 1977-78 NFCS to develop a classification scheme that divided individuals aged 65-74 years into groups or clusters based on similar food consumption patterns. Groups were divided by sex due to physiological differences. Women were divided into 8 clusters and nutritional intake was determined for each group. The eight patterns that emerged were moderate eaters in all food groups, high animal fat consumers, high alcohol consumers, high consumers of salty snacks and soups, above average sugar and sweets consumers, high fat milk products consumers, consumers of large amounts of legumes, and light eaters. Cluster analysis of the different food groups helped to identify individuals at risk for low calcium intake. Aiken et al. (1986) found that moderate eaters in all food groups, high animal fat consumers, and high alcohol consumers (~3% of the population) respectively met 73%, 75% , and 74% of the RDA for calcium. The lowest calcium intake, only 33% of the RDA, was found in women who had a high intake of salty snacks and soups, while those women with above average intake of sweets and sugars met 84% of the RDA presumably from ice cream and yogurt consumption. Women characterized by high-fat milk product consumption, such as cheeses, had the highest intake of calcium at 91% of the RDA (Aiken et al., 1986). Women characterized as light eaters still managed to eat 89% of the RDA for calcium while women with a high intake of legumes fell short at only 55% of the RDA. This type of cluster analysis helps to identify groups of women who may be at additional risk for low calcium consumption due to dietary practices and demonstrates again that women are not reaching the current RDA of 800 mg/day.

The Ross Laboratories Elderly Dietary Survey (RLEDS) conducted in 1990 by Ryan et al. was another national survey representative of the free-living elderly population. Nutrient analysis of the diets of 474 elderly persons aged 65 to 98 years was conducted on data from 24 hour dietary recalls. Mean calcium intake for women aged 65-74 years was 626.8 mg/day and decreased to 564.3 for women over 74 years. Forty-seven percent of females aged 65-74 years and 54% of females aged over 74 years were below two-thirds of the RDA for calcium. Over 16% of women aged 65-74 years and almost 12% of women over 74 years old ate less than one item from the dairy group each day. Almost 45% of women took some type of supplement each day, and 40% of these women had less than two-thirds the RDA for calcium from food sources.

Betts and Vivian (1984) assessed the dietary intake of 100 noninstitutionalized persons aged 65 and older including 75 women ages 65-92 years old. Among the group of women, 55% were living alone and 28% were married and living with their spouse. Mean calcium intake of all participants was 629.0 ± 438.1 mg/day. Subjects with no supplemental form of calcium intake had a mean of 571.2 ± 330.6 while subjects taking calcium supplements still did

not meet the RDA with a mean intake of 719.4 $\pm$ 577.3 mg/day. In the group of women the range of calcium intakes was 104.7-3181.0 mg with a mean of 590.7 $\pm$ 447.7 mg and a median of 459.3 mg. Only 14 of the 100 subjects consumed the recommended 2-3 servings of milk and dairy products a day with 56 subjects receiving less than 1 serving from the dairy group daily.

Fischer et al. (1995) compared dairy food consumption patterns in independent living persons in their 60's, 80's and 100's as a part of the Georgia Centenarian Study. Subjects were noninstitutionalized and mentally competent as determined by a mental status examination. Food frequency questionnaires and 24 hour dietary recalls were used to determine usual food and nutrition intakes in 241 elderly adults. Demographics, socioeconomic status and physical health were assessed using the Older American Resources and Services Questionnaire. Health motivated behavior was also assessed by questionnaire.

Fischer et al. (1995) found the mean calcium intake was 759 mg/day with a range of 122 mg/day. Thirty percent of the participants consumed less than one serving of milk each day. Only 20% of the 60 year olds and 30% of the 80 and 100 year olds consumed the recommended 2 servings a day. When intake of specific products were assessed, centenarians were found to consume more whole milk than 60 year olds and less yogurt than 80 year olds. Centenarians also were found to be less likely to engage in health seeking behaviors. Women of all age groups consumed more cottage cheese and yogurt than men. Participants living alone were found to eat more dairy products than those living with others, and Fischer et al. (1995) proposed that ease of preparation may be the contributing factor. Dietary attitudes were found to be a strong contributing factor in food selection. Skim milk and yogurt were consumed most commonly in participants trying to increase calcium intake. Ice cream and whole milk consumption was lowest in those participants who were avoiding high cholesterol foods.

Food Choices in the Elderly

Many factors influence the food choices of the elderly including income, household composition, food preferences, time constraints, education, food attitudes, social factors, general health and physiological changes such as loss of vision, hearing, taste and smell acuity (Briley, 1989). Understanding these factors is essential for nutritionists and dietitians in order to develop better education programs that help to insure proper nutrition. The food industry must be aware of the factors in order to develop suitable products for this rapidly increasing segment of the population. Such products must be palatable, nutritious and otherwise acceptable to elderly individuals (Leveille & Cloutier, 1986).

Food preferences may be affected by cultural factors such as religious beliefs and ethnicity (Briley, 1989). People may choose foods based simply on general habits and customs as well. Educated individuals may be more likely to use food labels and these individuals may have broader food choices due to greater lifestyle influences through travel or reading (Briley, 1989).

Time constraints can play different roles in food choices of the elderly. For some people, food quality may be more important than time saved, but physical limitations such as difficulty standing may make it nearly impossible for an elderly individual to prepare elaborate meals. In this case, time becomes a greater determinant of food choices (Briley, 1989). Similarly, physical changes resulting in decreased mobility may affect the individuals ability to get to the store and purchase food (Bidlack et al., 1986). This could limit intake of fruits, vegetables and dairy foods that need to be purchased on a regular basis to ensure freshness.

Physiological changes associated with eating pleasure such as changes associated with vision, hearing, taste and smell, can play an important role in food choices (Briley, 1989). Taste and smell acuity are known to decrease with age, and some drugs may further contribute to such losses. Kamath (1992) found that taste and smell are among the strongest factors in determining food choices in older adults. Vision losses inhibit the ability of individuals to read food labels, prepare foods, or try new recipes. Dental changes can seriously affect food choices. Dental problems and improper dentures may cause discomfort that influences people to switch to softer food items.

Social factors in general play a role in food intake and choices because eating is often a social event. Davis et al. (1985) reported that nutrient intake and food variety is more balanced in elderly individuals living with a spouse. The single elderly person may choose to eat away from home in order to eat with others. Natlow and Heslin (1986) reported that this type of social contact adds stimulation that is essential for good mental health. The death of a spouse or close friends and related lifestyle changes may lead to loss of social contacts or loss of independence. Such factors may lead to depression and loss of appetite which can dramatically affect food choices (Rowe, 1978).

Food Attitudes and Dairy Food Consumption

Food attitudes play an important role in choosing dairy foods for all people. Dairy food's association with calcium and protein helps to increase consumer acceptance. However, certain dairy foods, such as whole milk, cheeses, butter, and ice creams, are also associated with negative health factors, such as fat, cholesterol and calories, which may have a detrimental effect on consumer acceptance (Light et al., 1992). Light et al. (1992) studied the effects of fat content and label information on risk perception and liking of dairy products. Subjects were students, faculty, and staff of the College of Agriculture, Foods, and Natural Resources at the University of Missouri-Columbia. Consumers first rated their liking of both high and low fat versions of two dairy foods, processed American cheese and vanilla ice cream, with no label information given. This type of cheese product was considered a standard non-luxury item while the ice cream was considered a treat or luxury item that was not consumed regularly. The consumers then rated their liking of the same high and low fat dairy products when label information was given. Hedonic scales were used that ranged from "like extremely" to "dislike extremely". Panelist also completed personality tests and perceived risks tests to determine perceptions of risk associated with consumption of high fat and cholesterol foods. The results indicated that fat level was the most important determinant of liking a product regardless of perceived risk. High fat ice cream was liked more than low fat ice cream regardless of label information. Label information identifying high fat ice cream increased liking of the product. High fat cheese without the information was liked the most, while low fat cheese without information was liked the least. When consumers knew the fat content of the cheese, consumers still preferred the high fat product but they liked it less than before and similarly liked the low-fat products more than before. Light et al. (1992) concluded that information may influence initial purchasing of a product, but liking of the product is determined by sensory attributes. Panelists also indicated that they did not believe food labels, and this decreased their use of this type of information and contributed to their perception of risk even in reduced fat versions.

Higgins et al. (1985) found similar results when they used semantic differential scales to determine attitudes related to the use of milk products by the elderly. Two familiar foods, whole milk and cottage cheese, and two unfamiliar foods, coffee whitener and yogurt, were selected for the study. Individuals in the study were most influenced by sensory appeal of a

product. Emphasis on health aspects of foods was not found to be sufficiently compelling to result in changes in food habits among the elderly. Although elderly participants did have attitudes about health benefits of milk products, these did not influence use of the foods.

Shepherd (1988) studied the beliefs associated with low fat milk consumption in order to better understand the relative importance of different factors influencing food choice and found that nutritional beliefs were the most important factor outweighing sensory attributes. This contrasts with other findings where sensory attributes were more important (Light et al., 1992; Higgins et al., 1985). Shepherd (1987) previously found that the factors that affect food choices such as sensory attributes and psychological, social and cultural influences vary among different types of foods. Females generally had more favorable attitudes towards low fat milk consumption regardless of age or social class (Shepherd, 1988).

Research in the area of consumer attitudes towards dairy foods has been used to develop better advertising campaigns to promote milk products. The objective of the Milk Processor Education Program (MilkPEP) is to increase milk sales by increasing milk consumption so they began a campaign to increase media coverage (Anonymous, 1996). Extensive research was conducted by independent firms, KRC Research and Roper Starch Worldwide, to identify consumer attitudes, particularly in women aged 25-44, that affect milk consumption (Anonymous, 1996). Seven key attitudes were identified that influenced these women not to drink milk (Anonymous, 1996). They were: 1) milk is a fatty food that causes heart disease and obesity, 2) skim and 1% milks lack nutrients present in whole milk, 3) milk is a kid's drink, 4) milk is boring and old fashioned, 5) milk doesn't complement lots of different foods, 6) milk doesn't taste good, and 7) milk is not a convenience food. This information was used as the basis for a $52 million program that included the 1995 "Milk, What a Surprise!" campaign. Follow up research conducted in 1995 included almost 3,000 door-to-door interviews with adults and teens. This campaign was found to improve understanding of milk's nutritional benefits including decreases in the number of consumers who believe milk is necessarily a high fat food and increases in the number of women who feel skim milk is high in calcium (Anonymous, 1996).

Food Choice Models

Since food choices are affected by many interrelating factors, food choice models are sometimes used to represent the relationships between these factors. Most models are not quantitative and do not identify relative importance or exact interactions between factors, but they are useful in cataloging likely influences (Shepherd and Sparks, 1994). Randall and Sanjur (1981) developed a three part food preference model composed of characteristics of the individual, food, and environment. Individual characteristics include factors such as age, sex, education, nutrition knowledge, cooking skills and health attitudes (Randall and Sanjur, 1981). Characteristics of the food include taste, texture, cost, and preparation method while environmental factors encompass season, employment, household size, and degree of urbanization (Randall and Sanjur, 1981). A similar three part model was proposed by Shepherd (1989); the three interrelated factors were food, person, and economic/social. In Shepherd's model, food properties such as physical/chemical properties and nutritional content affect the person's perceptions of sensory attributes. Then combination of these perceived sensory attributes and economic/social factors, such as price and availability affect food attitudes. A third model (Khan, 1981) divides factors into seven categories which interrelate with one another to influence food preference. The seven factors in Khan's model are: 1) personal factors such as familiarity, influence of other persons, and emotional meaning attached to food; 2) biological, physiological, and psychological factors such as age and sex; 3)

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extrinsic factors, such as advertising and seasonal variations; 4) intrinsic factors (of the food), such as appearance, odor, flavor, and texture; 5) cultural, religious and regional factors including geographic regions; 6) educational factors including nutrition education; and 7) socioeconomic factors such as income, food cost and society. In general, it can be seen from the above models, that variables are divided in those related to the food, to the person making the choices and to the external environment (Shepherd and Sparks, 1994.)

Ajzen and Fishbein (1980) proposed a more structured attitude model, called the theory of reasoned action, that can be applied to food choices. In this model, the best predictor of behavior was the intention to perform this behavior, called behavioral intention, which arises from attitude and subjective norms. Subjective norm refers to a person's perceptions that important others desired the performance or nonperformance of specific behaviors. Attitudes were predicted by beliefs about the outcome of such behavior, both good or bad. When this model was applied to food choice issues, the consumer's attitude was found to be more important than perceived social pressure (Shepherd and Sparks, 1994).

Focus groups

Focus groups are a qualitative data collection technique using carefully planned discussions to gather perceptions, feelings, opinions, and thoughts on a topic in a comfortable, permissive environment where participants can respond to comments and ideas of fellow group members (Krueger, 1988). Focus groups have been used extensively in marketing research as a means of listening to the client, customer or user of products, programs or services (Krueger, 1988).

Focus groups usually consist of 6-10 participants and seek homogeneity among these participants in terms of occupation, social class, educational level, age, or family experience (Kreuger, 1988). According to Krueger, if such factors are ignored it will effect willingness to share in group discussion; people may be inhibited and defer to those they feel are better able to respond. An atmosphere that promotes freedom of expression and allows each individual to feel equal and respected as a person will result in more useful information (Basch, 1987). Answering a research question adequately requires more than one focus group. Krueger (1988) recommends conducting focus groups until no new information is gained; typically four sessions are recommended with evaluation made after the third to determine if the fourth group is necessary.

Focus group interviews have several important advantages. One major advantage is the ability to explore and probe issues that may not have been anticipated by the researcher (Krueger, 1988). Questionnaires do not have this type of flexibility. Questionnaire data are limited to the predetermined questions based on anticipated responses. While assessing the relationship of attitudes and the use of milk products in the elderly, Higgins et al. (1985) reported that their use of semantic differential scales was limiting in that it did not allow them to probe the depth of food attitudes. According to Krueger (1988), focus groups place people in natural, real-life situations which have a definite advantage over controlled experimental conditions in many quantitative studies. Krueger mentions that focus groups combine the advantages of direct probing found in interviews with the benefit of viewing interactions found in participant observation methods. Focus groups provide further benefits in that they have high face validity, are easily understood since they are not presented in complicated statistical tables, are speedy and relatively inexpensive (Krueger, 1988). Focus groups can get information from a greater sample of people without enormous time requirements such as would be seen in individual interviews.

While focus groups have several advantages over other methods, this method has limitations. Krueger (1988) pointed out several limitations to the use of focus groups that should be taken into consideration when selecting this method for research. First of all, focus groups are more demanding to assemble than other research methods. Unlike a questionnaire than can be filled out in the convenience of one's home or an interview that can occur in virtually any quiet setting, focus groups require an appropriate environment that requires participants to take the time and responsibility for arriving in the right location at the designated time. Secondly, during a focus group, the researcher has less control over the course of discussion than would be possible in individual interview setting. While it may be advantageous for group members to interact and influence one another, this means the members actually have more control over the direction of discussion. Focus groups are also subject to a great deal of variability between groups; one group may be enthusiastic and responsive while for no apparent reason another similar group may be uninterested and lethargic. It is necessary to have sufficient number of focus groups to ensure balanced results.

Focus group methods have been successfully used in exploring both food intake and health promotion issues. Although focus group discussions have been used primarily for marketing research, Basch (1987) reported that focus groups are an underutilized research technique for improving theory and practice in health education. As in marketing research, it is essential to understand the target audience in planning nutrition education because psychological and social characteristics such as reading ability, resources, support systems, levels of awareness, fears, and concerns, can influence learning, motivation and behavior (Basch, 1987). The focus group provides insight on these different variables which can then be incorporated into an education program instead of serving as barriers to effective education.

Brug et al. (1995) utilized the focus group technique to assess the psychosocial determinants of fruit and vegetable consumption among adults. The questions used by Brug et al. (1995) were designed to raise discussion about advantages and disadvantages, influences, important others, beliefs about skills and barriers regarding consumption of boiled vegetables, salad and fruit. Satisfaction, including liking and satiety was found to be the primary motivation of participants. Perceived positive health consequences included eating fruits and vegetables when trying to lose weight or as disease prevention were mentioned. Pesticide dangers were perceived as a negative health consequence. The strongest social influence on fruit and vegetable consumption was found in preparing a meal for others, an extra effort was made to include fruits and vegetables in order to provide a quality meal to guests. Habit played a large role in type and amount of fruits and vegetables consumed. Knowledge of how to correctly prepare different types of vegetables as well as availability, price and seasonality were additional factors mentioned by participants. Finally, some participants were unaware of health benefits while others perceived fruits and vegetables as healthy but were unsure of what would happen if they were not eating enough. Focus groups were used similarly to assess attitudes and behaviors related to fruits and vegetables among low-income WIC participants (Treiman et al., 1996).

Betts and Vivian (1985) used a modified focus group technique to determine perceptions of food among the elderly. Betts reported that this type of information could be fundamental to the success of nutrition education programs. Researchers attended congregate meal lunches with participants and directed the mealtime discussion towards food choices. General comments were later written down and used to develop a Q-sort method for further measuring food perceptions. Betts and Vivian (1985) found this modification of standard procedures allowed them to gather the information they needed without being invasive. Using

this technique, convenience and health promoting qualities were found to be related to consumption of foods while expense was associated with foods not consumed.

Focus groups can also be used in product development or promotion. Hashim et al. (1996) used this technique to study consumer attitudes towards irradiated poultry and get detailed information on consumer's awareness, attitudes, opinions, behaviors, and concerns towards irradiated products. Such information was needed to provide strategies for marketing irradiated foods. Data suggested that education, informative labels and posters and in-store sampling are effective ways to convince shoppers to purchase irradiated foods.

The qualitative data generated from focus groups can be used alone to generate behavioral theories or used to assist in the design of quantitative research tools such as a questionnaire (Stewart et al., 1994). Quantitative techniques are often used as a follow up to a focus group study to assess strength of conviction and allow for generalizability (Basch, 1987).