Dental and nutritional status of rural elderly in Montana
by Dorothy Karnis Albrecht

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Nursing
Montana State University
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Abstract:
The “Baby Boomer” generation is aging. Every day 5,574 Americans turn 65 years of age. In Montana, the elderly population over age 85 has increased by 44% in the last decade. Over 50% of the senior population is deficient in one or more dietary nutrients and 1 of every 4 elderly in America is malnourished. Factors related to malnutrition risk in the elderly are polypharmacy, poverty, social isolation and depression, and dental problems that affect the ability to chew food. The elderly need healthy teeth and gums to obtain good nutrition to prevent disease and further disabilities. Oral health and nutrition are linked to an overall sense of well being and improved quality of life.

Problem Statement Nutrition is important to overall health and dental health is necessary to maintain adequate nutrition. Little research has been done on the relationship of nutritional and dental status in the rural elderly population. Research on the dental status of the rural elderly in Montana has not been conducted.

Research on dental and nutritional status of rural elderly receiving Meals on Wheels has not been done.

Purpose: To examine the dental and nutritional status in the rural elderly of Montana. Specific Aims: Is there a relationship between the dental and nutritional status of the rural elderly in Montana? Whether there were differences in the dental and nutritional status of the rural elderly in Montana receiving Meals on Wheels and those who are not? Methods: A correlational descriptive design was used in a secondary data analysis of a USDA funded study. Eighty rural elderly, half of them receiving Meals on Wheels, all living independently in the community, participated in an interview and a questionnaire. To assess nutritional and dental status of the two groups frequency distribution, percentage, correlation matrix, and t-test were utilized.

Findings:-Greater than 50% of the elderly were at risk for malnutrition, 50% had not seen a dentist in 2 years, and 33% had mouth problems or dry mouth. The Meals on Wheels group had a higher risk of malnutrition, more oral problems and dental pain, and lower percentages of preventative oral health care practices than the independent group of rural elderly in Montana.

Conclusion: Dry mouth, difficulty swallowing, and denture problems are related to decreased food intake and increased risk of malnutrition. The Meals on Wheels group had decreased nutritional and dental status compared to the independent, rural, elderly group. Community programs and education need to be done to improve the oral and dental status of elderly especially in rural Montana. More elderly nutrition programs should be provided in the rural setting.

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This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic, style, and consistency, and is ready for submission to the College of Graduate Studies.

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Date July 12, 2002

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Abstract

The "Baby Boomer" generation is aging. Every day 5,574 Americans turn 65 years of age. In Montana, the elderly population over age 85 has increased by 44% in the last decade. Over 50% of the senior population is deficient in one or more dietary nutrients and 1 of every 4 elderly in America is malnourished. Factors related to malnutrition risk in the elderly are polypharmacy, poverty, social isolation and depression, and dental problems that affect the ability to chew food. The elderly need healthy teeth and gums to obtain good nutrition to prevent disease and further disabilities. Oral health and nutrition are linked to an overall sense of well being and improved quality of life.

Problem Statement Nutrition is important to overall health and dental health is necessary to maintain adequate nutrition. Little research has been done on the relationship of nutritional and dental status in the rural elderly population. Research on the dental status of the rural elderly in Montana has not been conducted. Research on dental and nutritional status of rural elderly receiving Meals on Wheels has not been done.

Purpose: To examine the dental and nutritional status in the rural elderly of Montana. Specific Aims: Is there a relationship between the dental and nutritional status of the rural elderly in Montana? Whether there were differences in the dental and nutritional status of the rural elderly in Montana receiving Meals on Wheels and those who are not?

Methods: A correlational descriptive design was used in a secondary data analysis of a USDA funded study. Eighty rural elderly, half of them receiving Meals on Wheels, all living independently in the community, participated in an interview and a questionnaire. To assess nutritional and dental status of the two groups frequency distribution, percentage, correlation matrix, and t-test were utilized.

Findings: Greater than 50% of the elderly were at risk for malnutrition, 50% had not seen a dentist in 2 years, and 33% had mouth problems or dry mouth. The Meals on Wheels group had a higher risk of malnutrition, more oral problems and dental pain, and lower percentages of preventative oral health care practices than the independent group of rural elderly in Montana.

Conclusion: Dry mouth, difficulty swallowing, and denture problems are related to decreased food intake and increased risk of malnutrition. The Meals on Wheels group had decreased nutritional and dental status compared to the independent, rural, elderly group. Community programs and education need to be done to improve the oral and dental status of elderly especially in rural Montana. More elderly nutrition programs should be provided in the rural setting.

CHAPTER 1

INTRODUCTION

The "Baby Boomer Generation" is aging (U.S. Department of Health and Human Services [U.S.DHHS], 2002). Every day 5,574 Americans turn 65 years of age (Federal Forum, 2000). Persons over age 65 make up 13 % of the total United States population and this will increase to 20% by the year 2030 (U.S. Census, 2000). Persons over age 85 are the fastest growing segment of the population. By the year 2050 there will be 19 million Americans age 85 years or older in the United States (U.S. Census, 2000). In Montana the 85 years or older age group has increased by 44% in the last decade (Kemmick, 2001). Many of these oldest of the elderly population will need physical and medical assistance (U.S. Census, 2000). Presently in Montana, 15 % of the total population is over age 65 and in some rural areas this is as high as 20% (U.S. Census, 2000).

More than half of the elderly populations are deficient in one or more dietary nutrients and one of every four senior residents in the United States is considered to be malnourished (Administration on Aging [AoA], 2001; Lazare, 2000; McKeown, 1999). Nutritional problems are highest for the elderly with more than one chronic medical condition, those taking three or more medications, and any elderly whose income places them at or below the poverty level (American Dietetic Association [ADA], 2000c). Rural elderly are older, poorer, and have more chronic medical conditions compared to the urban elderly (Stearns,

Slifkin, & Edin, 2000). In Montana 11-17% of the rural elderly have been estimated to have incomes at or below the poverty level (U.S. Census, 2000; Coon & Zulkowski, 2002).

The reasons for high rates of nutritional deficiencies in the older population are varied. Research documenting specific dietary changes and needs that occur with aging has been done for several, but not all nutrients (AoA, 2001). The Recommended Dietary Allowances (RDA), established by the Food and Nutrition Board of the National Academy of Sciences, does not have adjustable recommendations for persons over 65 years of age. The Institute of Medicine, Food & Nutrition Board (2001) is currently researching the Daily Recommended Intake (DRI) of several vitamins and minerals for the elderly population. The actual amount of protein required to maintain nutritional health is higher for the elderly population than stated in the RDA guidelines (ADA Position Statement, 2000c). Other factors related to nutritional concerns in this population are polypharmaceuticals, poverty, social isolation and depression, decreased sense of smell and taste, physical and cognitive disabilities, and dental problems that affect the ability to chew food (Miller, 1999; Meister, 1998).

The elderly need healthy teeth and gums to obtain good nutrition to prevent disease and further disabilities (McKeown, 1999). Oral health and nutrition are also linked to an overall sense of well being and improved quality of life (Fiske, 1999). Elderly with poor dentition often stop socializing due to embarrassment (Satcher, 2000). Social isolation leads to depression and results in

a decrease in nutrition and quality of life (Krassie, Smart, and Roberts, 2000). Dental problems and oral health of the elderly are of concern with the growing older population in America (Slavkin, 2001). Dental providers are scarce in rural areas of the United States (Stearns, Slifkin, & Edin, 2000). Few dentists and dental hygienists have practices in rural Montana and consequently dental health is often not possible for the older rural adult (Hagengruber, 2001). Twelve of the 56 counties in Montana do not have a practicing dentist and 20 counties are without a dental hygienist (Department of Public Health and Human Services [DPHHS], 2001b). Thirty percent of the dentists in Montana are over 55 years of age (Center for Disease Control [CDC], 2000).

Problem Statement

Nutrition is important to overall health and dental health is necessary to maintain adequate nutrition. However, little research has been done on the relationship of nutritional and dental status in the rural elderly population. Furthermore, research on the dental status of the rural elderly in Montana has not been conducted. In addition, research on dental and nutritional status of rural elderly receiving home delivered meals has not been done.

Purpose

The purpose of this study was to examine the dental and nutritional status of the rural elderly in Montana. Two specific aims were addressed in this study.

Aim 1: Is there a relationship between the dental and nutritional status of the rural elderly in Montana? Aim 2: Whether there are differences in the dental and nutritional status of the rural elderly in Montana receiving Meals on Wheels and those who are not?

Framework

A framework was developed for this study that represents the relationship between the individual, his or her nutritional and dental status, and the community. There is a two-way relationship between health of the individual and health of the community in the rural setting (Rural Policy Research Institute [RUPRI], 1999). When individuals in the rural community have decreased health status, they rely on community services to maintain their quality of life and improve their health. However, these needed services must be available and accessible to the individual. At the same time the rural community depends on the member's utilization of the local resources to continue to be able to provide the services within the rural area (RUPRI, 1999). (See Figure 1).

From the individual's perspective health is related to physical, psychological, and social factors (Roy, 1999). Changes in one area or another can affect the other areas and impact an individual's health, well-being, and functional status (Roy, 1999). Nutrition is an important component in the maintenance of the individual's health. However, even if a person has nutritionally sound products available he or she must be able to ingest them. Consequently the

individual's dental status may affect the types of food eaten, and the overall nutritional health of the individual. Malnutrition may impact the individual's oral health leading to a decreased resistance to infection, poor gum health and eventual loss of teeth (ADA, 1996).

From the community perspective access to food and dental services is a concern. Rural areas may be limited in products and services that are available. Geographic distance and limited monetary resources may decrease the rural elderly's ability to access needed care. This decrease in service use becomes circular. There may be further limitations on availability of services in the rural community since the health of the community is dependent on use of services, and is a collaboration between health care workers, key community leaders, and community resources (Courtney, 1996; Hanson & Spross, 1996).

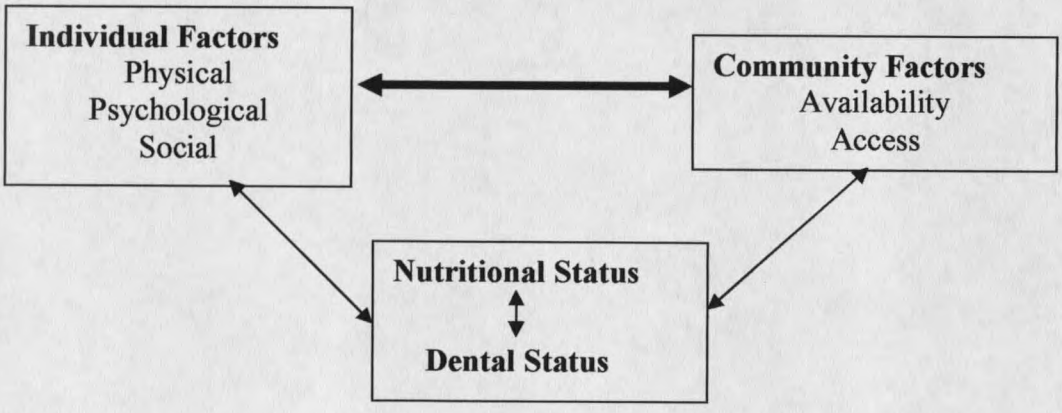

Figure 1. The nutritional and dental status of the rural elderly are dependent on individual and community factors.

Significance of This Study to Nurse Practitioners

Nurse Practitioners are primary health care providers, and in the rural setting they may be the sole health provider to the elderly client. The importance of providing education to the elderly in all areas of health includes oral health and nutrition, needs to be emphasized. Awareness of the nutritional and dental status of the rural elderly client and the need for improvements were the significant factors that prompted this study. Implementation of practices to prevent oral health disparities and malnutrition in the elderly client by the nurse practitioner; to improve health of rural individuals and overall health of rural communities, were goals of this research.

Definition of Terms

Individual

Person whose interactions with others are influenced by social, psychological, and physical factors in a multitude of environments.

For this study individual is an elderly person, age 60 years or greater, who is living in a residential setting in a rural community in Montana.

Dental Status

Dental status is the physical ability to obtain, chew, and swallow food and liquids through the oral cavity without pain or difficulty (National Institute of Dental & Craniofacial Research, 2000).

For this study dental status is measured by assessment of eight oral health questions, which are part of the Nutritional Screening Initiative (NSI), and two additional questions from the National Oral Health Surveillance System (2000).

Nutritional Status

The level of health of the human body from the intake of nutrients and metabolic processes of anabolism and catabolism that is necessary to sustain the cells functional capacity (Columbia Education Department [CED], 2001).

For this study nutritional status is evaluated by the level of malnutrition risk in an individual's diet as measured by the NSI and Mini Nutritional Assessment (MNA) scales and the laboratory values of hemoglobin, hematocrit, albumin, glucose, and protein.

Community

A collaboration of individuals in an environmental setting that is appealing to the individual's values and culture.

For this study community is a rural town with a population of 5,000 or less within the state of Montana.

CHAPTER 2

REVIEW OF LITERATURE

The review of literature covers problems identified in the conceptual framework related to the individual, community, dental and nutritional status. Physical, social and psychological factors related to the elderly individual were examined. Emphasis was placed on how these factors effect the rural elderly individual's health. Information specifically for elderly Montanan's was included when applicable.

Community factors reviewed included access to care for rural individuals, and programs for elderly individuals highlighting the availability of the rural programs. Research on the nutritional and dental health of the elderly population was included along with available statistics for Americans. The research done in the United States on community nutrition programs was reviewed. In Montana, the nutrition programs in use and the future plans to expand these programs was covered.

Individual Factors

Physical

The proportion of seniors in Montana has grown three times faster than the National average (U.S. Census, 2000). The "baby-boomer" generation is defined as those Americans born in the years 1946-1964. Thirty percent of Montana's total population consists of "baby boomers" (U.S. Census, 2000). In 2030 the number of Montanans over age 65 will exceed the rest of the population in the state (Kemmick, 2001). The current number of elderly aged 85 years or older years in Montana has increased by 44 % since 1990 (U.S. Census, 2000). Rural senior citizens have been found to be older, poorer and have more severe chronic medical problems compared to the urban senior population (Stearns, Slifkin, & Edin, 2000).

As the adult ages physiologic changes in the body start to occur around the age of 70 and these changes have an effect on nutrition for all elderly persons (Columbia Education Department [CED], 2001). The gastrointestinal tract slows down, and the basal metabolic rate decreases (Egg Nutrition Center [ENC], 1997). Most elderly people are not as active as they were at age 40, so the body requires fewer calories for fuel. Muscles in the body decrease and body fat increases as the cells age (Dhar, 2001). The nutrient requirements for the body change with the elder adult. The ability to absorb calcium decreases so the amount of calcium in the diet should be increased or the older adult needs to take calcium

supplements to prevent osteoporosis (Fort Valley State University, 2001). The protein requirements increase due to less efficient utilization of dietary protein intake (ENC, 1997). Vitamin and mineral requirements may stay the same, increase, or decrease and new RDI's for ages 51-70, and 70 years of age or older are now being established for specific nutrients (Institute of Medicine, Food and Nutrition Board, 2001).

The older adult should eat more protein-rich foods to meet his or her nutrient requirements and minimize calories consumed (Administration on Aging [AoA], 2000). One study conducted in America found the elderly consumed less then recommended amounts of calcium, protein and many other nutrients regardless of food insecurities (Lee & Frongillo, 2001). The ability to concentrate urine decreases due to a decrease in the glomerular filtration rate of the kidneys and an increase in water excretion (American Dietetic Association [ADA], 2000c). The sensation of thirst decreases, but the older adult still needs the same amount of water to stay hydrated and prevent constipation.

Dietary deficiencies in calcium, phosphorous, and vitamins C and D can result in soft bones and teeth, and periodontal disease (ADA, 2000c). Periodontal disease is evident in 90 % of the American population as a result of poor oral hygiene and dietary deficiencies (Lazare, 2000). Calcium deficiency in the elderly adult results in loss of bone and teeth. An estimated 89% of women age 75 years plus have osteoporosis (Slavkin, 2000). Over 50 % of adults over 65 years of age in America are edentulous (U.S. Preventative Service Task Force,

1996). The number of elderly adults who do not have dentures or have dentures that do not fit well has not been reported.

Mouth pain and loss of teeth make it difficult to chew many foods (Miller, 1999). Raw fruits and vegetables, which are important for vitamins and fiber, are often not eaten or replaced with canned, softer varieties in the elderly adult's diet (Sheiham, Steele, Marcenes, Lowe, Finch, Bates, Prentice, & Walls, 2001). The elderly adult may also compensate for decreased chewing ability, by eliminating hard to chew foods like meat and poultry from the diet (Fort Valley State University, 2001). The loss of these high protein foods from the diet can result in severe malnutrition if other soft protein food such as eggs, beans, and cheese are not eaten (Miller, 1999). An elderly person, who depends on the Elderly Nutrition Program (ENP) meal for the majority of his or her food and does not consume the meat portion because he or she cannot chew, will quickly become deficient in protein (Krassie, Smart, & Roberts, 2000).

Social

The elderly are being released from the acute care setting earlier and often are in need of assistance with rehabilitation until they gain back their strength (AoA, 1995). Approximately 50 % of older adults require assistance with activities of daily living at home (Satcher, 2000). The request for home delivered meals and home services for the elderly have increased (AoA, 1995). Almost half of the elderly adults across America receiving the Meals on Wheels program have been in the hospital within the last 12 months (ADA, 2000c). With the future

increases in the elderly population plans to expand the delivery of home services and nutrition programs to the rural population must to be addressed (Community Policy Analysis Center [CPAC], 1999).

The populations of senior citizens in urban areas are concentrated in retirement communities or assisted living facilities. More than 50 % of senior citizens live in 9 of the 50 states within suburban communities. Only 23 % of the elderly live in rural areas and most of those who do, reside in the West or Central United States (AoA, 2000). Most of the elderly population in the rural community live in their own homes and have a mixture of help from families and some home health care providers (Federal Forum, 2000). Most elderly living in skilled nursing facilities are there because they require assistance in three or more areas of self-care (Federal Forum, 2000).

Ten percent of the elderly in America were below the poverty level in 2000 and another 6.7 % are poor at 125% of the poverty level (AoA, 2001). In the rural areas the rate increases to 13 %. Poverty rates in the 85 years or older age group, for women, or any elderly person living alone are much higher, up to 21% for Whites, 22% for African-Americans, and 38 % for Hispanics (AoA, 2001). Persons living in poverty often do not have the resources to meet their needs for food, housing and health care (Federal Forum, 2000). Social Security is often the only financial resource for persons age 85 years or older, and in the United States only 8 % of women age 65 years and older are employed (Federal Forum, 2000). It is estimated that 50 % of all senior citizens in America will

experience living at or below the poverty level sometime in their life (ADA, 2000c).

Poverty has a strong association with nutrition risk in the older adult (ADA, 2000b). An estimated 20 % of elderly are poor, and older women have twice the poverty rate of older men. Living on a fixed income puts the older adult at higher risk for malnutrition (ADA, 2000a). When prescriptions or heating bills increase often the amount spent on food decreases. United States studies document that 5.5 % of homes with elderly residents do not always have enough money to buy food (Lee & Frongillo, 2001). In Montana 14 % of rural diabetic patients over age 45 did not have enough money for food and were at high risk for malnutrition (Coon & Zulkowski, 2002). In America half of the older adults living in the community do not consume 50 % of the RDA for protein (Hunter, 1998). It is estimated that 4.9 million older adults experience food insecurity, due to lack of money to buy groceries or the inability to prepare their own meals, and the federal programs only benefit approximately 30 % of these elderly (ADA, 2000c).

Psychological

The education level of the elderly in America has improved in the last century with 68 % having a high school diploma and 15 % having bachelor's degrees (AoA, 2000). Many of the "baby boomer" generation have a college education and have left the rural areas for jobs in the city ("Montanans' lifestyle," 2001). The elderly with higher education levels are associated with higher

income levels and home ownership (Federal Forum, 2000). Many elderly have their home paid for before retirement and do not have a mortgage payment every month. In 1997 only 37% of senior citizens stated a fourth of their income was for housing payments (AoA, 2000). A monthly house payment or rent consumes a large portion of an elderly's Social Security check (Federal Forum, 2000). Senior residents who are not home owners may have to spend up to 36 % of their income on housing, leaving less money for food and health care (Federal Forum, 2000).

Rural elderly are older, poorer, less likely to have supplemental health insurance, and have more health problems then their urban counterparts (RUPRI, 1999). Low income is directly related to a nutritionally inadequate diet, and studies have shown many elderly do not receive adequate amounts of two-thirds of the recommended nutrients (Food Research and Action Center [FRAC], 2001). Lack of adequate nutrition leads to exacerbation of chronic and acute illness and thus decreases the quality of life for the older adult. Degenerative diseases advance faster with an inadequate diet often resulting in increased difficulty with activities of daily living (ADL's) which leads to depression (FRAC, 2001).

Women constituted 70 % of the population over the age of 85 in 2000, and this proportion is expected to increase (Federal Forum, 2000). The median income of women is half the amount of men and ninety percent of elderly women have only social security for income (AoA, 1996). The rural elderly in Montana experience increased social isolation with an increasing number of their children

moving out of the area to find work in urban areas (Lee, 1993). Memory problems affect 36 % of this age group and 23 % of the elderly age 85 years or older suffer from depression (Federal Forum, 2000). White, elderly, divorced or widowed men have a high incidence rate of suicide. In fact the highest suicide rate in the U.S. is the age group 75-84 years old and occurs at twice the rate of the general population (Gomez, G. & Gomez, E. 1995).

Chronic disease, depression, social isolation, poor dentition, and the process of aging are all associated with malnutrition in the elderly population (Gentleman, 2000). Many of the homebound elderly have two or three chronic medical conditions that impair their level of function in the ADL's, and independent ADL's (ADA, 2000c). Chronic disease affects 60 % of the elderly (Federal Forum, 2000). Arthritis is the chief complaint for most elderly over 70 years of age and is often crippling to mobility and movement (Federal Forum, 2000).

One of the strongest indicators of food insecurity in the rural elderly is "polypharmacy" taking three or more prescription drugs (ADA, 2000c). A major risk factor identified in the rural, white, elderly is polypharmacy which is directly related to increased confusion and falls (ADA, 2000c). The confusion caused by the multiple medications and their interactions often results in the elderly forgetting to eat or forgetting when they have had their last meal (ADA, 2000c). Many drugs can decrease the absorption of nutrients, change the taste of foods, or decrease the amount of saliva (CED, 2001). More then 400 common medications

taken by the elderly population have the side effect of xerostomia, commonly know as dry mouth. Xerostomia results in difficulty eating and swallowing food and leads to tooth decay (AoA, 1999). Difficulty with eating results in food avoidance and an intake of food inadequate to meet the recommended daily allowances (Satcher, 2000).

Dental Status

The ability to smell and taste decrease with the aging process but the production of saliva does not alter with age (Baum, 1997). Oral dryness in the older adult is a side effect of medication, a sign of dehydration, or a pathological process. Saliva helps to protect the teeth and oral tissues by destroying bacteria, some fungi, and viruses (Baum, 1997). Saliva aids in speech, taste, and swallowing and the lack of saliva makes these functions difficult. Poor nutrition can affect the amount and characteristics of saliva and leads to periodontal disease (ADA, 1996). Many elderly adults think that oral dryness is associated with aging. Oral dryness is associated with malnutrition in the elderly and seen frequently in the hospitalized elderly patient along with dehydration (Dormenval, Budtz-Jorgensen, Mojon, Bruyere, & Rapin, 1998). The older adult is unaware that a change in medication or increasing oral fluids could reverse this problem and they do not inform their health care provider of this problem (Baum, 1997).

The attitude of many older adults age 85 years or older is that it is natural to lose your teeth with old age (Cirincione & Fattore, 1996). The average adult in

the U.S. has 10-17 decayed, missing, or filled teeth (U.S. Preventive Services Task Force, 1996). The goal of Healthy People 2010 is to reduce the number of edentulous adults over the age of 65 years to 20 %. It is known that after receiving dentures many people do not have regular dental visits, however, little research has been done on mouth problems associated with wearing dentures. Studies show that food selection is limited for older adults who wear dentures (Sheiham, Steele, Marcenes, Finch, & Walls, 1999). The "baby boomer" generation has been taught good oral hygiene practices and most of them will retain their teeth throughout life with the continuation of good oral health care (Cirincione & Fattore, 1996).

The elderly person with dentures has 30-40% less chewing ability then he or she had with his or her own teeth (Satcher, 2000). Many elderly Americans do not know that dentures can be adjusted to fit more comfortably and do not go back to their oral health care provider for this service. It is recommended that denture wearers see their dentist yearly to check their gums and tissue (Sharp, 2001). Oral health plays an important part in a person's emotional health and his or her level of socialization with others. Elderly who are embarrassed about their teeth stop smiling and going to social functions such as meals at the Senior Citizens Center (Cirincione & Fattore, 1996; Satcher, 2000).

Only 55 % of the population age 65 years and above had made a dental visit in the year 1999 (Center for Disease Control, 2000). A study of 50 elderly individuals living in the community found that 80% of them rated their oral health

as good and had not seen the dentist in two years; examination found that 80% of them were in need of dental care (Calabrese, Friedman, Rose, & Jones, 1999). Rural senior citizens and those at or below the poverty level may not have seen a dentist in years. Elderly residents in rural areas have a lower utilization rate of dental services compared to urban elderly residents regardless of income level (Stearns, Slifkin, & Edin, 2000). Access to dental services for the rural elderly is limited due to the unavailability of dental providers and lack of coverage for dental care (Stearns, Slifkin, & Edin, 2000). Medication and chronic disease affect oral health. For example, diabetes mellitus increases the risk for periodontal disease (American Dental Association, 2001). Oral assessment needs to be done on the geriatric patient at all medical visits and referrals made when appropriate. To improve the oral health of elderly Americans, all health care providers need to participate in oral screening (ADA, 1996). Oral health is essential for general health and a sense of well-being for Americans (Satcher, 2000).

Nutritional Status

Malnutrition is defined as any nutritional disorder caused by an insufficient, unbalanced, or excessive diet or by the impaired absorption or assimilation of nutrients by the body (Mosby, 1998). One in four of the elderly population in America is considered malnourished by this definition (AoA, 2000). An estimated 67 to 88 % of the United States elderly population in the community

setting have moderate to high nutritional risk (ADA, 2000c). In a study conducted in Sweden, ratios of elderly malnutrition risk were similar to the U.S. with 62 % of the elderly populations in their communities found to be at risk for malnutrition (Wiley & Sons, 1999). Malnutrition results in a weak immune system leading to increased susceptibility to infection, impaired healing, weight loss and fatigue (Miller, 1999). The decreased nutrition level of the older individual often leads to illness, resulting in hospitalization and depression, which further decreases his or her food intake (ENC, 1997).

A reported 35-65 % of the elderly admitted to acute care hospitals in America are malnourished (Gentleman, 2000; Zulkowski & Kindsfater, 2000). The older adult has increased stress on the body with illness and injury and needs a higher amount of nutrients than a well person at a comparable age. When the elderly are malnourished it takes much longer for recovery from illness or injury. Likewise surgical risk increases with the nutritionally deficient older adult, and the risk of infection increases with loss of protein to build antibodies (ADA, 2000b). Protein-calorie malnutrition (PCM) is a type of malnutrition in which the individual does not take in enough nutrients for the body systems to function. This results in the body using muscle for fuel. In the elderly, PCM can lead to weight loss and often damage to vital organs such as the kidneys (Gentleman, 2000).

An Australian study had results similar to those in the U.S. and Sweden, with 55-70 % of their population at nutritional risk with protein deficits highest at

70 % (Krassie, Smart, & Roberts, 2000). A Canadian study revealed that 59 % of the elderly admitted to their acute care hospitals were malnourished and most of them had poor oral health. Canada has a current campaign to improve the oral health and nutritional status of the elderly in their country (McKeown, 1999).

Elderly adults with memory deficits need to be reminded to drink fluids on a daily basis to prevent dehydration (CED, 2001). Adding milk to meals will increase fluid and protein intake (Heaney, McCarron, Dawson-Hughes, Oparil, Berga, Stern, Barr, & Rosen, 1999). Milk is also a good source of calcium and the older adult needs a higher amount of calcium than recommended by the RDA to help prevent osteoporosis. Adding powdered milk to soups and sauces is another way to increase the protein and calcium in the diet (Krassie, Smart, & Roberts, 2000).

The U.S. Department of Agriculture's study comparing diet patterns of adults age 65 and older in 1977-78 and 1994-96 found that the elderly are consuming more sweet drinks and snacks, which are empty calories (Gerrior, 1999). The overall consumption of protein had decreased in 1996 with fewer adults eating eggs, red meat, or drinking whole milk (Gerrior, 1999). Part of the change in dietary intake of protein may be from society's campaign to decrease cholesterol and fat in our diets (ENC, 1997). The diet of today's elderly is deficient in protein, fiber, vitamins, and minerals and high in fat (Gerrior, 1999). Education on the basic four food groups and a balanced diet could improve the nutritional status of the elderly.

Community Factors

Access and Availability of Dental Care

Dental providers are scarce in rural areas and only 14 % of rural elderly have been to the dentist for teeth-cleaning in the last two years (Stearns, Slifkin, & Edin, 2000). The number of dentists in the U.S. is decreasing. Over 2000 dentists retire every year, over and above the number of dentists finishing school and entering practice in the same year ("Billings needs to talk," 2002). The dental availability problem is compounded by the fact that Medicare does not pay for dentures or dental services. Access to dental care for those with Medicaid is a problem for the rural elderly with all of the dental clinics in urban areas, and many dentists do not take Medicaid assignment (Hagengruber, 2001). The number of denture wearers in the rural population or elderly without teeth has not been studied and these proportions are unknown (Stearns, Slifkin, & Edin, 2000).

Montana ranks 23rd in the U.S. for number of dentists per 100,000 population and 60 % of these dentists are over age 45 years ("Billings needs to talk," 2002). Currently one full time employee exists in the state dental health program and only four low-income dental clinics exist in Montana, all located in urban areas (CDC, 2000). Most people cannot afford dental insurance after retirement (Satcher, 2000). The distance to the major urban areas may be 60 miles or more for an elderly rural Montanan and the waiting list may be up to a year. Consequently, the low-income dental clinics are not utilized by the rural elderly (Hagengruber, 2001).

Montana is the only state in the nation without a dental school (Montana Dental Hygienists' Association, 2001). Lack of access to dental care has been addressed at Montana's legislative sessions in 2000 and 2001. State legislator's discussions focus mainly on children's access to dental care, Medicaid barriers, and the possibility of opening a dental school in Great Falls in the fall of 2003 (DPHHS, 2001b).). Efforts to educate the public on the benefits of fluoride in community water systems have been started in many of the larger cities in Montana and the individual communities will vote on this decision (DPHHS, 2001a).

It was reported in the U.S. Preventative Services Task Force (1996) that less then 50 % of dental clients follow through on preventative oral care practices taught to them by dental workers. If health care providers counseled all clients on the need for regular dental hygiene and preventative care the number of adults who practice these principles may increase with the repeated reminders. The average American adult has damage to 10-17 teeth and 80 % have inflammation of their gums called periodontitis (USPSTF, 1996). Of the elderly population 95 % have periodontitis and more than 33 % with this condition have severe damage to their gums (Satcher, 2000). More then half of the adults over 65 years of age have dentures (ADA, 2000c). National advertisings on dental preventive care has been in toothpaste advertisements for over 20 years, yet the oral health statistics for adults in America do not reflect that they follow the advice (Satcher, 2000).

Certain chronic diseases such as diabetes can exacerbate dental disease. Good nutrition and oral health care practices can minimize periodontitis in diabetics (American Dental Association, 2001). Health care providers need to include preventive education with every visit to improve the oral health level of all Americans (Satcher, 2000). This education needs to cover reduction in carbohydrate snacks, the use of fluoride in the water systems, routine oral care even if they have dentures, and the importance of a nutritious diet along with an emphasis on regular exercise. Education on tobacco and alcohol and the associated risk of increased oral cancers with their use needs to be presented also. Aging "baby boomers" need to take proper care of their teeth now. The answer to improvement of oral health in the elderly population may be maximized with reminders from health care providers (Cirincione & Fattore, 1996).

Collaboration needs to be done with dental workers, health care workers, and community leaders to bring preventive and promotional oral health practices to the older population in the rural communities (ADA, 1996). Education needs to be done with the elderly, care-givers and family members to improve the overall oral health of senior citizens. Brushing with electric toothbrushes that are designed to fit the arthritic hand may encourage elderly adults to improve oral hygiene (USPSTF, 1996). Health care professionals need to assess the oral health of clients and educate them on appropriate mouth rinses to use and salivary substitutes that are available to improve their level of comfort and reduce plaque. The need for dental care to be provided in the community at senior centers or

other convenient places that the elderly have easy access to is a must for the future with the growth of the older population (USPSTF, 1996).

A dietitian or dental worker educated in nutrition could recommend high protein softer foods such as beans, eggs, tuna, peanut butter and cheese for the elderly client with problems chewing (CED, 2001). Educators need to collaborate and cross-train health care workers of the future to provide holistic care to the patient, and improve the nutrition and oral health of elders. Seminars for practicing dental, health, and nutrition professionals to cross-train on oral and nutritional assessment of the elderly can be provided by the state health department (DPHHS, 2001b).). The goal of Healthy People 2010 is to alleviate barriers to care, improve oral health, and provide preventive and promotional measures to reach the elder population (CDC, 2000).

The Surgeon General's report (Satcher, 2000) on oral health and nutrition in America addresses the problem of lack of collaboration of health care workers in all fields to provide a holistic approach to the care of the elderly population. [Note: This report prompted the Dental Professionals in Montana to form a Dental Summit to improve oral health and access to dental care in Montana. The last meeting was held in December 2001 and plans to secure funds to increase the number of dental providers to care for the underserved and to open a dental hygiene school in the state were discussed]. The need for all health care providers to collaborate and all health programs to teach the importance of nutrition and

assessment of oral health is vital to improving oral health in America (Satcher, 2000).

Nutritional Programs

Many elderly on fixed incomes are unable to afford enough food to eat a balanced diet. The Elderly Nutrition Program (ENP), was started in 1983 by the federal government to provide assistance to elderly in economic need. The Administration on Aging (AoA) is in charge of dispensing funds to each state so meals can be provided at senior centers and to the homebound. These meals are for people age 60 and older and disabled Americans. The focus of this program is to improve the nutritional status of citizens in financial and social need. In 1994, ENP provided 240 million meals to more then three million elderly adults at senior citizen centers and in their homes (AoA, 1996).

The ENP was evaluated in 1993 to determine if the nutritional needs of the elderly were being met and how the program was being utilized. Many Americans are familiar with the ENP known as the Meals on Wheels program. Senior citizens centers in many towns across the United States offer a hot meal for lunch for a reasonable fee Monday through Friday. Ninety-five percent of the meal providers have a congregated site where the elderly can meet for lunch and other social activities. More then 80 % of the meal sites provide home delivered meals through volunteer services (AoA, 1996).

In Montana, many senior residents depend on the meal provided by the ENP for the majority of their food intake (Montana State Advisory Council on

Food and Nutrition, 2000). Often a homebound resident will divide the noon meal into two meals. The soup or salad and dessert will be their lunch, and the main meat, vegetable or starch is saved for their supper. Breakfast may consist of coffee, juice and toast along with their morning medications. These elderly adults are only consuming 50 % of their RDA of nutrients if they consume everything that is served with their ENP meal (ADA, 2000c). Almost two million meals were served in Montana last year at senior centers and through the Meals on Wheels program (Montana State Advisory Council on Food and Nutrition, 2000).

The noon meals provide the homebound elderly with approximately 50 % of their RDA of protein and other nutrients (AoA, 1996). Almost 90 % of the elderly who receive meal services have incomes at or below 200 % of the poverty level (AoA, 1995). More than half of the Meals on Wheels participants live alone and are without transportation to get to a grocery store. The volunteer delivery person provides daily social contact for the homebound residents (AoA, 1996). This small amount of human contact improves the overall health of the homebound participants (ADA, 2000a). The decrease in their feelings of loneliness improves the appetite of the older adult (ADA, 2000a).

Approximately two-thirds of Meals on Wheels participants have impaired nutritional status (AoA, 1995). Nutritional screening such as the Nutritional Screening Initiative (NSI) is only preformed at 25% of the meal sites across America and nutritional assessment such as the Mini Nutritional Assessment (MNA) is only preformed at 16% of the sites (AoA, 1996). All of the elderly

Americans nutritional needs are not met through the ENP and nutritional counseling for seniors is only available at 30% of U.S. meal sites (AoA, 1996). With the future increase of elderly more resources will be needed to improve the nutritional status of the nation's elderly (Gerrior, 1999).

Over 40 % of the meal sites across the U.S. have waiting lists for senior citizens who are homebound and in need of food services (ADA, 2000c). The average cost of a meal at a senior center in America is $5.17 and a home-delivered meal is $5.31 (AoA, 1996). Those who do not qualify for Medicaid and are on a fixed income often cannot afford the meals. Not all counties offer a meal program. This is especially problematic for those who live in rural areas. With the increasing population of the elderly citizens in America expansion of this program will be necessary (AoA, 1996). Few studies have been done to see if the homebound meal recipients are able to eat the meals served to them and if their nutritional status has improved (Krassie, Smart, & Roberts, 2000). The service centers are all individually operated and more then half of the meal sites do not have a dietitian available to help plan the menu (AoA, 1996).

The Montana State Advisory Council on Food and Nutrition (2000) is aware of the need to educate seniors and staff at the senior centers across the state on nutrition standards. Plans to collaborate with the Montana Dietetic Association to set policies and develop programs to deliver at congregated meal sites are being discussed. These programs will provide nutrition education and

education on screening seniors for malnutrition risk (Montana State Advisory Council on Food and Nutrition, 2000).

A new program called the Commodity Supplemental Food Program was started in 29 counties throughout Montana in June 2000. Montana plans to expand the commodity food program to all 56 counties in the future. This commodity program is to assist persons 60 years and older with incomes at or below 130 % of the poverty level. An estimated 7,500 Montanans met the criteria for food assistance in 1999. In 1998-1999 the number of households in Montana needing food assistance rose by 6% (Montana State Advisory Council on Food and Nutrition, 2000).

Another successful project started in summer 2000 is the Farmers Market Nutrition Program in six locations, which allows seniors to use food stamps to purchase fresh produce from local farmer's markets and increase their intake of fruits and vegetables. The state plans on increasing funds to continue and expand this food resource to more communities in the year 2002 (Montana State Advisory Council on Food and Nutrition, 2000).

Summary

The proportion of seniors in Montana has grown three times faster then the National average (U.S. Census, 2000). Rural senior citizens have been found to be older, poorer and have more severe chronic medical problems compared to the urban senior population (Stearns, Slifkin, & Edin, 2000). Poverty has a strong

association with nutrition risk in the older adult (ADA, 2000b). An estimated 67 to 88 % of the United States elderly population in the community setting have moderate to high nutritional risk (ADA, 2000c). Approximately two-thirds of Meals on Wheels participants have impaired nutritional status (AoA, 1995). In Montana, many senior residents depend on the meal provided by the ENP for the majority of their food intake (Montana State Advisory Council on Food and Nutrition, 2000).

As the framework shows the rural elderly individual, especially those in poverty, rely on the community to meet their physical, social, and psychological factors. The physical need for nutrition is met through the Meals on Wheels program, the social contact with the delivery person also decreases their isolation and helps reduce the psychological area of depression. Oral health is necessary to take in adequate nutrition and plays an important part in a person's emotional health and his or her level of socialization with others. The rural elderly resident is often dependent on family and friends for transportation due to the lack of public transportation in rural areas.

The availability of a local dentist, health care provider, and grocery store become a necessity to the elderly in rural areas with limited transportation and a distance of 60 miles or more to urban centers. In turn the community is able to continue to provide the Meals on Wheels as long as the program is utilized by the residents and maintained by community volunteers. Also, dental and medical practices remain in business in rural communities as long as the residents utilize

these local services. The community members also receive the psychological reward of helping others which lifts their esteem and improves the health of the community.

Of the elderly population 95 % have periodontitis with more than 33 % of this condition being severe to the point of 6 mm of damage to their gums (Satcher, 2000). More then half of the adults over 65 years of age have dentures (ADA, 2000c). Dental providers are scarce in rural areas and only 14 % of rural elderly have been to the dentist for teeth-cleaning in the last two years (Stearns, Slifkin, & Edin, 2000).

Few studies have been done to see if the homebound meal recipients are able to eat the meals served to them and if their nutritional status has improved (Krassie, Smart, & Roberts, 2000). Education needs to be done with the elderly, care-givers and family members to improve the overall oral health and nutritional health of senior citizens. With the future increases in the elderly population plans to expand the delivery of home services and nutrition programs to the rural population must be addressed (Community Policy Analysis Center [CPAC], 1999).

CHAPTER 3

METHODS

The purpose of this study was to examine dental and nutritional status in the rural elderly of Montana. Two specific aims were addressed in this study. Aim 1: Is there a relationship between dental and nutritional status in the rural elderly of Montana? Aim 2: Whether there are differences in nutritional and dental status between rural elderly in Montana receiving Meals on Wheels and those who are not?

Design

A correlational descriptive design was used to assess the relationship of oral health and nutrition status in the rural elderly of Montana. This is a secondary data analysis done on data collected for a USDA funded study. The goal of the USDA study was to determine an individual and community based nutritional profile necessary to support healthy aging in Montana.

Questions to assess oral health were added to the USDA study questionnaire booklet. Some oral health questions are part of the Nutritional Screening Initiative (NSI) and the Mini Nutritional Assessment (MNA). Both the NSI and the MNA were utilized as nutrition screening tools in the USDA study and both were used in the secondary analysis. Additional oral health questions

were obtained from the National Oral Health Surveillance System, a division of the Center for Disease Control.

Sample

A convenience sample of rural elderly from 5 of the 11 rural/frontier regions in Montana were utilized. The sample was obtained from individuals' age 60 years and over using programs at the Senior Citizens Centers in their community, and those listed on the rural communities Meals on Wheels programs. Participation in the study was voluntary. All data was collected at the subject's home by a trained interviewer. The total sample consisted of 80 rural elderly, 40 receiving Meals on Wheels and 40 who did not.

Inclusion Criteria

Age 60 years or older and non-institutionalized.

Ability to complete a questionnaire, an interview, and a 24-hour food diary.

Willingness to have blood drawn for laboratory values.

Resident of a rural community in Montana.

Exclusion Criteria

History of renal or liver failure, cancer, or an active infection.

(All exclusion criteria alter laboratory values for nutritional status).

Interview

Demographics

Gender, age, ethnic background, marital status, and living arrangements were addressed in the interview session of the USDA study. Home ownership, length of time in the community, and personal description of the community, were questions asked of each subject along with education level and yearly income. Whether the rural elderly individual had a chronic illness was addressed in the interview. In addition, the availability and distance to medical, dental, and community services was assessed at the subject's interview session. All of the interviewers in the USDA study used the same forms (See Appendix B).

Mini Nutritional Assessment

The Mini Nutritional Assessment (MNA) is a tool to for health providers to use to quickly screen geriatric clients for malnutrition risk. The MNA consists of 18 questions that assess four areas: anthropometric measurement, general, dietary, and subjective assessment of the elderly individual (MNA, 2000). Each question is scored and then the total score value is the indicator of malnutrition risk, with a total score of 24 and above-considered nourished, and a total score of 23 and below-considered at risk of malnutrition. A total MNA score of 17 or less indicates the individual is malnourished. For this study the total score values-indicators of malnutrition risk were utilized. The MNA screening tool has

established validity and reliability. The MNA was integrated into the interview forms of the USDA study (See Appendix B).

24-hour Food Diary

The 24-hour food diary was part of the interview session. Assessment of the actual food consumed by the subject at each meal, in the last 24 hours, was compared to the number of meals the participants stated they ate per day in the questionnaire (See Appendix B).

Laboratory Values

Laboratory values included serum hemoglobin, hematocrit, albumin, glucose, and protein levels to measure individual nutritional status. Obtaining specific laboratory values assessed the actual nutrition level of the participants at the time of the study and further validates the reliability of the tools used to assess nutrition. The laboratory values were used to assess specific dietary differences between the group receiving Meals on Wheels and the group that is not on the program.

Questionnaire

Nutritional Screening Initiative

The Nutritional Screening Initiative (NSI) was used to measure nutritional status. The NSI was developed by The American Academy of Family Physicians, American Dietetic Association, The National Council on the Aging, and other

organizations. The purpose of the NSI is to incorporate nutrition screening of the elderly, with an effective tool for all health professionals to use (NSI, 2000). The NSI consists of 10 individually scored questions to assess nutrition. The total score interpretation determines the individuals malnutrition risk, with a higher score corresponding with a higher risk of malnutrition. A score of 6 or greater is high risk, score of 3-5 is moderate risk, and a score of 2 or less indicates no risk for malnutrition. For this study the NSI tool was examined two ways. First the total score and second the interpretation of the score, were utilized to determine malnutrition risk. The NSI screening tool has established validity and reliability. The NSI was integrated into the USDA questionnaire given to the study participants (See Appendix A).

Oral Health Assessment

Oral health questions are part of the NSI screening tool. The oral health questions in the NSI are: Do you have tooth or mouth problems that make it hard for you to eat? Is your mouth dry? Do you have problems with: lips, tongue, bleeding or swollen gums, toothaches or sensitivity to hot or cold, pain or clicking in your jaw? When was your last dental exam? A list of specific times from never to over five years was attached to this question. A list of ten reasons to visit the dentist followed the dental exam question, which was obtained from the National Oral Health Surveillance System (NOHSS). These additional questions came from the NOHSS: Do you have difficulty swallowing? Do you have dentures? If yes: do your dentures fit well? (See Appendices A & B).

USDA Study Data Collection Process

1. Institutional review board approval obtained (See Appendix C).

2. A list of phone numbers and addresses of senior centers in the 11 regions providing home delivered meals in rural areas of Montana was obtained.

3. Sites were contacted to determine willingness to participate

4. The research assistants obtained a list of volunteer participants not on the home meal program at the senior centers.

5. A list of participants on the meal plan at each site in these regions was obtained from the senior centers.

6. Potential participants were contacted by telephone to determine willingness to participate and study eligibility.

7. Appointments were set up for a home visit

8. During the initial home visit written consent was obtained and each participant was given an identification number (See Appendix D). The identification number was used on the interview form, questionnaire booklet, and laboratory form.

9. Anthropological measurements were taken and blood was drawn for laboratory analysis.

10. A questionnaire and food diary was completed by the participant or was verbally asked and completed by the interviewer for participants who had difficulty with reading or writing (See Appendices A & B).

11. Thank you cards were mailed to the senior center sites.

12. Data was entered into an SPSS 11.0 statistical software program for analysis

Protection of Human Subjects

Montana State University-Bozeman Institutional Review Board approval was obtained for the USDA study. Montana State University-Bozeman College of Nursing Human Subjects Review Committee approved the secondary data analysis study. Consent was signed by each of the participants (Appendix D). The study results are confidential and participation was voluntary, which is stated on the personal interview information form and the consent (Appendix D). The primary investigator of the USDA study entered all of the data into the SPSS 11.0 system. The secondary data analysis was done with data in the SPSS system. The names of the participants in the USDA study were not put in the SPSS system to maintain confidentiality for this secondary data analysis. Only aggregate data was available for this study. Individual names were not available to the researcher.

Assumptions

Nutritional status and oral health are the variables assessed in the rural elderly population and between the group receiving meals and those who are not. It was assumed that rural individuals on the Meals on Wheels program would have a lower nutritional status. It was assumed that individuals with poor dental status would have a lower nutritional status. It was assumed that individuals wearing dentures would have a lower nutritional status.

Data Analysis

Demographics

Descriptive statistics were used to examine the age, gender, ethnic background, years lived in the rural community, and years of education of the rural elderly in Montana. Marital status, income, living arrangements, chronic illness, home ownership, the participants' descriptions of their community, and availability of medical, and dental services are presented in percentages. The nutritional and dental data are presented using descriptive statistics to assess the results of the nutrition screening tools: NSI, MNA, laboratory values, and the results of the oral health questions. Descriptive statistics for dental status and nutritional status with frequency distribution and measures of central tendency were used to look at the individual and community factors of the rural elderly in Montana.

Aim 1.

The purpose of this study was to examine whether a relationship existed between dental and nutritional status in the rural elderly of Montana. A correlation matrix was utilized to exam the relationship between dental and nutritional status of the rural elderly.

Aim 2.

Further this study examined whether there were differences in dental and nutritional status between rural elderly receiving Meals on Wheels and those who

were not. A t-test to assess nutrition, and descriptive frequency analysis to assess dental status, were utilized to look for differences between the group receiving Meals on Wheels and those who were not.

Potential Problems and Limitations

The convenience sample may not be an accurate representation of the rural elderly population in the U.S. The low minority rate in Montana is not representative of most areas and therefore the study results cannot be generalized to the populations of other rural areas. The nutritional and dental status of participants may not be representative of all rural elderly in Montana. The data collectors for the study were not residents of the rural community. This may have influenced the participant's responses due to the values of rural communities and strangers asking personal questions. The personal interviews of elderly participants may have altered the responses obtained related to bias in the interviewer or participant. Honest answers may not have been given due to embarrassment or shame for the elderly individual in poverty.

The USDA study was conducted in the summer. The hot weather may have skewed the laboratory values; dehydration in the elderly could result in higher laboratory values. Chronic illness may have affected the laboratory values. Cognitive impairment of short-term memory may have affected the results of the 24-hour food diary obtained from the participants. The day of the interview may not have been the typical diet of the participant. The elderly participant may not

have fully understood or been unable to read the questions in the questionnaire.

Because a dental exam was not done the results of the oral health assessment may be limited. A question to assess if the participant's were without dentures and edentulous, was not included in the USDA study. The interview questions may not have been understood completely by the elderly individual and answers obtained may not be accurate. The interviewers may have made errors in the recording of data that would affect the actual results obtained in the USDA study and, therefore, the results of the secondary analysis.

Summary

The purpose of this study was to examine dental and nutritional status in the rural elderly of Montana. A correlational descriptive design was used in a secondary data analysis. The original data is from a USDA funded study using a convenience sample of 80 rural elderly Montanans. Half of the participants were receiving Meals on Wheels and half were not. The study was voluntary and consent was obtained from each subject. Institutional review board approval was obtained for the original USDA study and the secondary data analysis.

The USDA study involved an interview, questionnaire, 24-hour food diary and laboratory blood values. The Nutritional Screening Initiative (NSI), Mini Nutritional Assessment (MNA), 24-hour food diary and laboratory values were used to assess nutritional status. Questions to assess oral health were added to the original USDA questionnaire booklet. Oral health questions added to the

questionnaire and those that are part of the NSI were examined to assess dental status. The data for secondary analysis was aggregate only in a SPSS 11.0 statistical software program; names were not available to the researcher.

CHAPTER 4

DATA ANALYSIS

Descriptive statistics were utilized to present the demographics of the 80 participants from the original USDA study. Significant physical, psychological, and social factors were examined and presented. Frequency distributions were utilized to assess the nutritional and dental status of the participants with measures of central tendency used to present laboratory values. A correlation matrix was used to assess the relationship of dental and nutritional variables. Differences between the two groups of participants were measured using a t-test for nutritional and frequency distribution for dental assessment.

Demographics

The sample consisted of 80 participants, 31% (n=25) male and 69% (n=55) female. Ninety-six percent (n=76) were Caucasian, 3% (n=2) Native American, and 1% (n=1) Hispanic, the ethnic mix is consistent with the population of Montana. The mean age was 79 years with a range of 60 to 97 years. Forty-four percent (n=35) were widowed, 39% (n=31) married, 10% (n=8) divorced, and 8% (n=6) never married. Forty-eight percent (n=38) lived alone, 39% (n=31) with their spouse, 10% (n=8) lived with their children or other relative, and 4% (n=3) with a friend.

Seventy-eight percent (n=62) of the rural elderly owned and lived in their own homes. The average length of time the participants lived in the rural community was 42 years or more. A third of the sample had 12 years of education 33.8% (n=27). Income was reported to be between $10,000-40,000 for 47% (n=37), 45% (n=35) reported incomes less than $10,000, and 8% earned over $40,000 annually. Forty percent (n=32) of the participants reported they lived in a farm/ranching community, 35% (n=28) a rural community, and 25% (n=20), a rural town (Table 1). Ninety percent (n=72) of the participants reported at least one chronic illness. A health care provider and a dentist were reported to be available by 94% (n=75) of the sample.

Physical/Psychological/Social Factors

Fifteen percent (n=12) did not always have enough money for food. More than half of the participants 55% (n=44) ate alone. Sixty-three percent (n=50) took three or more daily medications. Most of the participants had pain that interfered with their normal activities 65.4% (n=51). Twenty percent (n=16) of the sample reported they were unable to leave their homes for social or physical activities.

Table 1. Demographics of the Sample (n=80)

	(%)	n
Gender		
Male	(31.3)	25
Female	(68.8)	55
Ethnic Background		
Caucasian	(96)	76
Native American	(3)	2
Hispanic	(1)	1
Marital Status		
Widowed	(43.8)	35
Married	(38.8)	31
Divorced	(10)	8
Never Married	(7.5)	6
Living Arrangement		
Alone	(47.5)	38
With Spouse	(38.8)	31
With Family	(10.1)	8
With Friend	(3.8)	3
Education		
8 Years	(11.3)	9
12 Years	(33.8)	27
14 Years	(10)	8
16 Years	(10)	8
Yearly Income		
< $10,000	(45)	35
$10,000-$40,000	(48)	37
> $40,000	(8)	6
Type of Community		
Farm/Ranch	(40)	32
Rural	(35)	28
Rural Town	(25)	20

Nutritional Assessment

Nutritional Screening Initiative (NSI) scores ranked 46.3% (n=37) at high risk for malnutrition, and 33.8% (n=27) at moderate risk. The Mini Nutritional Assessment (MNA) score values rated, 53.8% (n=43) as malnutrition risk candidates. Twenty-nine percent (n=23) had a body mass index (BMI) of 30.0 or greater and 27.5% (n=22) had a BMI of 23 or less. More then half, 60.8% (n=48), of the sample reported they ate three meals a day, 22.8% (n=18) ate two meals, 11.4% (n=9) ate one meal, and 5.1% (n=4) had more then three meals a day. Assessment of the 24 hour food diary revealed 12% (n=9) had three meals, 64% (n=48) had two meals, and 24% (n=18) had one meal (Table 2).

Laboratory values for hemoglobin were 11.5 gm/100ml to 17.9 gm/100ml (M = 14.1 gm/100ml, SD ± 1.2). The laboratory values for hematocrit were 35.2% to 54.8 % (M = 42.4%, SD ± 3.5). The laboratory values for albumin were 3.6 gm/dl to 5.1 gm/dl (M = 4.3 gm/dl, SD ± 0.3). The laboratory values for glucose were 60 gm/dl to 367 gm/dl (M = 115 gm/dl, SD ± 49.2). The laboratory values for protein were 6.1 gm/dl to 8.9 gm/dl (M = 7.2 gm/dl, SD ± 0.5).

Nutritional Assessment

Nutritional Screening Initiative (NSI) scores ranked 46.3% (n=37) at high risk for malnutrition, and 33.8% (n=27) at moderate risk. The Mini Nutritional Assessment (MNA) score values rated, 53.8% (n=43) as malnutrition risk candidates. Twenty-nine percent (n=23) had a body mass index (BMI) of 30.0 or greater and 27.5% (n=22) had a BMI of 23 or less. More then half, 60.8% (n=48), of the sample reported they ate three meals a day, 22.8% (n=18) ate two meals, 11.4% (n=9) ate one meal, and 5.1% (n=4) had more then three meals a day. Assessment of the 24 hour food diary revealed 12% (n=9) had three meals, 64% (n=48) had two meals, and 24% (n=18) had one meal (Table 2).

Laboratory values for hemoglobin were 11.5 gm/100ml to 17.9 gm/100ml (M = 14.1 gm/100ml, SD ± 1.2). The laboratory values for hematocrit were 35.2% to 54.8 % (M = 42.4%, SD ± 3.5). The laboratory values for albumin were 3.6 gm/dl to 5.1 gm/dl (M = 4.3 gm/dl, SD ± 0.3). The laboratory values for glucose were 60 gm/dl to 367 gm/dl (M = 115 gm/dl, SD ± 49.2). The laboratory values for protein were 6.1 gm/dl to 8.9 gm/dl (M = 7.2 gm/dl, SD ± 0.5).

Table 2. Nutrition Assessment Data (n=80)

Category	(%)	n
NSI		
High Risk	(46.3)	37
Moderate Risk	(33.8)	27
No Risk	(20)	16
MNA		
Malnutrition Risk	(53.8)	43
No Risk	(46.3)	37
BMI		
33 or greater	(28.7)	23
23 or less	(27.5)	22
Meals/Day		
3 Meals	(60.8)	48
2 Meals	(22.8)	18
1 Meal	(11.4)	9
>3 Meals	(5.1)	4
Food Diary		
3 Meals	(12)	9
2 Meals	(64)	48
1 Meal	(24)	18

Dental Assessment

Thirty-eight percent (n=30), of the participants had seen the dentist within the past six months, 28.8% (n=23) had not seen a dentist in more than five years, and 51.4% (n=41) had not been to the dentist in two years or more. Dentures were reported by 54.4% (n=43) of the sample, and of those with dentures 30.2% (n=13) indicated that their dentures did not fit well. Mouth problems were reported by 27.8% (n=22) of the sample, tooth problems by 15% (n=12), and a

dry mouth by 26.3% (n=21). Difficulty swallowing and gum problems were reported by an equal number of participants 8.8% (n=7) (Table3).

Thirty-four percent (n=27) of the sample had been to the dentist for teeth cleaning or a check-up. Twenty-five percent (n=20) had a tooth filled, and 31.3% (n=25) had been seen for denture repair. Twenty percent (n=16) had a tooth pulled or had oral surgery and 2.5% (n=2) had a root canal. One participant reported a sore mouth, one reported bleeding gums, and 8.8% (n=7) of the sample had been to the dentist for facial or dental pain.

Table 3. Dental Assessment Data (n=80)

Dental Exam	6 Months 37.5% (n=30)	2 Years or > 51.4% (n=41)	5Years or > 28.8% (n=23)
Oral Health Problems	%	n	
Mouth Problems	(27.8)	22	
Tooth Problems	(15)	12	
Dry Mouth	(26.3)	21	
Difficulty Swallowing	(8.8)	7	
Gum Problems	(8.8)	7	
Wear Dentures	(54.4)	43	
Dentures Do Not Fit Well	(30.2)	13	(n=43)

Aim 1

Is there a relationship between the dental and nutritional status of the rural elderly in Montana? Correlations between nutritional and dental status of the rural elderly in Montana were examined. The data was analyzed using Pearson's Bivariant Correlation with significance at $p < 0.05$ and $p < 0.01$ level (2-tailed). Seven dental variables were found to have at least two significant correlations with three nutritional variables. The dental variables were: difficulty swallowing, mouth problems, dry mouth, tooth problems, dental exam, denture repair, and teeth cleaning. The nutritional variables were: Nutrition Screening Initiative (NSI)-score interpretation, Mini Nutritional Assessment (MNA)-score values, and food intake based on 24-hour food diary. These ten dental and nutritional variables were utilized in the correlation matrix (Table 4).

The Nutritional Screening Initiative (NSI), (NSI score interpretation) correlated most frequently with the dental data variables. There was a positive correlation with difficulty swallowing (0.239), mouth problems (0.551), dry mouth (0.387), tooth problems (0.220), dental exam (0.251), and the NSI score interpretation. There was a negative correlation with dental exam for teeth cleaning (-0.277), and the NSI score interpretation.

The nutrition variable from the Mini Nutritional Assessment (MNA) that correlated with the dental variables was the MNA Score Values. Tooth problems (0.319), and denture repair (0.247) correlated with MNA Score Values. The nutrition variable, food intake correlated negatively with dental variables,

difficulty swallowing (-0.379), dry mouth (-0.279), and denture repair (-0.222) (Table 4).

The strongest significant correlation found between all of the variables was the positive correlation of (0.551) between the dental variable, mouth problems and the nutrition variable, NSI score interpretation, at the 0.01 level of significance. The strongest negative significant correlation was (-0.379) between the dental variable, difficulty swallowing and the nutrition variable, food intake, at the level of 0.01 significance.

Table 4. Correlation Matrix Between Dental and Nutritional Data Variables

	1	2	3	4	5	6	7	8	9	10
1 Difficulty Swallowing	1.00									
2 Mouth Problems	.303**	1.00								
3 Dry Mouth	.519**	.393*	1.00							
4 Tooth Problems	.118	.366**	.227*	1.00						
5 Dental Exam	.095	.169	.132	-.090	1.00					
6 Denture Repair	.173	.081	.027	.019	.237*	1.00				
7 Teeth Cleaning	-.127	-.388**	-.125	-.004	-.586**	-.424**	1.00			
8 Food Intake	-.379**	-.070	-.279*	.008	-.003	-.222*	.043	1.00		
9 NSI Interpretation Score	.239*	.551**	.387**	.220*	.251*	.050	-.277*	-.233*	1.00	
10 MNA Score Values	.110	.172	.212	.319**	.070	.247*	-.027	-.368**	.316**	1.00

*p< 0.05, **p < 0.01 Note: 1=Difficulty Swallowing, 2=Mouth Problems, 3=Dry Mouth, 4=Tooth Problems, 5=Dental Exam, 6=Denture Repair, 7=Teeth Cleaning, 8=Food Intake, 9=NSI interpretation Score, 10=MNA Score Value.

Aim 2

Whether there are differences in the dental and nutritional status of the rural elderly in Montana receiving Meals on Wheels and those who are not? The differences in the nutritional data between the two groups of rural elderly was examined using a t-test with significance at $p < 0.05$ level (2-tailed) and confidence interval of 95%. The dental data was analyzed using frequency and percentage distributions, to assess differences between the group receiving Meals on Wheels and the group that did not (independent group).

Nutritional Differences

The t-test was performed using the mean total scores of the two nutrition screening tools, Nutrition Screening Initiative (NSI), and Mini Nutritional Assessment (MNA), from the two groups. The NSI total score showed a significant difference ($p < 0.021$) between the Meals on Wheels group and the independent group. The mean score for the Meals on Wheels group was 6.55 (SD $\pm$ 4.05) and the mean score for the independent group was 4.63 (SD $\pm$ 3.22). The MNA total score showed a significant difference ($p < 0.000$) between the Meals on Wheels group and the independent group. The mean score for the Meals on Wheels group was 22.9 (SD $\pm$ 4.01) and the mean score for the independent group was 25.9 (SD $\pm$ 2.09) (Table 5).

Table 5. Differences in NSI and MNA Scores of Meals on Wheels & Independent Group

Group	Mean	N	SD	t	df	Sig. (2-tailed)
NSI determine sum (NSI total score)						
Meals on Wheels	6.55	40	4.05	-2.35	74.2	0.021
Independent	4.63	40	3.22	-2.35	78	0.021
MNA total assessment (MNA total score)						
Meals on Wheels	22.9	37	4.01	3.98	54.6	0.000
Independent	25.9	36	2.09	3.95	71	0.000

SD = standard deviation, t = t value, df = degrees of freedom, Sig. = p value.

Dental Differences

The Meals on Wheels group scored a higher frequency and percentage in eight of the nine dental variables assessed which included: 40% (n=16) had mouth problems, 12.5% (n=5) difficulty swallowing, 32.5% (n=13) a dry mouth, 7.5% (n=3) lip problems, 2.5% (n=1) sore mouth, 12.5% (n=5) gum problems, 20% (n=8) tooth problems, and 7.5% (n=3) had jaw problems. The Meals on Wheels group reported a higher percentage of denture wearers, 62.5% (n=25) versus 45% (n=18) in the independent group, and a higher percentage of dentures not fitting well 32% (n=8) versus 27% (n=5) respectively. The ninth dental variable, tongue problems, occurred equally 2.5% (n=1) in both groups (Table 6).

Table 6. Differences in Oral Health Problems between Meals on Wheels & Independent Group

	Meals on Wheels		Independent	
Problem	(%)	N	(%)	N
Mouth	(40)	16	(15)	6
Diff. Swallowing	(12.5)	5	(5)	2
Dry Mouth	(32.5)	13	(20)	8
Lip	(7.5)	3	(5)	2
Sore Mouth	(2.5)	1	(0)	0
Gum	(12.5)	5	(5)	2
Tooth	(20)	8	(10)	4
Jaw	(7.5)	3	(0)	0
Tongue	(2.5)	1	(2.5)	1
Dentures	(62.5)	25	(45)	18
Dentures do not fit	(32)	8	(27)	5

The independent group scored higher for oral preventative care measures than the Meals on Wheels group. Fifty percent (n=20) of the independent group had a dental exam within the last six months compared to 25% (n=10) of the Meals on Wheels group. Almost half of the independent group 47.5% (n=19) had their teeth cleaned and 42.5% (n=17) had a regular check up at their last dental exam compared to 20% (n=8) had their teeth cleaned and 25% (n=10) had a

regular check up of the Meals on Wheels group. Fifteen percent (n=6) of the Meals on Wheels group had gone to the dentist for facial/dental pain compared to 2.5% (n=1) of the independent group. Both groups equally reported seeing the dentist for tooth filling 25% (n=10), and loose tooth 5% (n=2).

CHAPTER 5

DISCUSSION

The purpose of this study was to examine the dental and nutritional status in the rural elderly of Montana. Specifically this study addressed: Is there a relationship between the dental and nutritional status of the rural elderly in Montana? Frequency and percentage distribution statistics were utilized to examine the dental and nutritional data. Pearson's correlations were assessed to find significant relationships between the data variables obtained from the original USDA study. In addition this secondary analysis study addressed: Whether there were differences in dental and nutritional status of the rural elderly in Montana receiving Meals on Wheels compared with those who were not (independent group)? A t-test on nutrition variables, and frequency distribution statistics of dental variables, were utilized to examine differences between the two groups.

Findings

Aim 1.

Two nutrition assessment tools, the Nutritional Screening Initiative (NSI) and the Mini Nutritional Assessment (MNA), along with a 24-hour food diary and laboratory values were used in this secondary data analysis study. The data collected from 80 rural elderly participants for a USDA study, was examined to assess their dental and nutritional status. The NSI scores ranked more than half of

the participants at risk for malnutrition. The MNA scores also rated more than half of the participants at risk for malnutrition (Table 2). This finding is similar to the percentages of elderly at risk for malnutrition in the nation, which were estimated to be 67-88 % of elderly living in the community setting (ADA, 2000c). Evaluation of the NSI, part of the questionnaire, 61% of the participants reported eating three meals a day, and 23 % reported eating two meals a day. However, assessment of the 24-hour food diary, which was part of the interview, found only 12 % of the participants had three meals and 64 % had two meals per day. The nutritional laboratory values, conversely, were within range or elevated for the expected values listed from the laboratory that ran the tests.

The dental data revealed that half of the sample had not been to the dentist for two years or longer. This indicates that elderly Montanan's fall far behind the national average and wait twice as long to visit the dentist. Fifty-five percent of Americans age 65 years and older reported they had seen the dentist within the past year (Center for Disease Control, 2000). More than half of the sample wore dentures and of those a third indicated they did not fit well. It is recommended that denture wearers see their dentists every year for oral tissue examination (Sharp, 2001). It is evident that this is not practiced by the rural elderly in Montana. Mouth problems and dry mouth were reported as the most frequent oral health problems (Table 3).

The NSI score interpretation correlated significantly with six dental variables. The MNA score total correlated with two dental variables: tooth

problems and dental exam for denture repair. The study results indicated that food intake correlated negatively with the dental variables, difficulty swallowing, dry mouth and denture repair in the rural elderly of Montana (Table 4).

Aim 2.

The t-test performed on the mean NSI and MNA scores of the two groups, Meals on Wheels and independent, revealed a significant nutritional difference between them. The NSI score is an interpretation of malnutrition risk, a score of 6 or greater is high risk, score of 3-5 is moderate risk, and a score of 2 or less indicates no risk for malnutrition. The mean NSI score for the Meals on Wheels group was 6.55, at high nutritional risk compared to the mean score of 4.63, at moderate nutritional risk for the independent group. The MNA score is also a malnutrition risk indicator with a score of 23 or less considered at risk for malnutrition and a score of 24 or higher considered nourished. The t-test performed on the mean MNA scores of the two groups shows similar differences in the results with the Meals on Wheels group scoring 22.9, at risk for malnutrition and the independent group scored 25.9, well nourished. These results are similar to the national findings that approximately two-thirds of Meals on Wheels participants had impaired nutritional status (AoA, 1995).

Division of the dental data revealed many differences in the frequencies of oral health problems between the two groups. The Meals on Wheels group had higher frequencies in every oral health problem, except tongue problems, which

occurred equally; one participant in each of the groups reported this problem (Table 6). Differences in preventive oral health care measures were also present between the two groups.

Half of the independent group had been to the dentist within six months compared to only a quarter of the Meals on Wheels group. In addition, almost half of the independent group had been to the dentist for teeth cleaning or a check-up compared to only a fourth or less of the Meals on Wheels group for the same procedures. In contrast, a higher percentage of the Meals on Wheels group 15% (n=6) had seen the dentist for facial/dental pain, compared to only 2.5% (n=1) of the independent group.

Conclusion

Aim 1.

A relationship does exist between the nutritional scores of the Nutritional Screening Initiative (NSI) and the dental variables: mouth problems, dry mouth, tooth problems, dental exam, and teeth cleaning. The same relationship was not significant with the nutritional scores of the Mini Nutritional Assessment (MNA) which only showed a relationship with tooth problems and denture repair. Further studies need to be done to assess the differences found between the two nutrition tools and dental factors to demonstrate there is a definitive relationship present.

The negative relationship between food intake and the dental variables, difficulty swallowing, dry mouth, and denture repair, is significant and does show

that oral health has an impact on nutrition. If an individual is experiencing difficulty swallowing food they will avoid eating since it is an unpleasant experience. Dry mouth affects the taste of food and can make swallowing food difficult. If eating is not pleasurable the individual will avoid it. A study conducted in Sweden also found a significant relationship between dry mouth and malnutrition (Dormenval, et al, 1998). If dentures do not fit well or need repair the individuals chewing ability may be decreased. As a result high protein foods such as meat will be eliminated from the diet.

It was assumed that denture wearers would have a negative nutrition relationship but no significant relationship with nutrition was found. Limitation in the relationship between nutrition and dental variables, despite the significance of the correlations found, must be considered since there were no significant correlations between the dental variables and the laboratory values of the participants. The fact that the laboratory values were within normal limits or elevated raises the question of how hydrated the participants were. The original USDA study was conducted in the summer months and dehydration could have resulted in false elevation of serum laboratory values.

Aim 2

Significant differences in the nutritional and dental status were found between the Meals on Wheels group and the independent group. The mean scores of both nutrition tools, the NSI and the MNA, were significantly different, and revealed the Meals on Wheels group at a higher risk for malnutrition. The Meals

on Wheels group had a higher overall percentage of dental problems and less frequency in the use of preventative oral health care measures. The Meals on Wheels group had a higher percentage of edentulism and occurrences of facial/dental pain than the independent group.

The relationship from Aim 1, between dental and nutritional status does exist in the rural elderly of Montana. Poor dental status is associated with poor nutritional status. Poverty, lack of transportation, and individual values and beliefs must be considered as factors in this relationship since the same results were not found between all rural elderly participants in the study.

Discussion of Findings

Although these results cannot be generalized to other elderly populations or to other rural populations, the results do show that dental and nutritional status in the elderly are related. Further studies need to be done to assess the relationship between dental and nutritional status of the elderly in rural and urban areas. Further studies with the Meals on Wheels group need to be done to assess their nutritional and dental status. The meal program may be adequate but, if it is their only source of food, then additional resources need to be made available to this group of elderly to meet all of their nutritional needs.

It was reported in the U.S. Census (2000) that 11-17% of the rural elderly in Montana had incomes at or below the poverty level. Income was reported to be less than $10,000 annually for 45% (n=37) of the participants in the original

USDA study. Poverty is defined by the federal government in 2001 for an individual 65 years and over at $8,494 and for two people with the householder 65 years and over at $10,715 (U.S. Census Bureau, 2001). Almost half of the study participants had incomes very close to the definition of poverty, three times the poverty level listed for Montana in the U.S. Census for 2000. Poverty puts the elderly at a higher nutritional risk (ADA, 2000b). Future studies need to be done to validate this study's findings on poverty levels of Montana's rural elderly.

Studies in America report that 5.5% percent of elderly do not have enough money for food (Lee & Frongillo, 2001). Fifteen percent of the sample in this study reported not having enough money for food. This correlates with the poverty rate reported at three times the average rate, so, the sample results again may be influenced by income amount. However, results of this study are similar to the 14 % reported by Coon & Zulkowski (2002) for rural diabetic patients.

When comparing the sample in the original USDA study to the general elderly population in America some characteristics are similar and some differ in percentages. The percentage of denture wearers was reported as 54.4% in the sample and the U.S. Preventative Task Force (1996) reported that over 50% of Americans age 65 years and older were edentulous. Review of literature reports that only 14% of rural elderly had their teeth cleaned in the last two years (Stearns, Slifkin, & Edin, 2000). The sample reported 33.8% having been to the dentist for teeth cleaning. Whether this was within the past two years was not examined.

Education in the elderly of America is reported as 68% with 12 years of education and 15% with 16 years (AoA, 2000). The study participants reported much lower rates; 33.8% had 12 years of education and 10% had 16 years. In 2000, seventy percent of the elderly age 85 years and over were women (Federal Forum, 2000). This correlates with the sample which was 69% women with a mean age of 79 years. Having at least one chronic disease was reported by 90% of the participants in the original USDA study. This is much higher than the national average reported to be 60% in the elderly population (Gentleman, 2000).

Implications

Practice

Results of this study reveal that oral health is being overlooked in the rural elderly in Montana. Oral health can be improved in the elderly if all health care providers work together and participate in assessment and education of the elderly and family members (Satcher, 2000). All health care providers should include a brief oral assessment and exam with office visits and assist with referrals to dentists or periodontists when appropriate (ADA, 1996). Elderly clients will not tell the provider all their problems and specific questions regarding swallowing and mouth problems need to be asked. Many elderly have dry mouth from prescription medications and do not report this to their health care provider. Assessing dry mouth and changing prescriptions to eliminate this problem need to be addressed by the health care provider.

Nutrition assessment should be part of the office visit for all elderly clients at least once a year. The Mini Nutritional Assessment (MNA) and Nutritional Screening Initiative (NSI) are two screening tools that take only a few minutes and can be completed in the office. Both of these nutrition assessment tools are available for order on the internet. Representatives for many of the nutrition supplements offer these forms free to providers and the dietician is a good resource for these materials and instruction on their use.

Education

In the future, medical schools along with nurse practitioner and physician assistant programs need to include oral health assessment as part of their programs (Satcher, 2000). In addition, dental providers and dieticians need cross training to improve the oral and nutritional health of our elderly (ADA, 1996). The health provider can also help to teach and remind the client about the importance of preventative oral health care measures along with teaching basic nutrition with the food groups (ADA, 1996).

Research

Further studies need to be done on the elderly in rural and urban areas to assess the nutritional and dental status of this population. Comparison studies using the Nutritional Screening Initiative, Mini Nutritional Assessment, 24-hour food diary, and laboratory values need to be done to evaluate which screening tool is most effective with the elderly population. Further assessment needs to be done

with Meals on Wheels participants to see if they have any food resources on the days that the meals are not delivered. Longitudinal studies need to be done on the elderly to assess how and when to intervene and prevent malnutrition.

A mobile food commodity van or food market may be beneficial to the rural population. There is no public transportation available in many rural areas and research on how the rural elderly obtain their groceries needs to be done. Poverty needs to be further researched to assess if the levels in this study are correct. If poverty is the problem then providing food stamps, food banks, or other food provisions to the rural elderly population, in a culturally appropriate way needs to be researched. Research involving the local churches and community leaders needs to be done to improve the nutritional and oral health of the rural elderly, while maintaining their dignity, pride and independence.

Summary

Health and nutrition are interrelated with quality of life of the individual within the community (ADA, 2000c). Poor oral health increases the individuals risk for disease and is associated with lifestyle behaviors that lead to poor nutritional intake (ADA, 1996). The independent elderly may need assistance from the community during periods of illness to meet his or her physical, social, and psychological needs (ADA, 2000a). Many rural communities have nutritional and other services available of which the elderly may be unaware. Health care providers have a responsibility to assist the elderly in meeting their needs.

Assessment of dental, nutritional, and psychological factors need to be addressed in all senior clients to improve their overall health and prevent malnutrition. With the aging of the "baby boomers" the need for collaboration of health care workers and community leaders is vital to plan for the resources that will be needed in the future. Every health care worker needs to have a list of resources, or a person for referral, to inform the elderly client of available community services. Dental, medical, nursing, and nutrition programs need to start cross training providers now to improve the dental and nutritional status of the current and future elderly population. Plans to increase dental and nutritional services, available to rural elderly in Montana need to be addressed, as the needs of senior citizens are not being met.

In Montana there are several regional offices for the Agency on Aging and they can provide information to providers and clients on the resources available in the area. The Meals on Wheels program is only one part of the Elderly Nutrition Program (ENP). Additional resources such as the Commodity Supplemental Food Program started in 2000, and the Food Banks may be available for clients. If health care workers, including dieticians, are educated on oral health, and dental workers are educated on nutrition, and a collaborative effort between dental, nutritional, and community agencies is started, the overall health of the elderly can be improved. The public health goal of Montana is to develop a coordinated system of communities and agencies to assure all Montanans have access to basic health care, which includes dental care (DPHHS, 2001a).

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APPENDICES

APPENDIX A

QUESTIONNAIRE

Thank you for taking the time to complete our nutrition and health assessment survey. Please read each question carefully. Some questions require a short answer and others are multiple choice.

There are no right or wrong answers to any of these questions. If you are unsure about how to answer a question, please give the best answer you can.

The results of these questions will be used to help plan programs to better meet the needs of your community.

Part 1: This first section is about <u>your</u> nutrition

Circle the answer that best describes <u>you</u>



Remember there are no right or wrong answers

Q- 1. Do you have an illness or condition that made you change the kind and/or amount of food you eat?

a. YES
b. NO

Q- 2. Do you eat fewer than 2 meals per day?

a. YES
b. NO

Q-3. Do you eat few fruits or vegetables, or milk products?

a. YES
b. NO

Q-4. Do you have 3 or more drinks of beer, liquor or wine almost every day?

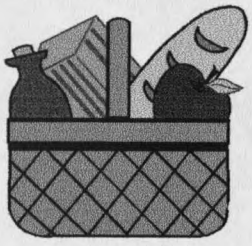
a. YES
b. NO

Q-5. Do you have tooth or mouth problems that make it hard for you to eat?

a. YES
b. NO

Q-6. Do you always have enough money to buy the food you need?

a. YES
b. NO



Q-7. Do you eat alone most of the time?

a. YES
b. NO

Q-8. Do you take 3 or more prescribed or over-the-counter drugs a day?

a. YES
b. NO

Q-9. Without wanting to, have you lost or gained 10 pounds in the last 6 months?

a. YES, I LOST 10 POUNDS
b. YES, I GAINED 10 POUNDS
c. NO, MY WEIGHT HAS NOT CHANGED

Q-10. Are you always physically able to shop, cook, and/or feed yourself?

a. YES
b. NO

If NO, who does these for you, and what is their relationship to you?

_____

Q-11. Do you have difficulty swallowing?

a. YES
b. NO



Q-12. Do you have dentures?

c. YES
d. NO

If YES: do your dentures fit well?

a. YES
b. NO

Q-13. Is your mouth dry?

e. YES
f. NO

Q-14. Do you have problems with: (<u>check all that you have</u>)

a. LIPS (soreness or cracks in the corners of your mouth)
b. TONGUE (pain/soreness)
c. SORES THAT DO NOT HEAL
d. BLEEDING OR SWOLLEN GUMS
e. TOOTHACHES OR SENSITIVITY TO HOT OR COLD
f. PAIN OR CLICKING IN YOUR JAW

Q-15. Have you noticed any problems in your ability to smell?

g. YES
h. NO

Q-16. Have you noticed a difference in how foods taste?

a. YES
b. NO

Q-17. When you need food or supplies do you

a. TAKE CARE OF ALL OF YOUR SHOPPING BY YOURSELF
b. SHOP BY YOURSELF FOR SMALL PURCHASES ONLY
c. NEED TO HAVE SOMEONE COME WITH YOU WHEN YOU SHOP
d. NEVER SHOP

Q-18. When you want to prepare a meal do you



a. PLAN, PREPARE AND SERVE MEALS INDEPENDENTLY
b. PREPARE MEALS IF SUPPLIED WITH INGREDIANTS
c. HEAT AND SERVE ALREADY PREPARED MEALS
d. NEED TO HAVE MEALS PREPARED AND SERVED

Part 2:
This set of questions is about your health and everyday activities.
Circle the answer that best describes you

Q-1. How healthy do you feel TODAY?

(Rate on a scale of 1 to 10, with 1 being not at all healthy and 10 extremely healthy)

1 2 3 4 5 6 7 8 9 10

Q-2. How would you rate your overall quality of life TODAY?

(Rate it on a scale of 1 to 10, with 1 being very poor and 10 excellent)

1 2 3 4 5 6 7 8 9 10

Q-3. How would you rate your present state of health compared to other people your age?

a. WORSE THAN OTHERS
b. ABOUT THE SAME AS OTHERS
c. BETTER THAN OTHERS
d. DON"T KNOW

Q-4. During the past three months how much has your health worried or concerned you?

i. A GREAT DEAL
j. SOMEWHAT
k. A LITTLE
l. NOT AT ALL

Q-5. Do you see your doctor or health care provider for a yearly checkup?

m. YES
n. NO



Q-6. When was your last dental exam?

o. WITHIN THE LAST 6 MONTHS
p. WITHIN THE PAST YEAR
q. WITHIN THE PAST 2 YEARS
r. WITHIN THE PAST 5 YEARS
s. OVER 5 YEARS AGO
t. NEVER BEEN TO A DENTIST

If you have visited a dentist, was the main reason for your visi
apply)
a. REGULAR CHECKUP
b. TO HAVE TEETH CLEANED
c. BLEEDING OR SORE GUMS
d. TO HAVE TOOTH FILLED
e. LOOSE TEETH/LOOSE TOOTH
f. TO HAVE TOOTH PULLED OR OTHER SURGERY
g. ORAL OR FACIAL PAIN
h. TO HAVE A ROOT CANAL
i. ADJUSTMENTS OR REPAIR OF DENTURE
j. OTHER_____

Q-7. Have you had your blood pressure checked in the past 6 months?

a. YES
b. NO

If YES, on average is it?

a. HIGH
b. LOW
c. AVERAGE

Q-8. Are you on medication to lower your blood pressure?

a. YES
b. NO
c. DON'T KNOW

Q-9. Are you on medication to lower your cholesterol?

a. YES
b. NO
c. DON'T KNOW

Q-10. Did you get a flu vaccine in the past 12 months?

a. YES
b. NO
c. DON'T KNOW

Q-11. Did you get a pneumonia vaccine in the past 2 years?

a. YES
b. NO
c. DON'T KNOW

Q-12. Do you have a planned exercise program?

a. YES
b. NO

If YES, on how many of the last 7 days did you do at least 20 minutes of physical exercise in addition to your usual household or work activities?

a. 0 days
b. 1 days
c. 2 days
d. 3 days
e. 4 days
f. 5 days
g. 6 days
h. 7 days



Q-13. Mark the answer that best describes you:

u. I HAVE NEVER SMOKED
v. I QUIT SMOKING 2 OR MORE YEARS AGO
w. I QUIT SMOKING LESS THAT 2 YEARS AGO
x. I SMOKE PIPE OR CIGAR ONLY
y. I CURRENTLY SMOKE LESS THAT 10 CIGARETTES DAILY
z. I CURRENTLY SMOKE MORE THAN 10 CIGARETTES DAILY

Q-14. Do you currently use chewing tobacco?

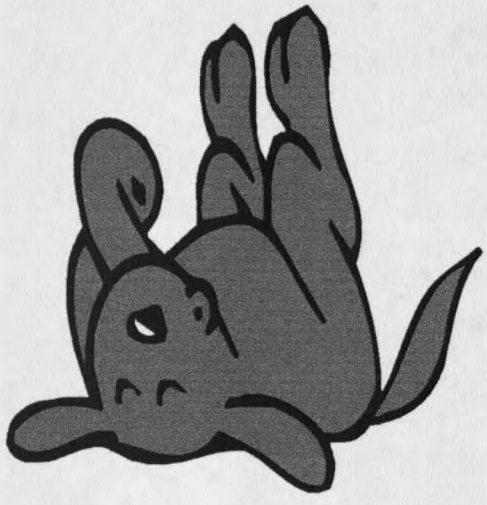
aa. YES
bb. NO

Q-15. Are you currently under any significant stress?

cc. YES
dd. NO

Q-16. On the average, how often do you get at least 7 or 8 hours of sleep each night?

ee. ALWAYS OR NEARLY ALWAYS
ff. MOST OF THE TIME
gg. LESS THAN HALF OF THE TIME
hh. SELDOM OR NEVER



Q-17. Do you have any difficulty staying asleep?

a. YES
b. NO

Q-18. How rested do you usually feel when you wake up?

a. NOT AT ALL RESTED
b. SOMEWHAT UNRESTED
c. SOMEWHAT RESTED
d. VERY RESTED

MEN ONLY

Q-1. Have you been checked for prostate cancer in the past year?

ii. YES
jj. NO

Q-2. Do you do a testicular self - exam on a regular basis?

kk. YES
ll. NO

WOMAN ONLY

Q-1. Have you had a mammogram in the past year?

mm. YES
nn. NO

Q-2. Do you perform breast self- examination on a regular basis?

oo. YES
pp. NO



Part 3:
The next set of questions are about the quality of your life and your views about your health.

Please circle the response that best matches your usual activities.

Q-1. In general would you say your health is:

qq. EXCELLENT
rr. VERY GOOD
ss. GOOD
tt. FAIR
uu. POOR

Q-2. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?***

A. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf

a. YES, LIMITED A LOT
b. YES LIMITED A LITTLE
c. NO, NOT LIMITED AT ALL

A. Climbing several flights of stairs

a. YES, LIMITED A LOT
b. YES LIMITED A LITTLE
c.NO, NOT LIMITED AT ALL

Q-3. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

A. Accomplished less than you would like

a. YES
b. NO

Q-3. (Continued) During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

B. Didn't do work or other activities as carefully as usual

a. YES
b. NO



Q-4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

A. Accomplished less than you would like

a. YES
b. NO

B. Didn't do work as carefully as usual

a. YES
b. NO

Q-5. During the past 4 weeks, how much did pain interfere with your normal work (including bot work outside the home and housework)?

a. NOT AT ALL
b. A LITTLE BIT
c. MODERATELY
d. QUITE A BIT
e. EXTREMELY

Q-6. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks…

A. Have you felt calm and peaceful?
a. ALL OF THE TIME
b. MOST OF THE TIME

c. A GOOD BIT OF THE TIME
d. A LITTLE OF THE TIME
e. NONE OF THE TIME



B. Did you have a lot of energy?

a. ALL OF THE TIME
b. MOST OF THE TIME
c. A GOOD BIT OF THE TIME
d. A LITTLE OF THE TIME
e. NONE OF THE TIME

C. Have you felt downhearted and blue?

a. ALL OF THE TIME
b. MOST OF THE TIME
c. A GOOD BIT OF THE TIME
d. A LITTLE OF THE TIME
e. NONE OF THE TIME

Q-7. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

a. ALL OF THE TIME
b. MOST OF THE TIME
c. SOME OF THE TIME
d. A LITTLE OF THE TIME
e. NONE OF THE TIME

Q-8. Compared to one year ago, how would you rate your health in general now?

vv. MUCH BETTER THAN 1 YEAR AGO
ww. SOMEWHAT BETTER THAN 1 YEAR AGO
xx. ABOUT THE SAME AS 1 YEAR AGO
yy. SOMEWHAT WORSE THAN 1 YEAR AGO
zz. MUCH WORSE THAN I YEAR AGO

Q-9. When you need to make a phone call do you

aaa. LOOK UP AND DIAL THE NUMBERS BY YOURSELF
bbb. DIAL A FEW WELL KNOWN NUMBERS
ccc. ANSWER THE PHONE BUT NOT DIAL ANY NUMBERS
ddd. NEVER USE THE PHONE

Q-10. Can you get to places beyond walking distance:

eee. WITHOUT HELP
fff. WITH SOME HELP
ggg. I AM UNABLE TO TRAVEL UNLESS SPECIAL ARRANGEMENTS ARE MADE

Q-11. When you clean your house do you

hhh. CLEAN IT ALONE
iii. DO LIGHT DAILY TASKS ONLY SUCH AS DISHWASHING, AND BEDMAKING
jjj. NEED HELP WITH ALL DAILY CLEANING
kkk. DO NOT PARTICIPATE IN HOUSECLEANING TASKS

Q-12. Can you do your own handyman work:



lll. WITHOUT HELP
mmm. WITH SOME HELP
nnn. I AM UNABLE TO DO ANY HANDYMAN WORK OR SOMEONE DOES IT FOR ME

Q-13. When you have laundry that needs to be done do you

ooo. COMPLETELY HANDLE YOUR PERSONAL LAUNDRY
ppp. RINSE SMALL ITEMS SUCH AS SOCKS
qqq. NEVER DO LAUNDRY

Q-14. Do you or could you take medicine:

rrr. WITHOUT HELP (the right doses at the right times)
sss. WITH SOME HELP (take medicine if someone prepares it for you and/or reminds you to take it)
ttt. I AM UNABLE TO TAKE MY OWN MEDICINE

If you need help with your medications who provides that help for you?

_____

Q-15. When you have bills that need paid do you

uuu. HANDLE ALL BILL PAYING AND CHECK WRITING BY YOURSELF
vvv. MANAGE DAY TO DAY PURCHASES BUT NEED HELP WITH OTHER THINGS
www. IHAVE SOMEONE ELSE PAY THE BILLS

Thank you for taking the time to complete this survey



Part 1 Questions 1-10 used from the Nutrition Screening Initiative
Part 1 Question5, 14, Part 2 question 6 used from Determine Your Oral Health
Part 3 Questions7 used from the SF-12

APPENDIX B

INTERVIEW

MONTANA STATE UNIVERSITY

COLLEGE OF NURSING

Personal Interview

Hi my name is _____ and I represent Montana State University, College of Nursing. We are conducting a research study on the nutritional and health needs of people in rural areas. This information will help us plan nutritional programs in rural areas of Montana.

It is important for you to know that only the research team will see your answers to these questions or any other personal information associated with this study. You are assured of complete confidentiality. There are several parts to this study. First, I will record your height and weight, measure the width of your arm and leg and draw some blood to look at your nutritional status. Next, I will ask you some questions about your community and your health. (Finally I will be happy to help you fill out the booklet we sent you. If you would like more time to finish it I will give you a stamped envelope to mail it back to us.)

There are no right or wrong answers to any of the questions I will ask you. You don't have to answer any you don't want to and it is alright to say you don't know some of the answers. Do you have any questions?

Date _____

Permission Form Signed_____ Gender _____Male
_____Female

Phone # _____ Date of Birth
_____

Residence
_____ Own home
_____ Relative's home
_____ Friend's home
_____ Apartment
_____ Assisted living center
_____ Other (specify)_____

Ethnic background
_____ Caucasian
_____ Native American
_____ Hispanic
_____

Height _____ Weight _____

Mid arm circumference_____ Calf circumference_____

Blood drawn _____(site)

We are going to start by talking about your diet and what you ate and drank yesterday. Could you tell me what you had for……

(BE SURE TO ASK QUANTITIES OF EACH ITEM. Also ask about coffee, tea, nutritional supplements, and prompt for snacks between meals.)

If receives home delivered meal ask how much they ate of specific items on that meal and then go over what else they ate.

1. Breakfast

2. Lunch

3. Dinner

4. Snacks

5. Water

(Let them respond to only water and then ask)

Q-1. How much fluid (water, fruit juice, coffee, tea, milk, pop, ...) do you drink every day?***

0. Less than 3 cups
0.5. 3 to 5 cups
1. More than 5 cups

Code: 1a. How many full meals does this person eat daily?***

0. 1 meal
1. 2 meals
2. 3 meals

1b. Is this person ***

0. Bed or chair bound
1. Able to get out of bed chair but does not go out
2. Goes out

1c. Does this person have neurological problems? ***

0. Severe dementia or depression
1. Mild depression
2. No psychological problems

1d. Is this person ***

0. Unable to eat without assistance
1. Self fed with difficulty
2. Self fed without difficulty

Q- 2. Has your food intake declined over the past 3 month due to a loss of appetite, digestive problems, chewing or swallowing difficulties?***
0. Severe loss of appetite
1. Moderate loss of appetite
2. No loss of appetite

Q-3. Have you lost weight in the past 3 months?***
1. YES
0. NO
If yes is it how much weight do you think you have lost?_____

Code: 0. < 6.6 pounds
1. Does not know
2. Weight loss between 2.2 and 6.6 pounds
3. No weight loss

Q-4. Do you eat at least 1 serving of dairy products (milk, cheese, yogurt) per day?
1. YES
0. NO Code: 0 = 0 or 1 serving

Q-5. Do you eat 2 or more servings of legumes or eggs per week?***(Interviewer Note: You may need to explain that legumes are nuts)
1. YES
0. NO Code: 0.5 = yes

Q-6 Do you have at least 1 serving of meat, fish or poultry every day?***
1. YES
0. NO Code : 1.0 = yes

Q-7. Do you consume 2 or more servings of fruits or vegetables per day?***
0. YES
1. NO

Q-8. How do you view your nutritional status?***
0. Views self as malnourished
1. Is uncertain of nutritional status
2. Views self as having no nutritional problems

Next I am going to ask you several questions are about your overall health.

Q-9. How do you rate your health in comparison with other people your age?***
0.0 Not as good
0.5 Does not know
1.0 As good
2.0 Better

Q-10. Have you suffered any (psychological) stress or acute disease problems in the past 3 months?***
1. YES
0. NO

Q-11. Do you have any pressure sore or skin ulcers?***
0. YES
1. NO

Q-12. How many different prescription medications do you take on a regular basis? ***

_____NUMBER OF PRESCRIPTION MEDICATIONS
Code: Takes more than 3 drugs 0= YES, 1=NO

Please list their prescription medications

_____

_____

Q-13. How many different over-the-counter medications do you take on a regular basis? (This includes aspirin, vitamins, cold pills, etc.)

_____NUMBER OF OVER THE COUNTER MEDICATIONS

Please list their over-the-counter medications

_____

_____

Q-14. Do you have a chronic medical condition or conditions?

0. NO
1. YES

If yes, what medical problems do you have?

_____

_____

_____

Now I am going to ask you questions about your community.

Q-1. How long have you lived in this community?

_____ Number of years

Q-2. Which best describes where you live? (Please CIRCLE only ONE response)

1 ON A FARM/RANCH COMMUNITY (farming/ranching is the major economy of the area and it is at least 25 miles from an urban area)

2 IN A RURAL COMMUNITY (something other that farming/ranching is the major economy and it is at least 25 miles from an urban center)

3 IN A RURAL TOWN (town less than 25 miles from an urban center)

We would also like to know about the services that are available in your community. Please tell us

1) If the program or service I will name is available in your community and
2) How far you travel one way to get to this program or service.

For example: if the question was about availability and distance to an emergency room you should think about a potential emergency such as a serious cut from broken glass. How far (ONE WAY) must you travel to get assistance such as stitches? Please try to be as accurate as possible when recording the distance, e.g. 3/4 of a mile, etc.

Service	Available Y/N	Distance Miles to service ONE WAY
Primary health care provider (physician, physician assistant, nurse practitioner)		
Specialized health care (surgeon, cardiologist, oncologist, podiatrist)		
Chiropractor		
Eye care doctor (ophthalmol ogist)		
Eye care (optometrist)		
Dentist		
Physical therapist		
Occupational therapist		
Registered dietitian		
Health or diabetic educator		
Community Hospital		

Emergency Room		
Ambulance/ EMS		
Nursing Home		
Program	Available Y/N	Distance Miles to service ONE WAY
Assisted Living Center		
Pharmacy		
Mental health services		
Alcohol and drug program		
Home health care services		
Hospice service		
Public health Department		
Service	Available Y/N	Distance Miles to service ONE WAY
Grocery Store		
Farmers Market		
Store other than grocery		
Fast food restaurant		

Other restaurant		
Senior center/ Congregate meal program		
Food bank/Soup kitchen		
MSU county extension office		

Q-3. Do you have a healthcare provider who takes care of most of your health care needs?

_____NO
_____YES

If YES

Is the health care provider you see most frequently a (Note: if they select more than one tease out the one they have seen the most frequently in the past year)

_____ PHYSICIAN (doctor)
_____NURSE PRACTITIONER
_____PHYSICIAN ASSISTNAT
_____CLINIC STAFF OR PROVIDER GROUP IN SAME PRACTICE
_____OTHER (specify)_____

Q-4. Are you currently working or volunteering outside the home?

_____ NO
_____ YES

If yes where do you volunteer or work?

_____

SUGGESTED CATEGORIES COULD INCLUDE

_____ Farming
_____ Labor
_____ Service (public and commercial)
_____ Health Care
_____Other (Specify)_____
_____ Retail sales
_____ Skilled trades
_____ Professional services (management)
_____ Secretarial

Q-5. Are you currently…..

_____ Married
_____ Single never married
_____ Widowed
_____ Divorced
_____ Separated

Q-6. Does anyone live with you? If so what is their relationship to you?

_____ Spouse _____ Children

_____ Other relative _____ Caregiver

_____ Friend _____ Lives alone

Q-7. How many years did you go to school?

_____years

Q-8. About how much money did you make last year before taxes?

_____INCOME AMOUNT

SUGGESTED CATEGORIES COULD INCLUDE

_____ less than $10,000 _____ over $80,000

_____ $10,000- $40,000

_____ $40,000-$80,000

The last set of questions is your opinion of nutritional programs in your community and what types of programs are needed. (Please provide brief answers or lists of needed services.)

Q-9. What are the most common food and nutrition problems or nutritional services that are needed in your community?

Q-10.What strengths does your community have for addressing these problems?

Q-11. What barriers does your community run into when trying to address these problems?

Q-12. Is there anything else you would like to tell us about your community?

Thank you for your help?

*** Items from Mini Nutritional Assessment

APPENDIX C

HUMAN SUBJECTS REVIEW

POLICY #F-4
ATTACHMENT #2

FORM A.2: TO BE COMPLETED BY THE INVESTIGATOR (GRADUATE STUDENT)

MONTANA STATE UNIVERSITY
COLLEGE OF NURSING
HUMAN SUBJECTS PROPOSAL SUMMARY

Submit one copy of the full research proposal with five copies of this form (which includes attachment of the proposal summary) and two blank copies of Form B to the Associate Dean's Office 14 working days in advance of the Committee's meeting. (Refer to Policy F-4, page 4 of 4, for additional information.)

Date of Submission: March 2002

Name of Proposal: DOROTHY ALBRECHT
Name of Investigator(s): DENTAL PROBLEMS OF RURAL ELDERLY NOT CORRELATED [illegible]
Signature of Thesis/Project Chair: [signature]

If seeking EXEMPT status under Federal Regulation 45 CFR 46, please indicate the specific exemption you are seeking:

- _ 46.101(2)(b)(1). Research will be conducted in an established educational setting and involves standard educational practices.
- _ 46.101(2)(b)(2). Research involves the use of educational tests. Information taken from them will be recorded so that subjects cannot be identified.
- _ 46.101(2)(b)(3). Research involves survey or interview procedures and responses will be recorded so that subjects cannot be identified.
- _ 46.101(2)(b)(4). Research involves observation of behavior and observations will be recorded so that subjects cannot be identified.
- X 46.101(2)(b)(5). Research involves the study on collection of existing data, documents, or records. Information will be recorded so that subjects cannot be identified.

NOTE: See page two for instructions on completing the proposal summary (to be attached).

☒ Approved/NO Revisions Needed:

Dr Charlene Winters 4/9/02

Signature, Chair, College of Nursing, Human Subjects Review Committee / Date

Distribution of Form A.2 (page 1 of 2) following Committee Review:

Original: Investigator(s)
Copies: Thesis/Project Chair
Campus File
College of Nursing Human Subjects Review File in Bozeman (OARS)
University Human Subjects Committee through College of Nursing Associate Dean's Office

APPENDIX D

CONSENT FORM

IRB Approval Montana State University-Bozeman

Consent Form
Nutritional Status in Independently Living Elderly

Name _____ Date _____

1. **Background:**
Malnutrition is a major concern in the elderly. Effects of poor nutrition lead to prolonged hospitalization, and less successful treatment outcomes. While nutritional programs are available in Montana's rural communities, it is not known if the available programs match the needs of the residents.

2. **Purpose of Study:**
The purpose of this study is to determine both individual and community nutritional profiles. Further, it will determine if the nutritional services available in the rural areas match the needs of the people residing in them.

If you participate in this research the following will be done:
You will be asked to have blood drawn from a vein in your arm by a Registered Nurse. Approximately 2 tablespoons of blood will be removed on 1 occasion. This is the standard medical method used to obtain blood for testing of serum albumin, prealbumin, serum protein, hemoglobin, and hematocrit. There is momentary pain at the time the needle is inserted into the vein, but other discomfort should be minimal.
Next you will be given a questionnaire and food diary to fill out. The questions will ask you about what you eat, health practices, community services and some demographic information.

4. **Costs:**
There will be no charge to you for the blood test or any part of the study.

5. **The following are the risks of participating in this study:**
Because you will need to have blood taken from your arm there is a chance you will have some bruising or discomfort at the site of the blood draw. In about 10% of the cases there is a small amount of

bleeding under the skin, which will produce a bruise. Infection in your arm is also a slight possibility. The risk of infection is less than 1 in 1,000. If you experience any redness or excessive swelling you should see your physician. Financial compensation for any physician visits resulting from study participation is not possible.

6. **The following are the benefits of participating in the study:**
You will be given an explanation of your nutritional status and results of the study overall, will be shared with you. You will be helping to determine a nutritional profile of rural elderly and the match between individual nutritional needs and community services available.

7. **Confidentially:**
The records of your laboratory work and questionnaire answers will be kept confidential by the researcher. Your name will not appear in any publications that may result from this study

8. **Participation and Termination:**
Your participation in this study is voluntary. You may decide to stop participating in the study at any time without penalty. You will be told of any new information that may affect your willingness to continue to participate in this research. The researcher will answer any questions you have.

9. This study has been approved by the Human Subject Committee at Montana State University – Bozeman. You may contact Dr. Karen Zulkowski at 657-1739 during office hours or 259-2886 other times if you have any questions or problems. The Chairman of the Montana State University Human Subjects Committee, Dr. Stephen Guggenheim, can answer additional questions about the rights of human subjects at (406) 994-4441.

10. You understand the above description of the study. You have had all your questions answered to your satisfaction, and consent to participate in this study. By signing this consent form, you have not waived your legal rights.

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of the study. I, _____, agree to participate in this research. I understand that I may later refuse to participate, and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed _____

Witness _____

Investigator _____
Karen Zulkowski, DNS, RN

Date _____

MONTANA STATE UNIVERSITY - BOZEMAN
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