

CHAPTER II: REVIEW OF LITERATURE

Demographics of Women in the U.S.

Since the turn of the century, the life expectancy of American women has increased from 48 years to 79 years. At present, women are living seven years longer than men, but not necessarily better than men. Women also experience poorer health outcomes and greater disability than do men (Finn, 1997).

During the twentieth century, the number of persons in the U.S. under age 65 has tripled. At the same time, the population aged 65 and greater has increased by a factor of 11. Consequently, the elderly population which comprised 1 in 25 Americans (3.1 million) in 1990, made up 1 in 8 (33.2 million) by 1994. Declining fertility and mortality rates have also led to an increase in the median age (U.S. Department of Commerce, 1995). Accompanying these changes will be shifts in the ethnic composition of the elderly population. It is estimated that by the year 2050, one-third of the elderly population will be other than non-Hispanic white. Research has shown that better educated individuals tend to be healthier longer and better off economically. These findings are encouraging as college enrollment for young adults rose by 55% in the 20-year period of 1973 to 1993. At the college level, 13.9 million students were enrolled in 1993 compared with 9.0 million in 1973. The percentage of college students who were female rose from 44 to 54% during those years (Bruno, 1993).

In 1994, 23.6 million (12%) adult persons lived alone in the U.S. and women accounted for the larger share (6 of 10). Between 1970 and 1994, the number of women living alone increased 94% (from 7.3 to 14.2 million). Living alone is more common among elderly women. For persons 75 years or older, 52% were women and 21% were men (Saluter, 1994).

Demographics of Women in Virginia

Virginia had a population of 6.6 million people in 1995 and ranked as the 12th most populous state with 2.5% of the nation's population residing in Virginia. By 2000, it is projected to be the 12th most populous state with 8.5 million people. Between 1995 and 2025, the number of non-Hispanic whites residing in Virginia is projected to increase by 570,000. The proportion of Virginia's population classified as elderly is expected to increase from 11.1% in 1995 to 17.9% in 2025. In comparison, the proportion of Virginia's population aged 18 and over is expected to increase from 5 million (75.6%) in 1995 to 5.3 million (78%) by 2025 (Campbell, 1996). The estimated number of females (ages 18-24) residing in Virginia in 1996 was 313,284 (Campbell, 1996).

The 1990 Labor Force estimates of females aged 16-19 who were not in the labor force was 2,336, and for ages 20-24, it was 2,582. Seventy-nine percent of non-Hispanic white females in Virginia were enrolled in college for a bachelor's degree or higher in 1990. For householders under 25 years old and living in Virginia, 81,003 live in "renter-occupied" units (U.S. Bureau of the Census, 1993).

Osteoporosis: Prevalence and Risk Factors

Osteoporosis is an age-related bone disorder, occurring mainly in postmenopausal women, that deteriorates bone tissue, decreases bone strength, and increases susceptibility to fractures (Murray, 1988; Eastell and Riggs, 1987). This disease affects more than 25 million people in the U.S. and is a major underlying cause of bone fractures in postmenopausal women and the elderly (NIH, 1994). It is a major health problem as it not only causes fractures, but disability, pain, and deformity (Murray, 1988). The sites most prone to these osteoporotic fractures include the proximal femur, distal radius, vertebra, humerus, pelvis, and ribs (Arnaud and Sanchez, 1990). They contribute significantly to morbidity and health care costs, resulting in approximately 1.3 million fractures each year at a cost in excess of \$10 billion a year to the health care industry. The medical, social, and economic costs of poor bone health continue to increase daily. Fifty percent of hip fracture victims will be disabled, many times permanently (Consensus

Development Conference, 1993). The cost of hip fractures alone are estimated to reach \$62 billion by the year 2020 because of an increase in life expectancy coupled with an increase in the proportion of the population that will be elderly (Cummings et al., 1990; Consensus Development Conference, 1993; Cooper et al., 1992). Therefore, the prevention of osteoporosis is of major importance to women as well as society since osteoporosis cannot be cured (Chapman et al., 1995; NIH, 1994). However, a Gallup survey of 750 U.S. women indicated that 80% did not associate osteoporosis with disabling hip fractures, and 90% were not aware death was a possible outcome (Anonymous, 1992). Osteoporosis is not just a disease of elderly women; all women are at risk. It is estimated that at age 50, a woman has a 40% chance of experiencing an osteoporotic fracture sometime during the remainder of her life (Melton, 1992).

The incidence of osteoporosis has led to an examination of how bone growth and maintenance are affected by diet, exercise, and lifestyle factors. Among the experts on osteoporosis, there is consensus about the role of diet and lifestyle in both prevention and treatment (Finn, 1997). Immobilization or a sedentary lifestyle has been shown to cause a rapid decrease in bone mass, thereby increasing risk of fracture (NIH, 1994). Other lifestyle factors that are known to have a negative impact on bone health include smoking and consumption of alcohol (Murray, 1988). Severe disturbances of menstrual function that occur with anorexia nervosa and in some athletes also are associated with low bone mass (Johnston and Longcope, 1990). Therefore, achieving peak bone mass during the first 2-3 decades of life is important. After peak bone mass has been attained, most women probably have little bone loss before menopause. The rate of bone loss in later years becomes the most important variable as it may indicate osteoporosis in those whose losses are significant (Johnston and Longcope, 1990; NIH, 1994).

Women who had never engaged in preventive behaviors to reduce risk of osteoporosis were found to be less educated in general than women in other preventive stages (Blalock et al., 1996). Women who were in the “never engaged” stage had less knowledge and were less concerned about osteoporosis than women in any of the other

stages of preventive behavior. Compared with “never engaged” women, women who were currently thinking about or planning to increase their intake of calcium reported greater health motivation, perceived osteoporosis as more controllable, associated more benefits with calcium consumption, and viewed calcium as more effective in reducing their risk of developing osteoporosis (Blalock et al., 1996). Although women say they might be aware of the relationship between diet and health, fewer than one third implement dietary interventions to lower their risk of osteoporosis (Beatty and Finn, 1995).

A nationwide Gallup telephone survey of 1,021 U.S. women of all ages (Anonymous, 1993) assessed knowledge and behavior regarding health and fitness. Approximately 7 in 10 women (69%) believed they could lower their risk or help prevent osteoporosis. Among women with a family history of osteoporosis, 85% believed they could lower their risk. Women who stated they had a healthy diet were more likely than women who said they did not have a healthy diet to believe that they could lower their risk. Women identified the following as factors that increased risk for developing osteoporosis: lack of calcium (38%), poor diet (17%), and lack of exercise (14%).

Few researchers have evaluated what young women in their twenties know about osteoporosis, their beliefs about the disease, and to what extent they practice preventive behaviors, such as adequate calcium intake (Kasper et al., 1994). Neumark-Sztainer et al. (1997) found that adolescent females’ beliefs about osteoporosis were not associated with their behaviors or nutrition knowledge. There was no significant relationship between osteoporosis beliefs and calcium intake, and the women surveyed were not practicing osteoprotective behaviors. Approximately 82% reported consuming less than the RDA (1,200 mg/day) for college age females, suggesting that these women believed that it is unlikely that they will develop osteoporosis. The concern that this age group of women may not be worried about chances of developing osteoporosis 30-50 years “down the road” is widespread among researchers. Consequently, health educators must find what motivates young adults and adolescents to eat a healthful diet to make this “far off”

disease real to them (Neumark-Sztainer et al., 1997).

Calcium and Bone Density

Calcium is an essential nutrient to the body. It is the major constituent of bone mineral that gives bone its characteristic strength and hardness, and is required for normal growth and development of the skeleton and teeth. Ninety-nine percent of body calcium is in the skeleton; therefore, it is not possible to build bone without a positive calcium balance nor is it possible to be in negative balance without losing bone (Murray, 1988; Arnaud and Sanchez, 1990). Vitamin D enhances calcium absorption, and 600-800 IU/day of vitamin D from supplements have been shown to improve calcium balance and reduce fracture risks in elderly individuals (NIH, 1994).

Researchers have discovered that the window for storing calcium and building bone density remains open longer than originally thought, and that the time of peak bone mass varies for different bones. Current information suggests that bones continue to grow in thickness and strength during adolescence and adult life (up to age 30-35). It is important to gain as much bone as possible during this period of skeletal growth in order to offset the effects of bone loss that may occur in later life (Murray, 1988; Finn, 1997). The consequences of low calcium intake during this crucial period of rapid skeletal accrual raise concerns that achievement of optimal peak adult bone mass may be seriously compromised (NIH, 1994).

At menopause, when estrogen levels begin to fall, a woman can lose as much as 15% of her bone density; therefore it is important for women to fulfill their potential when it comes to bone mass (Finn, 1997). With this knowledge, it is important to understand calcium intake thresholds which provide sufficient calcium to ensure maximal skeletal retention of calcium. Threshold estimates are shown to be above the current RDA for younger age groups. Identifying and locating such a threshold is important for determining optimal diets (Matkovic and Heaney, 1992).

Lloyd et al. (1993) reported calcium supplementation of 500 mg/day for a group of 12 year-old girls resulted in significant gains in total body and spinal bone densities. The increase may ensure optimal development of peak bone mass which could decrease the risk of osteoporosis fracture in later life. Tylavsky et al. (1992) studied the effects of dietary calcium intakes and exercise patterns during adolescence and early adulthood on bone mineral content and density of 18-22 year old females. Total daily calcium intake was 827 +/- 451 mg. Daily intake from milk and cheese alone was reported to be 498 +/- 387 mg. Results also indicated that females with both adequate calcium intake and regular physical activity, such as weight-bearing exercise during a significant part of adolescence, had greater bone mass by age 20 than females with long term low calcium intake and physical activity. The 20 year olds who had ceased drinking milk and consuming cheese had significantly lower distal bone values (Tylavsky et al., 1992). Recker et al. (1992) suggested that the most sedentary of college-aged women could increase rate of bone gain without much increase in physical activity or calcium intake. In a longitudinal study of 156 college age women, Recker et al. (1992) found that highly significant reductions in fracture risk late in life might be possible with no more than modest increases of these factors in young adult women under age 30.

Role of Calcium in Other Chronic Diseases

Low calcium intake has been implicated not only in the etiology of osteoporosis, but in other chronic diseases such as hypertension and colon cancer. According to the "Fifth Report on Detection, Evaluation, and Treatment of High Blood Pressure," consuming an adequate intake of calcium, potassium, and magnesium positively impacts blood pressure reduction (Miller et al., 1995). The Nationwide Committee on Detection, Evaluation, and Treatment of High Blood Pressure also recommends adequate intake of calcium, potassium, and magnesium for the prevention of hypertension (Miller et al., 1995). Dairy foods are the best food source, providing all three nutrients in meaningful amounts. Karanja et al. (1994) found that hypertensive individuals consumed significantly lower amounts of calcium, potassium, and magnesium than normotensive individuals. It was also found that intake of these minerals could be restored to

recommended levels with dairy foods. Overall epidemiological findings support a beneficial role for calcium, particularly from dairy foods (Miller et al., 1995).

Another chronic disease impacted by calcium intake is colorectal cancer. It is the third leading cause of cancer morbidity and mortality in the U.S. A high fat or calorie diet has been associated with increased risk of colon cancer. There is no evidence that dairy foods contribute to the disease. On the contrary, several components of dairy foods, specifically calcium and vitamin D, have been suggested to protect against colon cancer. It has been recommended that calcium intakes of over 1800 mg and 1500 mg/day for men and women, respectively, are necessary to reduce the incidence of colon cancer (Miller et al., 1995). The relationship of calcium intake to the risk for developing these chronic diseases further emphasizes the importance of an adequate calcium intake each day.

Recommended Calcium Intakes

Adequate calcium intake has been made an objective for national health promotion and disease prevention in the Healthy People 2000 campaign (NIH, 1994). Optimal calcium intake refers to the levels of consumption necessary for an individual to maximize peak adult bone mass, maintain adult bone mass, and minimize bone loss in the later years (NIH, 1994). Optimal calcium intake varies according to a person's age, sex, and ethnicity.

Recommended Dietary Allowances are levels of nutrient intakes adequate to meet known needs. Recommended intakes of calcium for females are ages 11-24 years, 1,200 mg/day and 25+ years, 800 mg/day (Food and Nutrition Board, 1989). The National Academy of Sciences (NAS) has recently released new recommendations for calcium intake referred to as Dietary Reference Intakes (DRIs). These new intakes were derived from research on calcium for each stage of the lifespan, role of calcium in the decrease of chronic diseases, and current data of intakes in the U.S. and Canada. Dietary Reference Intakes will replace the old RDAs. The new recommended levels that include the college

age ranges are 1,300 mg for ages 14-18 and 1,000 mg for ages 19-30. These are daily dietary intakes sufficient to meet the nutrient requirements of nearly all individuals in a specific life stage and gender group (Yates et al., 1998). The National Institutes of Health (1994), however, recommended 1,500 mg/day to maintain bones, but even more calcium may be needed to build bone.

Calcium Intake of College Females

Lack of dietary calcium is not the sole cause of osteoporosis, but it is one of the few controllable factors (Chapman et al., 1995). It is generally agreed that food sources are the most effective delivery method for meeting calcium needs; however, supplements may be necessary for those who lack adequate dietary intake of calcium (Finn, 1997; Neumark-Sztainer et al., 1997). Studies emphasize the fact that effective behavior change has not occurred in the past 20 years despite nutrition education and marketing strategies (Chapman et al., 1995). In fact, levels of calcium intake show a consistent decline with age. The lowest intake in comparison with the RDA is during the period of development of peak bone mass, ages 12-29. During these ages, reports indicate that women consume less than 60% of the RDA for calcium (Fleming and Heimbach, 1994). Although recent improvements in calcium intake have been noted for most ages in NHANES III (1988-1991), the survey still documents that a large percentage of Americans are not meeting the recommended guidelines for calcium intake. Mean intakes for females ages 18-24 were 796-833 mg/day (Alaimo et al., 1994). Another study compared nutrient intakes of teenage females consuming milk (whole, lowfat, or skim) to those not consuming milk. Values were based on nutrient density (nutrients per 1000 kcals). Calcium intake was 495 mg/1000 kcals for those who consumed milk and only 275 mg/1000 kcals for those who did not (Fleming and Heimbach, 1994).

Furthermore, Nationwide Food Consumption Survey (NFCS) data indicated calcium consumption varies by region of the country, ethnic group, and household income. Mean per capita daily consumption of calcium for the total U.S. population was 737 mg. Per capita intake was highest in the West, for non-Hispanic whites, and for those from households in the highest income groups (at least \$41,000/year in 1987).

Those with the lowest intakes were southern, non-Hispanic blacks, and those in the lowest income range (\$18,000/year). Sex and age groups with the highest intakes were males 6-11 years and 12-19 years (Fleming and Heimbach, 1994). Population surveys of girls and young women 12-19 years show average calcium intake to be less than 900 mg each day, which is well below the calcium intake threshold (NIH, 1994). In another study, 25% of women who were calcium deficient (less than 60% of the RDA) were not aware of this deficiency (Chapman et al., 1995).

Adequate calcium intakes are of potential benefit, entail little risk, and are easily achieved with the current food supply (Murray, 1988). The magnitude in reduction of bone loss by dietary calcium is approximately 1-2% per year. Over a number of years the degree of reduction in bone loss is enough that it should lead to fracture prevention over time (Murray, 1996).

Sources of Calcium

Adequate calcium intake can be achieved through the consumption of dairy products. Vegans who voluntarily limit their intake of dairy products can obtain dietary calcium through other sources, which include some green vegetables, calcium-rich tofu, legumes, canned fish, seeds, nuts, and fortified food products. Breads and cereals are low in calcium, but contribute significantly to calcium intake of vegans because of frequency of consumption. Some calcium-fortified foods are currently available, and include fortified juices, fruit drinks, breads and cereals (NIH, 1994). To maximize calcium absorption, food selection decisions should include information on their bioavailability (absorption) of calcium. This is dependent on the foods' total calcium content and on whether components such as vitamin D and phosphorus, that enhance or inhibit calcium absorption, are also present in these foods (NIH, 1994).

Dairy products are the best source of calcium (Finn, 1997). They are the major contributors of dietary calcium for Americans because of their high calcium content (approximately 250-300 mg/8 oz of milk) and availability in the food supply (NIH, 1994).

These include fluid milk, milk drinks, yogurt, cream, cheese, and milk-based desserts such as ice cream and puddings (Fleming and Heimbach, 1994). These foods are responsible for supplying 75% of all the calcium in the U.S. food supply; at least 55% of calcium comes from milk and milk products. Milk as an ingredient in other foods accounts for approximately 20% of total dietary calcium (Neumark-Sztainer et al., 1997).

Food Choice Models and Behavior

In order to gain an understanding of perceptions and behaviors of college females towards dairy products, it is important to recognize the process of food selection as it plays a large role in why people choose the foods they do. How people consider and select foods and beverages affects the acquisition, preparation, or consumption of food in a variety of settings including grocery stores, restaurants and vending machines, parties and social events, and meals and snacks at home (Furst et al., 1996). The choices people make among foods determine which nutrients enter the body and influence food production systems through consumer demand. Food choice process incorporates not only decisions based on conscious reflection, but those that are automatic, habitual, and subconscious. The life course provides an orientation for food choices through past, present, and future roles and experiences and is the underlying source of many factors that shape food choice. Ideals include people's expectations as well as conscious assumptions about food. These assumptions are rooted in and derived from cultural factors that link ideals to food. Sensory perceptions, particularly flavor, and monetary considerations (the budget) also are important (Furst et al., 1996).

Food Choice Models

Interrelating factors influence food choice, and several models have been proposed which focus on these factors. These models are not quantitative and do not attempt to explain the mechanisms of action of different factors (Shepherd and Sparks, 1994).

Khan (1981) proposed a model with seven categories of factors that influence food preferences as well as how those factors interact. Categories include personal factors, biological/physiological/psychological factors, extrinsic factors, intrinsic factors, cultural/religious/regional factors, educational factors, and socioeconomic factors. However, this model proposes a large number of variables which makes it difficult to pinpoint the significant factors of food choices (Shepherd and Sparks, 1994). Proposed models by Randall and Sanjur (1981) and Shepherd (1985) both are comprised of three similar categories. Randall and Sanjur (1981) used individual, food, and environment; whereas, Shepherd (1985) used food, person, and economic/social. Influencing factors are categorized as related to food, the person making the decision, and to the external economic and social environment within which a choice is made, but many of the factors are mediated by people's beliefs and attitudes. Sensory preferences and beliefs concerning nutritional quality and health effects of a food may all be more important than the actual nutritional quality and health consequences in determining a person's choice. Other factors acting through personal attitudes and beliefs include social, cultural, religious, and demographic factors (Shepherd and Sparks, 1994).

Fishbein and Ajzen's "theory of reasoned action" (1975) seeks to explain rational behavior that is under the control of the individual. A subjective norm reflects perceived pressure from certain people or groups and the person's motivation to comply with the people or groups. In this model a relationship exists between food choices and attitudes. Research has found that attitudes are more important than perceived social pressure in choosing foods; specifically, beliefs concerning flavor of foods are important in determining food selection. However, Shepherd and Sparks (1994) reported that for dairy products, the belief evaluation score for healthiness was higher than the one for taste. This model provides a structured relationship between belief evaluations and attitudes as well as between intentions and attitude (subjective norm). Through these relationships, the importance of different factors affecting food choice can be evaluated (Shepherd and Sparks, 1994).

Food Choice Behavior

Koszewski and Kuo (1996) identified factors in college women that influenced food consumption adequacy. The majority of women rated their adequacy of resources as sufficient. An exception was time available to prepare food (6%). The following resources were significantly correlated with consumption: time available to eat and to prepare food, transportation and quality of foods in stores nearby, and quality of foods and selection of foods nearby. Further analysis found significant differences between nutrient adequacy and energy and the ratings for time available to eat and for the ability to get the most for the dollar. These findings suggest that adequate time to eat and ability to obtain food at a good value affected the adequacy of the diet of college females. Betts et al. (1997) reported that time constraints, lack of money, and health concerns influenced food intake through focus group interviews with both college and non-college young adults. Guinard and Marty (1997) found that adolescent females were less willing than males to purchase regular, full-fat foods once they were provided with nutrition information. A high degree of liking for fat-modified foods was found, with most fat-modified versions of the foods liked as much as the regular versions. However, when asked to give a preference, all participants still liked regular, full-fat foods significantly more than fat-modified foods.

Both media and peers pressure young adults to be thin, at any cost, often in an environment unsupportive of regular or healthy eating patterns (Seymour et al., 1997). With Western society's concern about obesity and cultural pressures for thinness, it is likely that adolescents' concerns about weight and interest in dieting influences everyday food choices (Contento et al., 1995). Young adults are at the crucial time of development where they become responsible for their own food intake, no longer relying on their parents' control (Seymour et al., 1997). Food habits that young adults have developed may have nutritional, health, and physiologic consequences at a period later in life as a result of these behaviors (Betts et al., 1997).

Beerman (1991) reported that age, academic major, and body image perceptions influenced food choices of college students. Contento et al. (1995) studied the relationship of weight and dieting status to what adolescents valued or wanted in the food they ate and the importance of various personal and social-environmental criteria they used to choose foods. Diets in the sample of the frequent dieters were adequate in nutrients averaging above the RDA for protein, vitamins and minerals, with the exceptions of calcium and iron. Calcium intakes averaged about two-thirds the RDA. These findings suggest that the more healthful eating by frequent dieters is not a consequence of wanting to be thin for weight control or for the physical appearance, but that the particular foods and food consumption patterns that promote thinness may be those that promote health in the sense of disease prevention. It has been suggested that although adolescents appear to have definite knowledge about the extent to which particular foods are “fattening”, they probably know less about the consequences of these particular foods for risks of chronic disease (Contento et al., 1995). Eddy (1997) found that educated older women (65 and over) thought dairy products were a good source of calcium and were aware of osteoporosis and its relationship with calcium. The differences in knowledge between these two age groups suggests that college females do not perceive risks from inadequate calcium intake, as osteoporosis is not an immediate disease. These findings stress the need for emphasizing the importance of adequate calcium intake early in life, for prevention of osteoporosis and other “aging” diseases.

For many college students, an introductory nutrition course may be the only formal exposure to nutrition education during college years or later in life. Significant dietary changes have occurred pre- to post-instruction for college females in such a class, resulting in decreased intakes of kilocalories and fat and increased intakes of calcium. Thus, nutrition educators should strive for improvements in student’s dietary behaviors, as well as knowledge and attitudes while enrolled (Skinner, 1991). A study of eating out practices of college students reported nutrient intakes to be unrelated to having or not having a college meal plan. It was also reported women purchased more salads, chose

reduced portions, and followed practices consistent with dietary guidelines and weight control more than men did (Hertzler and Frary, 1992).

Georgiou et al. (1997) reported a study comparing nutrition status between female college students, college graduates, and non-students. Students and graduates were most confident of their abilities to use nutrition labels on foods when compared with non-students. Dairy foods were consumed in inadequate amounts in the diets of young adults compared with recommendations in the Food Guide Pyramid of 2-3 servings/day, regardless of student status, especially among females. Although student status was not associated with consumption of all dairy foods, it was clearly associated with the level of milkfat preferred. Students and graduates both chose low-fat milk more often than did non-students.

Chapman et al. (1995) reported significant differences in the attitudes of women who had calcium intakes less than 60% RDA and those who had greater than 60% RDA of calcium. The decreased calcium group felt they did not meet the RDA for calcium and that milk upset their stomach. The increased calcium group more likely limited caloric intake due to weight control, did not avoid milk, more often expressed concern about calcium intake, and liked milk. A significant increase in cottage cheese, milk, and yogurt consumption was found when women limited caloric intake due to weight control. There was also a significant decrease in milk intake when concerns about kilocalories were expressed. A lack of knowledge about calcium-rich foods that were non dairy-based was found among women in that study. Forty-six percent did not list or know of any non-dairy calcium-rich foods. The researchers concluded that by changing attitude towards dairy products and increasing interest in calcium intake, behavioral change could be significant (Chapman et al., 1995).

It has been established that health perceptions associated with dairy foods can play a role in motivating women to consume or avoid dairy foods. Despite numerous recommendations that healthy individuals should be able to meet all of their nutrient

needs with diet rather than with vitamin and mineral supplements, the use of food supplements is a very common practice in the U.S. Even among college students, vitamin and mineral supplements are reportedly used by approximately half of the population (Eldridge and Sheehan, 1994). Hertzler and Frary (1989) studied the change in food behavior and supplement use among 212 undergraduate college students enrolled in an introductory nutrition course. Results indicated that 8% started taking supplements during the course. Of the 26 in the class taking single-nutrient supplements before the course, about one-fifth switched to a multivitamin/mineral supplement on a regular basis. This finding was observed in those with formal nutrition training (ie., nutrition majors) as well as those without formal nutrition training. Although supplement users were extremely diverse with respect to improved intake, food experiences and previous nutrition information, consistent use of vitamin/mineral supplements was noted throughout the course (Hertzler and Frary, 1989).

Some common reasons for taking supplements are to increase energy; to prevent colds and other illnesses; as a precaution; to make up for what is not in food; and to reduce stress (Eldridge and Sheehan, 1994). Eldridge and Sheehan (1994) evaluated the type and frequency of food supplement use in a community college population. Health beliefs and attitudes of the college students were used as explanations of supplement use. The students who used food supplements had stronger beliefs about the health benefits of food supplements than nonusers. Most students believed that eating a variety of foods provides the necessary vitamin and minerals needed for proper nutrition, but that supplements would provide extra pep and energy to help reduce stress. The most popular combination supplements used were multivitamins and multivitamins with minerals.

College Females' Attitudes and Behaviors Towards Dairy

There is a need to target health education efforts to young adults both outside the college environment as well as on the campus, because as research has shown, a higher education does not always mean higher calcium intake. Seymour et al. (1997) found that among females, college students tended to practice inappropriate dieting behaviors most

(43.3%), followed by 22% of non-students and 16.6% of graduates. Weaver et al. (1997) reported that both attitudes towards diet, health, and knowledge of food consumption were related to dietary practices and intake of college students. Favorable attitudes were associated with higher nutrient intakes. Witte et al. (1991) examined several aspects of self-concept, including attitude and behaviors, and their relationship to eating patterns and nutrient intake. A “Super Person” factor was negatively associated with several desirable eating patterns, suggesting that individuals with a “Super Person” orientation are self-confident and do not apply recommended behaviors to their dietary practices. “Super Person” was a negative predictor for adequate calcium intake. Individuals who viewed themselves as aggressive, leaders, self-confident, and talkative, which are generally considered positive personality characteristics, apparently had poorer dietary habits than women who viewed themselves differently.

Barr (1995) studied dieting behaviors and concerns about body shape and size in high school students, and examined how these concerns and behaviors affected calcium intake. Taste enjoyment of dairy products was significantly correlated with the students’ consumption. For milk, fruit yogurt, and ice cream, the taste enjoyment score for a particular food was significantly associated with estimated intake of the same food, but was not associated with intakes of other foods. Taste enjoyment scores of most dairy products were not related to dieting. Higher dieting scores were associated with greater taste enjoyment of skim milk and lesser taste enjoyment of ice cream. Higher dieting scores were also associated with lower consumption of ice cream and milk and greater consumption of yogurt. Barr (1995) also found that adolescent females with dieting concerns were not specifically compromising calcium intake. Instead, they appeared to be making food choices consistent with their desire to lose weight. This finding suggests that adolescents can make food choices appropriate to personal health goals and motivations. The challenge is to identify nutrition behaviors perceived to be beneficial to this age group.

If low caloric diets are a way of life for a segment of college females, there is clearly a need for nutrition educators to help those individuals select nutritionally adequate diets. Specific recommendations include increased consumption to at least 1,200 kcal so it is possible to meet nutrient needs, adjusting activity level to meet ideal body weight, and selecting nutrient dense food with emphasis on sources of calcium (Betts et al., 1997). It is possible that low caloric intakes of some or all nutrients may be related to inadequate nutrient intakes, the tendency to skip meals, and/or the avoidance of certain food groups (Hernon et al., 1986). Finn (1997) reported that in a study of 19-22 year olds' consumption patterns, those with nutritionally adequate intakes tended to meet the RDA recommendations for calcium of 1,200 mg/day. Those who did not have nutritionally adequate intakes tended not only to avoid eating desserts, fat, and sugar, but also tended to avoid eating milk products, meat, eggs, legumes, bread, and cooked starchy vegetables. These foods are not necessarily high in kilocalories, but the perception that they are was common, which might explain why they were avoided by this group. One reason for inadequate consumption of dairy is that young adult women and adolescent girls perceive dairy foods as "fattening" (Finn, 1997). In comparison, Eddy (1997) found that dairy foods were perceived as "high in fat" to women 65 and over, and that this perception affected dairy choices for this age group. Research has shown that, with proper nutrition counseling, teenage girls and women can increase their intake of dairy products without experiencing a change in percentage of body fat, percentage of energy from fat, weight gain, or increase in cholesterol (Finn, 1997). Another behavior compromising practice by college age adults was meal skipping, with breakfast the most frequently skipped meal (Seymour et al., 1997). Those who did eat breakfast most often reported that it was important to "eat a variety of foods" and to "eat nutritiously."