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Rivera Torres, Angel.
Prevalence and risk
indicators for root caries

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Rivera Torres, Angel D.D.S., M.P.H., M.S.P.H., Prevalence and Risk Indicators for Root Caries in Non-institutionalized Older Adults U.S. Population, 1988-1994. Doctor of Philosophy (Biomedical Sciences), May 2000, 139 pp., 17 tables, 1 illustration, bibliography, 132 titles.

Background. Dental caries and periodontal disease are prevalent in the elderly population; the progressive consequences of these have physical, economic, social, and psychological implications for long term care. This study reports on associated risk indicators for root caries in a population-based sample of non-institutionalized older adults of diverse race/ethnic groups and age cohorts.

Methods. Data were analyzed from 3,313 non-institutionalized U.S. adults 65 years of age and over, who had been surveyed in the National Health and Nutrition Examination Survey, III 1988-94 (NHANES III) and who had completed the dental examination. Descriptive and Multivariate statistics were used to compare older adults with and without root caries. Logistic regression analyses was utilized in this study to identify predictors for root caries

Results. The mean number of teeth in this population was 21, with an average prevalence of root decayed, filled surfaces (RDFs) of 2.17. The prevalence as measured by the root caries index (RCI) was 39.07 and the ratio RDs/RDFs was 70%. Multivariate logistic regression analysis indicated that African-American males (O.R.1.55;C.I.1.30-1.84) or Mexican-American males

(O.R.3.18;C.I.2.56-3.94) with a level of education less than 8 years (O.R.1.50;C.I.1.25-1.81) living below poverty level (O.R.1.60;C.I.1.33-1.93) were most likely to have root caries. Smoking (O.R.1.70;C.I.1.41-2.04), previous root caries experience (O.R.1.61;C.I.1.54-1.68), wearing a partial denture (O.R.1.78;C.I.1.38-2.29), having 14 teeth or less (O.R.1.42;C.I.1.15-1.76) and consuming starchy (O.R.1.52;C.I.1.26-1.83) and liquid sugar snacks (O.R.1.75;C.I.1.44-2.11) were also indicators of an increased risk for root caries.

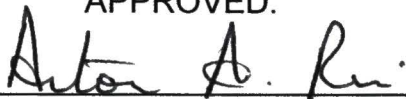
Conclusions. These findings suggest that Caucasians had less risk of root caries than African-Americans and Mexican-Americans and that poor periodontal status (O.R.3.29; C.I. 2.39-4.52) increased the risk of root caries. Additionally, older adults in the U.S. population have a great need for dental treatment.

Additional epidemiologic studies are needed and should focus on those social and behavioral factors that put individuals at risk for developing root caries.

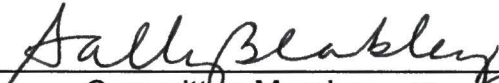
PREVALENCE AND RISK INDICATORS FOR ROOT CARIES IN
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U.S. POPULATION, 1988-1994

Angel Rivera Torres, D.D.S., M.P.H., M.S.P.H.

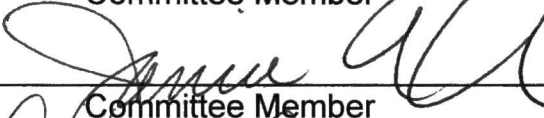
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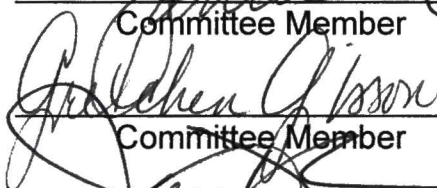
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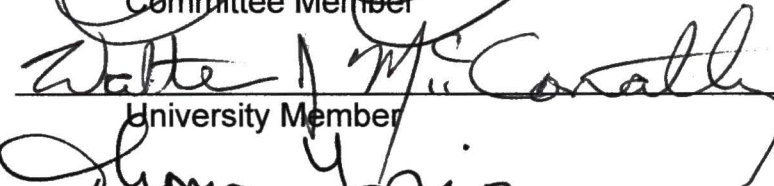
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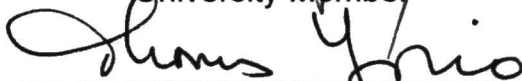
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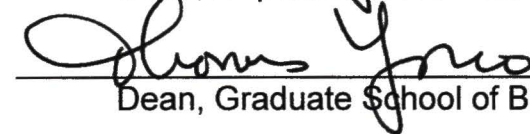
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PREVALENCE AND RISK INDICATORS FOR ROOT CARIES IN
NON-INSTITUTIONALIZED OLDER ADULTS
U.S. POPULATION, 1988-1994

DISSERTATION

Presented to the Graduate Council of the
Graduate School of Biomedical Sciences

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In Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

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CHAPTER 1

INTRODUCTION

Historically, dental caries has been identified as a disease of childhood and adolescence. Mature people usually had their natural teeth removed during mid-life, and their dental problems centered on the challenges of removable dentures or full dentures.¹ In the mid-80's, the National Institute of Dental Research surveyed employed adults and senior citizens determining that 4% of employed adults and 41% of seniors were edentulous.^{2,3} The Healthy People 2000 Progress Report for Oral Health indicates that about one-third of people aged 65 and older have lost all of their natural teeth.⁴ Winn et al. (1996) found that 94% of persons older than age 18 years had either untreated decay or fillings in the crowns of their teeth.⁵ On average, American adults have 22 decayed or filled coronal surfaces.^{6,7}

Root surface decay associated with gingival recession is a particular concern in older adults. This problem increased significantly with age: 82% of persons older than age 65 years had attachment loss.^{8,9} The pattern of retaining natural teeth into later life results in an increasing number of elderly who will be at risk for caries, either coronal, recurrent, or root caries.^{10,11,12} Root caries appears to be the greater caries problem in older adults affecting up to 63

percent of dentate individuals 65-69 years old and more than 70 percent of dentate people aged 75-79 years old. The 80 and older age group has the highest mean scores for carious coronal and root surfaces.¹³ This increasing pattern of root caries supports the neo-generational model for root caries (Niessen et al. (1991)¹², Berkey et al. (1996)¹³, Ettinger (1993)³⁶.

Significance of the Problem

Research identifying risk factors for certain oral conditions among older adults is crucial. Dental caries and periodontal disease are prevalent in the elderly population; the progressive consequences of these have physical, economic, social, and psychological implications for long term care. Although oral diseases are neither life-threatening nor seriously impair the great majority of individuals, oral diseases do affect the quality of life.^{14,15} The oral cavity contributes to the quality of life at the very basic biologic level through protection from systemic infection, chewing, and swallowing, and at the more social and psychological level through self-esteem, self-expression, communication, and facial esthetics.^{14,15,16,17}

Conceptual Framework

Epidemiologic work to develop an accurate and practical root caries prediction model can provide fundamental knowledge about goals related to the disease process:

1. Targeting those in need: Accurate prediction of root caries will permit the identification of older adults at high risk.¹⁸
2. Effectiveness of preventive procedures: Culturally appropriate messages and educational interventions require changes in thinking and behavioral changes. Adequate time must be available, especially for minority populations who may not respond in the same time frame as those in the majority.^{19,20,21,22}
3. Appropriate levels of care: Identifying individuals at high risk for root caries, the low risk group is also defined. This presents opportunities to over time change thinking and behavior that will influence the dental health of the elderly.¹⁸

Objectives and Hypotheses

Using the national data set of the National Health and Nutrition Examination Survey, III 1988-94 (NHANES III), this study focuses on associated potential risk factors for root caries in non-institutionalized older adults. The research question addressed the relationship between root caries and physical/medical conditions and diet and the comparison between older adults with and without root caries.

Specifically, the following two objectives anchor the delineation of four hypotheses:

1. To determine whether there is an association between root caries and (i) frequency and cariogenic quality of the diet, (ii) multiple chronic conditions and polypharmacy, and (iii) gingival recession, wearing a partial denture and functional ability as measured by the Activities of Daily Living (ADLs).

Three hypotheses guide this examination:

H1. Older adults with root caries consume a greater number of snacks that have a higher cariogenic potential than do older adults who do not have root caries.

H2. Older adults with root caries suffer from multiple chronic conditions and use multiple medications more often than do older adults who do not have root caries.

H3. Older adults with root caries tend to have more gingival recession, are more likely to wear partial dentures, and are more likely to present impairment in the ADLs than do older adults who do not have root caries.

2. To determine if differences exist with respect to demographic, medical, behavioral, nutritional and environmental conditions of older adults with and without root caries.

One hypothesis guides this:

H4. Educational level, income, oral hygiene practices, smoking and alcohol use are factors which will differentiate older adults with and without root caries.

The appropriateness and efficacy of these hypotheses are developed in Chapter 2. As with all studies, the strengths and weaknesses of previous research efforts determine the path of this study.

CHAPTER 2

REVIEW OF THE LITERATURE

Ethnicity, Aging, and Oral Health Outcomes

Based on data from the U.S. Bureau of the Census the number of older Americans has increased by 8% since 1990.²³ There are presently 33 million Americans aged 65 and older. In the next century, this number will grow to 77 million.²⁴ The segment of the population who are 65 and above is expected to peak between 2030 and 2040 when the baby-boom generation (those born between 1946 and 1964) will compose the eldest segments of the population.^{12,25} The greatest growth will occur in the group aged 85 and older, whose numbers are expected to triple. It is expected that significant health problem will impact this aging population especially in the area of oral health.

The "Years of Healthy Life" measure incorporates life expectancy and data on self-perceived health status and restricted activity due to chronic conditions. The Years of Healthy Life remaining at age 65 is, on average, 11.9 years. For women life expectancy is greater, but there are also more years of "unhealthy" life.²⁵ These changes in life expectancy and population structure will result in an increase in the median age of the population over the next 50 years.¹²

The evidence does not suggest one final gray stage, but a mixture of "healthy aging" with gradations of morbidity and dependence in the population.²⁶ Such diversity in the older population offers challenges for measuring individual quality of life and how it can be fostered. Oral health has not been observed equally in many racial and ethnic minority groups. Lifelong conditions of economic, health, and psychosocial well being of Caucasians, African-Americans, Hispanics, Asian-Americans, and Native-Americans appear to have differential cumulative effects on oral health and oral health-related quality of life.^{26,27,28}

Some evidence suggests that gains in oral health are not equally shared by all segments of society. Ethnic minority groups under utilized dental care services compared with Caucasian adults in the U.S.A.²⁹ Empirical evidence indicates that these differences were associated with lower levels of education and lesser knowledge of oral disease prevention as well as less availability of resources.^{29,30}

Aging consists of two dimensions: the aging process itself and cohort effects. The aging process leads to a transition in the physical, social, and psychological status of older persons.²⁹ The physical component of aging refers to the physiological changes and eventual decline in physical ability and functional capacity. The social dimension is characterized by a transition in social conditions, roles, and relationships.²⁷ The psychological component of the aging process is characterized by the need to cope with social role changes and

changes in physical health status.³¹ These three dimensions related to the aging process are in turn influenced by the background of personal history and life experiences of the older person and the broader social context of the environment.²⁹ This generational history of shared social experiences is referred to as cohort effects. Cohort effects operate to influence beliefs, attitudes, values, knowledge, and expectations that shape health behavior and ultimately, the individual's present health status.²⁹ The cohort concept permits the possibility of intracohort variation occasioned by socioeconomic or other social differences affecting persons over the life course.^{32,33} In relation to oral health, cohort effects influencing personal oral health behavior include the socially accepted values and norms related to toothbrushing and dental floss use, use of fluoride-containing toothpaste, and the routine utilization of dental services during a specific time period.²⁹

The risk factor concept widely used by demographers and epidemiologists is useful in illustrating continuities in the human life course.³⁴ The risk factor concept related to the probability of an unwanted outcome is related to learn socially reinforced behaviors. Cumulatively, these behaviors may exhibit patterns of healthy or unhealthy lifestyles reflecting shared reinforced preferences for living.³⁴ Implications of understanding risk factors and cohort follow. Individuals, as the result of circumstances of birth, will age and experience their aging differently. The timing of birth possibly exposes individuals to distinctively different environmental circumstances and events over the course of their

development.³⁴ Different learned patterns of behavior and lifestyles developed and continued over the life course change the probabilities of survival and well-being in later life. Other factors affecting well being over the entire life course are social and societal in origin – ignorance, poverty, and social isolation. These social factors affect the processes of aging and the experience of aging as powerfully as the biomedical and lifestyle factors.³⁴

This neo-generational model reflects most characteristics of a traditional structure. Gerontologists separate persons who are 65 and older into three categories: the young-old (65-74), the old (75-84), and the old-old (85 and over).³⁵ Expectations, attitudes and behavior affecting life style differ among the young-old, old, and old-old. These differences affect risk factors related to healthy aging. Ettinger (1993) presents the socio-dental and historical influences on five specific age cohorts born between 1905 and 1945, focusing on the differences in attitudes and expectations of these individuals when they seek dental treatment.³⁶

When the birth cohorts concept is considered, a study must be interpreted in view of the fact that societal characteristics gradually change over time and differentially influence the beliefs, values, and norms within a time period. Persons aged 65 and older at present were born before 1930, when different societal values and norms of oral health behavior were accepted, as well as different historical characteristics of the dental care delivery system and the practice of dentistry, compared with the present.²⁹

Definition and Etiology of Root Caries

The etiology of dental caries is well known, repeatedly described as being multifactorial; namely, it depends on a number of factors that interact with each other to determine the development of the disease. The microbiologic role of *mutans streptococci*, *lactobacillus*, and other cariogenic bacteria has been identified clearly and has been described as a major aspect of this plaque-dependent disease. However, their implantation, colonization, and pathogenic activity are modified by the presence of salivary components, fermentable substrates, minerals, and trace elements, including fluoride. The severity and extent of the disease is modulated by the interaction of these factors, not by one factor alone. Dental caries are also effected by the behavior, nutritional status, ethnic and socioeconomic status of the individual, as well as by the availability of health education and health care services in the community where a person lives.³⁷

Katz (1995) defines root caries as “a soft, irregularly shaped, lesion either (a) totally confined to the root surface or (b) involving the undermining of enamel at the cemento-enamel junction (CEJ), but clinically indicating that the lesion initiated on the root surface”.³⁸ It is found only where loss of periodontal attachment has led to exposure of the roots to the oral environment, and hence, to the accumulation of bacterial plaque around these exposed roots.³⁹

Animal studies have led to the hypothesis that a microflora different from that implicated in coronal caries may be involved in the root caries process.^{40,41}

- Jordan and Hammond (1972) were the first to culture samples of microorganisms from human root caries lesions on extracted teeth.^{42,43}
- Sumney and Jordan (1973) extended this hypothesis by culturing surface deposits of plaque and carious debris from teeth freshly extracted because of periodontal disease.⁴⁴
- Syed et al. (1975) obtained plaque samples from root caries lesions and *Actinomyces viscosus* was found to be the dominant bacterial species recovered and therefore was considered to be the primary agent.⁴⁵
- Ellen et al. (1985) were the first to compare the microflora colonizing sound and carious root surfaces. *Actinomyces viscosus* was the most frequently isolated microorganism.⁴⁶
- Two longitudinal studies taking repeated samples of plaque or saliva for microbiologic analysis reported that the relative risk of developing a carious lesion on a susceptible tooth root was five times greater if both *Streptococcus mutans* and *Lactobacillus* were present in the root plaque than when both were absent.⁴⁶ High salivary counts of *Lactobacillus* and *S. mutans* were also found in patients who had the greatest number of new root caries lesions over an 8 year period.⁴⁷
- Jordan (1987) reviewed the available knowledge relating to the microbiology of root caries lesions and concluded that a wide array of organisms should be considered as causative agent. The presence of

S. mutans and *Lactobacillus* together increases the risk of root caries.⁴⁸

- Van Houte et al. (1990) in an *in vitro* determination of the pH-lowering potential of suspensions of fresh human dental plaque from tooth surface areas with incipient caries and tooth surface areas considered as sound and, concurrently, analysis of their microbial composition. The findings suggested that organisms other than *mutans streptococci* or *lactobacilli* can make a critical contribution to a fast pH drop and a low pH minimum reached in dental plaque and, consequently, could play a significant role in the etiology of dental caries.⁴⁹
- Sansone et al. (1993) concluded that samples from caries-free subjects exhibited a pH-lowering potential, which was not significantly different from that of both types of samples from the caries-active subjects. The findings suggest that the role of *Non-Mutans Streptococci* capable of acidogenesis at low pH in caries development merits further study.⁵⁰

Animal models suggest that *S. mutans* is capable of inducing coronal and root caries in the presence of a carbohydrate source.

Epidemiology of Root Caries

In ancient man, dental caries were frequently found on the root of the tooth (root caries), whereas in modern man the crown portion of the tooth is more

commonly attacked (coronal caries).⁴⁰ This is widely assumed to be due to a less cariogenic diet in ancient populations that was more capable of demineralizing cementum than enamel.⁵¹

The first descriptive epidemiological studies in modern populations on the prevalence of root caries appeared in surveys published between the early 1970's and the early 1980's.⁵¹ They can be characterized as being extremely diverse in both study populations and research design elements. Discernible patterns from these studies, which were conducted largely on working-age (20 to 60 years old) adult populations, revealed that the percentage of subjects with root caries ranged from 18% to 51%.⁵¹ Most of these studies reported an increase in the percentage of individuals with root caries in the older age groups.⁵¹

The studies conducted prior to 1980 primarily presented simple prevalence rates, that is, the percentage of individuals with root caries, and limited data on the intraoral distribution patterns and degree of association with other oral conditions.^{51,52} Since 1980, the studies on the epidemiology of root caries have provided a clearer picture regarding international breadth as well as intraoral details. The consistency in reporting methods now facilitates cross-study comparisons. Most studies include three methods of reporting the prevalence of root caries. First, almost all studies report the percentage of subjects with root caries. Second, most studies report their severity measure of prevalence as the DFs (decayed, filled surfaces). Third, Root Caries Index (RCI) is the proportion of

at-risk surfaces (typically those exhibiting gingival recessions) that are decayed or filled multiplied by 100. The use of both DFs and RCI provides a very clear picture of the disease process in any population and is extremely useful for drawing comparisons between populations.^{51,53}

The descriptive epidemiological findings for root caries from major studies conducted since early 1970's followed:

- Schamschula et al. (1974) in a follow-up study of adults aged 18 years and over in Papua New Guinea reported that: the prevalence of root caries was much higher than that of coronal caries in persons aged 30 to 39 years; periodontal disease and root caries were statistically strongly associated. They hypothesized that under certain combinations of etiologic and environmental influences; the prevalence of root caries may equal or exceed the prevalence of coronal caries. Furthermore, that certain dietobacterial plaque infections are not conducive to highly active coronal lesions but are associated with periodontal lesions and radicular cavitation. There was at that time some microbiologic and histopathologic evidence to support the concept of two separate caries processes.⁵⁴
- Banting et al. (1980) concluded that the number of coronal decayed and filled surfaces, age and number of retained teeth were the factors found to be helpful in discriminating between persons with and without root surface caries.⁵⁵

- Katz et al. (1982) a descriptive epidemiologic survey of root caries revealed that approximately one in nine surfaces with recession exhibited root caries. Intraoral distribution patterns for root caries revealed that the most frequently attacked tooth types were mandibular molars, mandibular premolars and maxillary canines. Although there is uniformity in terms of the proportion of surfaces at risk for each tooth type, the variable root caries rates suggest that specific intra-oral factors, as yet undefined, may determine the patterns of root caries attack.⁵⁶
- Banting (1986) reports lack of consistency of reporting among the studies undertaken and the wide spectrum of populations investigated. He estimated that the occurrence of root caries is between 20 and 40 percent in healthy, urban adults. Certain population groups such as the institutionalized older adults and patients with periodontal disease tend to exhibit much higher prevalence rates. He indicated that age, gender, oral hygiene, diet, saliva, systemic fluoride and previous carious experience have been shown to be associated factors.⁵⁷
- The prevalence of root caries reported in five studies of older adults is delineated in Table 1. Graves et al. (1992) and Beck et al. (1985) included randomly selected samples of community-dwelling adults aged 65 years and over in North Carolina and Iowa.^{30,58} Locker et al. (1989) studied community-dwelling adults aged 50 years and over in

Toronto, Canada.⁵⁹ The National Institute of Dental Research (NIDR) Seniors Study (1987) provided information on a national sample of people aged 65 years and over.³ Wallace et al. (1988) supplied baseline data from respondents recruited for a clinical trial.⁶⁰ Beck et al. (1985) reported that primary root caries lesions were found to be almost six times more prevalent than secondary root lesion.⁵⁸

TABLE 1. SUMMARY OF PREVALENCE OF ROOT CARIES AS REPORTED IN FIVE STUDIES OF OLDER ADULTS

Measured used	Beck et al. 1985	NIDR Seniors, 1987	Wallace et al. 1988	Locker et al. 1989	Graves et al. 1992
Mean Number of Teeth	18.8	17.2	23.5	17.9	18.1
Root Caries Index (RCI)			8.1		
Mean Number of Decayed Teeth	0.6	1.5		1.3	0.8
Mean Number of Decayed & Filled Teeth	2.3	3.2		2.6	1.7
% Population with Decayed & Filled Teeth	63	56.9	69.7	56.8	43.7

- Beck (1986) identified oral, medical, behavioral, and social factors that have been associated with root caries and indicated a need for further investigation to study a wide range of risk factors associated with root caries.⁶¹

- Raval and Birkhed (1992) in a study to evaluate the effect of different fluoride programmes, on root caries incidence in periodontally treated patients and to identify risk factors for root caries development. No statistically significant differences were found between the various fluoride programmes. Smokers had a significantly higher root caries prevalence and higher root caries incidence during the study than non-smokers.⁶²
- Papas et al. (1993) describes the prevalence and intraoral distribution of coronal and root caries in a predominantly Caucasian, educated, middle-aged and older adults. The median number of teeth was 21 in the 65+ age group, and 40% had coronal caries and 33% had root carious lesions.⁶³
- Joshi et al. (1993) reported on the incidence of root caries in a healthy, community-dwelling middle-aged and older adults population who had retained a relatively greater number of teeth for their age groups. Fifty percent of subjects developed one or more new root caries lesions over the follow-up period. Multivariate logistic regression analysis identified past root caries experience, high plaque score and number of teeth to be positively associated with new root caries.⁶⁴
- Katz (1995) reported a nearly 6-fold increase in caries (mostly root caries) in removable partial denture patients when compared to fixed bridge patients; and, for overdentures patients, between 10-30% of

overdenture abutment teeth succumb to root caries within the first year after placement.³⁸

- Lawrence et al. (1995) identified predictors for root caries in a three-year follow-up study of noninstitutionalized adults aged 65 and older residing in North Carolina. Multivariate logistic regression analysis indicated that African-Americans wearing a partial denture, having some root fragments, having an average gingival recession ≥ 2 mm., were at greater risk for developing new root caries. The mode for Caucasians showed that retired people with their most severe gingival recession ≥ 4 mm., an average probing pocket depth ≥ 2 mm., and taking antihistamine were more likely to develop new root carious lesions.⁶⁵
- Galan et al. (1995) in a sample of residents of senior housing centers in Winnipeg, Canada reported 2.8 decayed teeth, a RCI of 38%. The oral health indices indicated that there was significant dental disease and treatment need among this sample of older adults.⁶⁶
- Clarkson (1995) discussed the influence of changes in population characteristics on root caries and re-examines the epidemiology of the disease. For the over 55 years old, the results indicated that conventional epidemiological study would have underestimated the number of surfaces filled for caries by 50%. The paper concluded by suggesting that consideration should be given to novel ways of

collecting data so that more information is available on the etiology, prediction and management of the disease.⁶⁷

- Winn et al. (1996) reported that root caries affected 22.5% of the dentate population. African-Americans had the most treated and untreated root surfaces with caries, close to the Mexican-Americans. Untreated root caries was most common in dentate non-Hispanic blacks, followed by Mexican-Americans with non-Hispanic whites having the fewest untreated carious root surfaces.⁵
- Beck (1993) reviewed the prevalence and incidence of root surface caries in North America, through a combination of epidemiologic studies and clinical trials. The available evidence on the relationship between root caries and missing teeth is presented. These data lead to the conclusion that the prevalence and, to some extent, the incidence of root caries are underestimated in adults with missing teeth. A number of observations regarding the status of root caries as an oral health problem resulted from the review:
 1. There is evidence that would allow conclusions regarding the secular increase or decrease in the prevalence or incidence of root caries to be drawn.
 2. Similar prevalence and incidence rates obtained from the studies reviewed, positive association between root caries and age, negative associations between the prevalence and

incidence of root caries and consumption of water containing fluoride.

3. Indications that root caries is a problem in adults with incidence rates that approach caries rates in children.
4. Association between the prevalence and incidence of root caries and a wide variety of oral, behavioral, and medical conditions.⁶⁸

Predictors of Root Caries

Several studies have investigated sociodemographic and microbiological factors as well as general health status and behavior as risk indicators or risk factors associated with root caries. The studies of these general risk factors have produced conflicting results.

- Beck et al. (1986) in a study in the United States found that 30% of the variance in root caries was explained by a combination of overall physical and oral health, health behavior and social factors.⁶¹
- Locker et al. (1989) reported that oral health variables were stronger predictors of root decay than demographic, general health or dental care factors.⁵⁹
- Powell et al. (1991) and Graves et al. (1992) have shown males to be at higher risk for root caries, but other studies have shown no significant gender differences, leaving the findings equivocal.^{30,69}

- Mac Entee et al. (1993) reports that behavioral factors that are associated with oral neglect (low socioeconomic status, last dental visit for emergency, greater than one year since last dental visit, residence in a nursing home, infrequent toothbrushing, and poor oral hygiene) have all been identified as being associated with root caries.⁷⁰
- Banting et al. (1980) stated that no social risk factors for root caries, other than age, have been identified by any of the previous epidemiologic surveys. However, institutionalized people had higher root caries rates than noninstitutionalized people, suggesting that whatever mental, social, or physical conditions necessitated the institutionalization also may have placed the patient at increased risk for root caries.⁵⁵
- Kitamura et al. (1986) reported that the best predictors of root caries were number of teeth remaining, calculus, plaque, and the use of medications with xerostomic effects. Medications were most predictive of maxillary root caries. The results pointed to the need to provide interceptive dental therapeutics for high-risk geriatric population such as those using multiple medications and with a poor history of oral care.⁷¹
- Banting (1986) used a classification system proposed by Susser (1973) and grouped the variables associated with root caries into antecedent, intervening, moderating, and causal. This classification

helped us to understand where, in the causal chain a given factor may exert its effect and the nature of the effect. Table 2 identifies his classification.^{40,57,72}

TABLE 2. FACTORS ASSOCIATED WITH ROOT CARIES BY TYPE*	
Type	Factors
Antecedent	Oral hygiene and Plaque Gingivitis Periodontal disease Coronal caries experience Root caries experience Number of teeth Systemic fluoride
Intervening	Diet Saliva secretion rate Saliva pH Saliva buffering capacity
Moderating	Age Gender
Causal	<i>Streptococcus mutans</i> <i>Lactobacillus</i>

*From: Banting DW. Management of Dental Caries in the Older Patient. In: Geriatric Dentistry Aging and Oral Health. Pp.153.

- Banting et al. (1991) proposed risk indicators for root caries derived from prevalence studies (Table 3).⁴⁰
- Tavares et al. (1991) investigated the relationship between root caries and diabetes and found that the nondiabetic control subjects had an RCI score that was twice that for diabetics, 15.2% versus 7.1%.⁷³
- Saunders and Handelman (1992) compared saliva flow rates and the prevalence of coronal and root caries in a group of older adults using

hyposalivatory medications with a similar group not using these medications. The results indicated that subjects using hyposalivatory medications had slightly higher percentages of decayed and filled coronal tooth surfaces than those not using these medications.⁷⁴

TABLE 3. RISK INDICATORS FOR ROOT CARIES FROM PREVALENCE STUDIES*		
Risk Indicators	Number of Times Measured	% Factor Found to be Important
Age	11	82
Gender	10	60
Fluoride	4	100
Race	2	50
Microorganisms	2	100
Education	3	67
Income	3	0
Use of Services	3	100
Brushing	1	100
Sugar Consumption	2	100
Coronal Caries	4	75
Plaque	2	100
Calculus	2	100
Loss of Attachment	2	100
Number of Teeth	5	80

*From: Banting DW. Management of Dental Caries in the Older Patient. In: Geriatric Dentistry Aging and Oral Health. Pp.153.

- Paunovich et al. (1997) reported that xerostomia is a common oral side effect of medications that has been associated with more than 250 drugs. In addition to the effect of xerostomia on oral soft tissues, many of these medications have also been shown to increase the incidence of root surface caries.⁷⁵

The oral health factors that have been reported as either being highly associated with, or being in predictive models for, root caries include: previous root caries history, high plaque scores, microbiological factors and low salivary flow rates.

Dietary Factors

The animal model has been used in caries research to answer many of the questions that have been proposed by investigators through the years. A great deal of useful information has been gathered with this research model, but uses of animal models have also led to confusion. This is the case with oral health research that is done with animal model to study the caries potential of human foods.⁷⁶

The effect of diet has to be considered at two distinct stages of tooth development: pre-eruptively and post-eruptively. Pre-eruptively, nutrients in the diet can influence the maturation process of enamel, the chemical and physical composition of teeth, tooth size and morphology, and to a lesser extent, the time of eruption.³⁷ Post-eruptively, diet can influence implantation, growth, and microbial metabolic activity in the microenvironment of teeth, the flow and composition of saliva that bathes the teeth, and the composition of the enamel surface and the organic films deposited on its surface.³⁷

Among the potential risk factors for the development of dental caries, diet is one of the several that are modifiable. Among the food-related factors that

affect cariogenicity are the chemical composition of the food, the physical form in which it is eaten, the oral clearance time, the concentration, and the organoleptic effect of the food.⁷⁷ The differences in cariogenicity among various foods containing fermentable carbohydrates do not depend primarily on the amount of fermentable carbohydrates they contain, but rather their frequency of consumption and the time necessary to clear food from the mouth.⁷⁷

Root caries in people appear to be enhanced by dietary sugars. The frequency of both coronal and root caries coincided with the increased daily intake of sugar, especially when taken between meals.

- Gustafsson et al. (1953) in the Vipeholm Dental Caries Study demonstrated that caries activity in younger age groups was much higher than in the older age groups supplied with similar high-sugar diets. In the older age groups, however, the carious lesions occurred most frequently on the tooth roots. However, the effect of sugar was partially confounded by a diet of starch in the study, making this conclusion doubtful.⁷⁸
- Hix and O'Leary (1976) observed that patients with moderate-to-severe periodontal disease who were affected by root caries had a significantly higher number of fermentable carbohydrate exposures per week than those without root caries did. This relationship was independent of whether the patient received periodontal treatment.⁷⁹

- Papas et al. (1984) three-day food diaries were compiled for older adults subjects, and the results were then compared with a dental examination for coronal and root caries. Positive correlation was found between dietary sugars and both coronal and root decay. Associations were also confirmed between the frequency of snacks and the presence of root caries.⁸⁰
- Bowen et al. (1990) demonstrated that a sucrose substitute (sucralose) added to the feed of normal desalivated rats infected with *Streptococcus mutans* significantly reduced root caries formation in comparison to similar rats fed a diet containing sucrose. The substitution of sucrose with noncariogenic sweeteners therefore may be an effective means of minimizing the prevalence and incidence of root caries.⁸¹
- Papas et al. (1995) used a stepwise multiple logistic regression model to assess which nutritional variables differentiate the healthy and diseased group of participants in the Forsyth Specialized Caries Center. This model was consistent with past in vitro studies suggesting that cheese protects against caries formation when sugar intake is controlled for and that increasing frequency of sugar intake increases the odds of root caries.⁸²

- Papas et al. (1995) reported on the relationship between root caries and diet. These data suggest that root caries have a similar dietary etiology to coronal caries.⁸³

Cariogenicity Research

An acceptable and reliable cariogenicity rating methodology for food has not been devised. There are several reasons for this:

1. It is almost impossible to associate specific foods directly with caries in human beings because of the uncontrollable variables such as oral hygiene, diet, heredity, oral flora, past fluoride experience, enamel resistance.
2. Difficulty in the extrapolation of rat studies to human beings.
3. Multifactorial variations among individuals in oral flora, enamel resistance, and anatomic factors make rating of the cariogenic potential complex.⁷⁷

Studies to date have assessed cariogenicity by measuring acid formation in dental plaque, enamel demineralization, or caries formation in experimental animals.

- Jensen and Schachtele (1983) replicated an animal study of four different foods (cereal flakes, potato chips, milk chocolate, and a sucrose/lactalbumin/starch product) in humans. They found large

differences in responses to the test foods and concluded that the complexity of human variables influenced the results.⁸⁴

- The Scientific Consensus Conference on Methods for Assessment of the Cariogenic Potential of Food (1985) concluded that data generated by the plaque pH and animal caries methods are capable of providing relatively definitive information on the cariogenic potential of foods with negligible or low cariogenicity. That is, they can be used to categorize foods as having no cariogenic potential or low cariogenic potential, which may be helpful in identifying foods that are to be recommended to patients for dental health.⁸⁵

Diet Methodology in Caries Studies

A number of studies exist in which individual's meals and snacks are rated by the presence of fermentable carbohydrates and degree of retentiveness and compared with caries prevalence or incidence.

- Tiegen et al. (1981) developed a system for classifying vegetarian diets by their cariogenicity based on a four-point scale, according to retentiveness of foodstuffs. The study suggested that in contrast to current opinion, a vegetarian diet might be potentially cariogenic.⁸⁶
- Vedrenne (1985) designed a cariogenicity rating system based on the work of Bibby and Mundorff, that scored 60 common snack foods on

the basis of their properties relating to enamel dissolution and acid production in vitro, as well as on the retentiveness in the mouth.⁸⁷

- Papas et al. (1984) have devised and improved and abbreviated cariogenicity scale that rates each food and then each eating interval according to potential cariogenicity. This index assign the 50 foods contributing the most carbohydrate and additional items known to be highly cariogenic in the American diet to one of six groups based on their relative physical consistency. In addition, the questionnaire asks about serving sizes, frequency of use, and whether consumption was at or between meals.⁸⁰

Several problems exist with these diet methodologies. First, they attempt to associate the lifetime caries experience with a short-term diet survey. Second, the background diet may already provide maximum deterrents or promoters for the bacterial process. The background level of "hidden sugars" in some diets may be sufficient to obscure the cariogenicity of test foods in present caries studies.⁷⁷

Validity of Food Frequency Questionnaire

Epidemiologists addressing the effects of diet have generally used questionnaire that inquire about the usual frequency that specified foods are eaten, and that sometimes also attempt to quantify usual portion sizes. This approach is attractive because the data are simple to collect and process and in

theory represent intake over an extended period, which is the usual temporal frame of interest for chronic diseases. The single 24-hour recall, is relatively easy to administer, but does not provide a valid reflection of an individual usual diet. Multiple 24-hour recalls, a traditional diet history interview, or a multiple day diet record may provide valid assessments of an individual usual intake, but require a high level of commitment of nutritional expertise and respondent time. What is needed is an instrument that is both valid at the individual level and is easier and less expensive to administer.⁸⁸

- Willet et al. (1985) developed a semiquantitative food frequency questionnaire that was completed by a cohort of female registered nurses being followed for the occurrence of cancer and coronary heart disease. The data indicate that a simple self-administered dietary questionnaire can provide useful information about individual nutrient intakes over a one-year period.⁸⁸
- Block et al. (1986) developed a self-administered diet history questionnaire for epidemiologic and clinical use. The survey collected 24-hour dietary recalls, with data on generic and brand names and methods of food preparation, as well as portion size of each reported food using three-dimensional food models. The resulting food list and its corresponding brief data base, when used to calculate nutrients from a diet record, yielded correlations of $r > 0.70$. Field administration produced mean values comparable to national data. The limitation of

this study is the applicability of this food list to geographic or ethnic subgroups.⁸⁹

- Joshi et al. (1993) in an investigation to determine the reliability of 3-day food records in estimating the dietary amount and composition in an older adult population. They concluded that given on initial training the geriatric population can successfully complete 3-day food diaries and the food diary is a reliable instrument in obtaining dietary information in the studies of diet and caries studies.⁶⁴
- Dwyer et al. (1987) reported that in studies of dietary data four consistent findings have emerged from such studies. First, individuals failed to report consumption of some foods that were actually eaten; second, individuals sometimes recalled foods that were never eaten; third, reported estimates of amounts and kinds of foods were often inaccurate; and fourth, other factors including current diet, influenced recall of diet in the distant past. One reason why recall of foods may be incomplete, despite repeated exposures, is that most people eat without devoting full attention to the type and amount of foods they are eating. Lack of attention may account for frequent omission of foods that are not major parts of the meal.⁹⁰
- Taylor-Davis and Smiciklas-Wright (1993) stated that the quality of survey data obtained from elderly adults is subject to inaccuracies. Accuracy of data obtained from older respondents may be lower than

that of younger respondents. Errors made by older adults are largely due to misinterpretation of the question asked, motivations related to participation and reporting of information, and changes in memory associated with aging and other factors which may impact respondent accuracy. Many older adults have difficulty retrieving information from memory, and, to compound this, it appears that older adults may need to have more information than younger adults to answer the same question. Several demographic factors, including education, can influence the quality of survey data available from older adults.⁹¹

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

Database NHANES III (1988-94): The National Data Source

The Third National Health and Nutrition Examination Survey (NHANES III) was the seventh in a series of large health surveys conducted in the United States beginning in 1960.⁹² Three of these surveys, the National Health Examination Surveys (NHES), were conducted in the 1960's. In 1970, an expanded nutrition component was added to provide data with which to assess nutritional states and dietary practices, and the name was changed to National Health and Nutrition Examination Survey. A special survey of Hispanic populations in the United States was conducted during 1982-84. The general structure of the NHANES III sample design was similar to that of the previous NHANES. All of the surveys used complex, multi-stage, and stratified, clustered samples of civilian, noninstitutionalized populations. NHANES III was the first NHANES without an upper age limit; in fact, the age range for the survey was two months and older.⁹²

NHANES III was conducted over a six-year period, from October 1988 through October 1994 in two phases, each of which comprised a national probability sample. The first phase was conducted from October 18, 1988,

through October 24, 1991, at 44 locations. The second phase was conducted from September 20, 1991, through October 15, 1994, at 45 different locations (Appendix A). In NHANES III, 39,695 persons were selected over the six years; of those, 33,994 (86%) were interviewed in their homes. All interviewed persons were invited to the mobile examination center (MEC) for a medical examination. Seventy-eight percent (30,818) of the selected persons were examined in the MEC.^{92,93}

Inclusion Criteria

Non-institutionalized U.S. adults 65 years and over surveyed in NHANES III, 1988-94 who completed the dental examination were included in this study.

Sample Design

The NHANES III sample represented the total civilian, non-institutionalized population, two months of age or over, in the 50 states and the District of Columbia of the United States. The first stage of the design consisted of selecting a sample of 81 primary sampling units (PSU) that were individual counties. In a few cases, adjacent counties were combined to keep PSU's above a minimum population size. The PSU's were stratified and selected with probability proportional to size (PPS). Thirteen large counties were chosen with certainty (probability of one). For operational reasons, these 13 certainties PSU's were divided into 21 survey locations. After the 13 certainty strata were

designated, the remaining PSU's were grouped into 34 strata, and two PSU's were selected per stratum. The selection was done with PPS and without replacement. The NHANES III sample therefore consists of 81 PSU's or 89 locations. The 89 locations were randomly divided into two groups, one for each phase. The first group consisted of 44 locations; and the second of 45 locations.^{92,94}

The second stage of the design consisted of area segments composed of urban or suburban blocks, combinations of blocks, or other area segments in places where block statistics were not produced in the 1980 census. In the first phase the area segments were used only for a sample of persons who lived in housing units built before 1980. The third stage of sample selection consisted of households and certain types of group quarters, such as dormitories. All households and eligible group quarters in the sample segments were listed, and a subsample was designated for screening to identify potential sample persons. The subsampling rates enabled production of a national, approximately equal-probability sample of households in most of the United States with higher rates for the geographic strata with high Mexican-American populations. Persons within the sample of households or groups quarter were the fourth stage of sample selection. All eligible members within a household were listed, and a subsample of individuals was selected based on gender, age, and race or ethnicity.⁹⁴

Household Adult Questionnaire

Four sources of information provide the data points for this study: household adult questionnaire, examination data, dietary interviews, and dental examination.

The Household Adult Questionnaire contains all data collected during the household interviews for adult's 17 years and older (Appendix B). The data were obtained from three separate interviews administered in the household: the screener, the family and household adult questionnaires. The screener, through a brief interview administered to all households within selected sampling units, determined eligibility for participation in the survey. Information obtained from the screener questionnaire provided the basis for the demographic variables, and survey-related variables. The family questionnaire obtained data on educational levels, occupation, health insurance coverage, income, food security of family members, and characteristics of the house itself. The Household Adult Questionnaire was administered to the respondent or in some instances to a proxy respondent. Questions on topics such as medical conditions, health services usage, dental care, tobacco use and vitamin, minerals and medicine use were asked according to age subgroups. Field staff, in both English and Spanish conducted interviews. All staff received intensive initial training; formal retraining occurred throughout the survey to ensure that high skill levels were maintained.⁹²

Examination Data

Information relative to physical/medical and cognitive status of the survey population was collected in the mobile examination center (MEC) as well as data collected during the home examination (Appendix C). Sample persons were examined in the MEC within four weeks of the household interview. To assure that a full spectrum would be included, a home examination was scheduled for those aged 2-11 months or 20 years and over who were frail or unable to come to the MEC. The home examination was designed to gather certain physical and physiological information on sample persons in their own homes through a subset of components normally done in the MEC. These components were: body measurements, venipuncture, spirometry, cognitive testing, and physical performance testing.^{92,95}

Dietary Interviews

Trained interviewer conducted the dietary interviews of all examinees. The reported nutrient intake includes nutrients from foods and beverages reported in the 24-hour dietary recall (Appendix D). Respondents reported all foods and beverages consumed except plain drinking water. The primary source of food composition data for NHANES III is the U.S. Department of Agriculture (USDA) Survey Nutrient Database. Each USDA file contained food composition values that were appropriate for the time period during which the data were collected.

Additionally, food composition data for a small number of herbs and spices were obtained from the University of Minnesota's Nutrition Coordinating Center.⁹⁶

Dental Examination

Licensed dentists trained in the use of specific epidemiologic indices for oral health completed a visual and tactile oral and dental examination (Appendix E). The oral and dental examination consisted of a number of separate components applied to different age ranges (Table 4).⁹²

TABLE 4. COMPONENTS OF ORAL AND DENTAL EXAMINATION BY AGE	
Component	Ages
Oral mucosal tissue examination	2 years and over
Dental caries examination	
Nursing bottle caries	12-23 months
Coronal caries	2 years and over
Root caries	18 years and over
Presence of third molars	18 years and over
Restorations and tooth conditions	18-74 years
Traumatic injuries	6-50 years
Occlusal characteristics	8-50 years
Periodontal diseases	13 years and over
Prosthesis assessment	18-74 years
If full dentures	18 years and over
Denture questionnaire	18-74 years
If completely edentulous	18 years and over

Before NHANES III, most of the measurements had been extensively field-tested and, in some cases, modified to improve intra-examiner reliability, and reduce examination time. To maximize examiner consistency the general

rule was that when a choice existed between two possible diagnoses, the less severe diagnosis was recorded.⁹²

Medical Exclusion

Before beginning the examination, the dentist asked a series of questions about specific heart problems and conditions that might require antibiotics before a dental examination. If there was a positive response to any of the questions, the examinee was excluded from the periodontal and root caries components.^{92,95}

Dental Caries

The examiner used a mirror and #23 explorer for the DMFS/T index, recording the sum of the number of decayed, missing or filled permanent tooth surfaces/teeth. This data point indicated a summary of cumulative caries experience. If a tooth surface was both carious and filled, only the caries was scored precluding some history of fillings. Third molars are only indicated as present or absent.^{92,97}

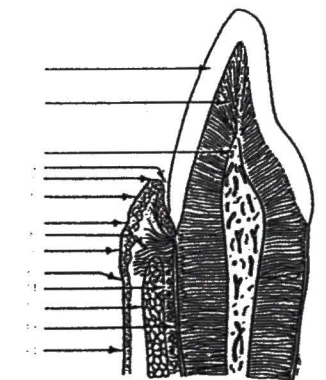
Root caries

The area below the cemento-enamel junction, if visible, was also examined for decay and filling on the roots of permanent teeth in adults 18 years and over. Four sides per tooth, were examined.^{92,97}

Periodontal Measures

The periodontal measures were completed for those 13 years and older. Randomly assigned half-mouths, one upper quadrant and one lower quadrant were selected at the beginning of the examination. The buccal and mesial-buccal aspects of each tooth were scored separately for each periodontal measure: gingival bleeding, calculus, gingival recession, and pocket depth. Loss of attachment was derived from two measurements made at each site (Figure 1): 1) the distance from the free gingival margin (FGM) to the cemento-enamel junction (CEJ), and 2) the distance from the FGM to the bottom of the sulcus (pocket depth). When the gingival margin had receded and the CEJ was exposed, the first number was scored as a negative value and was an indication of gingival recession.^{92,97}

FIGURE 1
LONGITUDINAL SECTION OF MAXILLARY INCISOR ILLUSTRATING
SUPPORTING STRUCTURES⁹⁸



Longitudinal section of maxillary incisor illustrating supporting structures: 1. enamel; 2. dentin; 3. pulp; 4. gingival sulcus; 5. free gingival margin; 6. free gingiva; 7. free gingival groove; 8. junctional epithelium of gingiva; 9. attached gingiva; 10. mucogingival junction; 11. periodontal ligament; 12. alveolar bone; 13. cementum; 14. alveolar mucosa.

Prosthesis Assessment

For prosthetic assessment, the arch-specific presence or absence of a removable prosthesis by type (full or partial denture) was recorded. When present the prosthesis was evaluated for five characteristics: integrity; excessive tooth wear; relined material; conditioner, or denture adhesive; stability, and retention. Only one partial denture per arch was evaluated. Where two partial dentures were present in a single arch, the partial replacing the most teeth or for equal spans, the one in the right quadrant was selected for evaluation.^{92,97}

Training and Quality Control

The National Institute of Dental Research and the dental consultant provided extensive training of the dental examiners at the time of hire. One examiner was available for the entire six years and performed about half of the examinations. Three more examiners and one back-up examiner performed the rest of the exams. As part of quality control, a separate "gold standard" examiner visited each dental examiner one or two times a year in the MEC for observation and to perform replicate exams of most indices on approximately 30 persons. Each examiner also performed replicate examinations on selected sample persons within the six weeks examination period available at each location. For all major components of the examination the intra-and inter-examiner measures were in satisfactory ranges.^{92,97}

Data Analysis

Descriptive and Multivariate statistics were used to compare the older adults with and without root caries with respect to frequency of consumption of snacks, cariogenic quality of the snacks, and demographic, medical and physical conditions, medications and oral hygiene practices. Logistic regression analyses was utilized in this study to measure the association between independent and the dependent variable. The Statistical Packages for Social Sciences (SPSS) 9.0 software and 0.05 level of significance were used in hypothesis testing.

Descriptive Statistics

The summary statistics used to describe the survey population were computed for older adults with root caries (RCG) and those without root caries (NRCG) separately. Frequency distribution and chi-square tests were used to describe the study population according to potential root caries risk factors and to compare older adults with root caries and those who do not have root caries.

a. Analyses to test hypothesis H1:

Older adults with root caries consume a greater number of snacks that have a higher cariogenic potential than do older adults who do not have root caries.

To test the first hypothesis, an index of cariogenic potential was calculated based on the consumption of snacks in the following manner. Using the rating scale designed by Palmer a score was created characterizing the cariogenic

potential of the foods: non-cariogenic (score=0), slightly cariogenic (score=0.5), moderately cariogenic (score=1.0), and highly cariogenic (score=2.0), and the number of snacks eaten a day. This index was calculated by summing up the cariogenic potential of each snack eaten in a day. Snacks were also scored on a scale similar to one used by Hoffman et al.⁷⁷ (Table 5), that classified food by cariogenic potential in noncariogenic, starches, low cariogenicity, liquid sugars, solid sugars, sticky, and slowly dissolving. Spearman's correlation was calculated to test the relationship between root caries and high-cariogenic snack exposure. In addition, root caries data were classified into three categories for further analysis: (1) no root caries, (2) a single incident of root caries, and (3) multiple root caries. Root caries were also dichotomized into the presence and absence of root caries for further analysis. These categorical variables were used in a logistic regression analysis as the response variable with snack cariogenic potential index and snack form index as predictors.

b. Analysis to test hypothesis H2:

Older adults with root caries suffer from multiple chronic conditions and use multiple medications more often than do older adults who do not have root caries.

To test the second hypothesis, scales were created. The scales were categorized into three components for polypharmacy (0 medications, 1 to 4

medications, 5 or more medications) and xerostomic effect (0 no, 1 yes) and chronic conditions (0 to 2 chronic conditions, 3 or more chronic conditions).

TABLE 5. CLASSIFICATION OF FOOD BY CARIOGENICITY POTENTIAL *		
Rating	Category	Food
1 N ₁	Noncariogenic	Cheese, eggs, bacon, sausage, nuts, peanut butter, butter, gravies, margarine, salad dressing, club soda, water, coffee, tea, cream, artificial sweetener, nonlegume vegetables, meat, fish, poultry, soups, antacid tablets
2 S ₁	Starches	Bread, rolls, crackers, potato, spaghetti, plain cereals, legumes, corn, cornbread, grits, tortillas, rice, pizza, noodles, macaroni, pancake, waffle, french toast, pot pies, pretzels, sweet potato, yam, white sauce, cooked cereals, popcorn, breaded meat, breaded fish, breaded poultry
2 L ₁	Low cariogenicity	Milk, yogurt, buttermilk, juices, fruit
3 F ₁	Liquid sugar	Soft drinks, mixed drinks, fruit drinks, sugar or honey in beverages (coffee, tea), nondairy creamer, cocoa, Kool-aid beverage mix, lemonade, breakfast drinks, tonic water
4 F ₂	Liquid or solid sugar	Ice cream, ice milk, frozen desserts, applesauce, puddings, custard, gelatin desserts, sherbet, flavored yogurt, whipped cream
5 F ₃	Solid sugar	Donuts, cookies, cake, sweetened cereals, pies, pastry, sweet rolls, sweet bread, chocolate candy, canned fruit, toaster pastries, wheat flakes, soda crackers, snack crackers, pretzels, chips, caramel, muffins, coffee cake
5 F ₄	Sticky	Dried fruits, marshmallows, toffee, sticky candy, jelly, jam, syrup, molasses, bananas, gum
6 F ₅	Slowly dissolving	Breath mints, cough drops, hard candy

* From: Hoffman L, Dwyer JT, Palmer C, Papas A. Clin Nutr 1988; 7: 71-76.

The numbers of root caries were compared among the three groups for polypharmacy using Kruskal-Wallis ANOVA. Medications that are reported to produce xerostomic effect were used as a proxy for xerostomia in the survey population. The numbers of root caries among older adults with xerostomic effects were compared to the number of root caries among older adults without xerostomic effects using Wilcoxon rank sum test. Root caries among older adults with multiple chronic conditions were compared to root caries among older adults with two or less chronic conditions using Wilcoxon rank sum test. These variables for root caries were used in a multiple logistic regression analysis as the response with polypharmacy, chronic conditions, and xerostomic effects as possible predictors of root caries.

c. Analysis to test hypothesis H3:

Older adults with root caries tend to have more gingival recession, are more likely to wear partial dentures, and are more likely to present impairment in the ADLs than do older adults who do not have root caries.

To test the third hypothesis, Spearman's correlation between number of root caries and amount of gingival recession was calculated. The number of root caries among older adults with partial denture were compared to the number of root caries among older adults not wearing partial dentures using Wilcoxon rank sum test. The numbers of root caries among older adults with impairment in the ADLs were compared to the number of root caries among older adults without

impairment. To further investigate the relationship of gingival recession to root caries among older adults, gingival recession was categorized (< 2 mm. or ≥ 2 mm.). The number of root caries among older adults with < 2 mm. of gingival recession were compared to the number of root caries among older adults with gingival recession ≥ 2 mm. using Wilcoxon rank sum test. These variables for root caries were used in a multiple logistic regression analysis as the response with gingival recession, partial denture wearer (0 no, 1 yes), and impairment in the ADLs (0 no, 1 yes) as potential predictors of root caries.

d. Analysis to test hypothesis H4:

Educational level, income, oral hygiene practices, smoking and alcohol use are factors which will differentiate older adults with and without root caries.

The fourth hypothesis was tested using descriptive and multivariate statistics to determine the relationship between the predictor and outcome variable. The relative strength of the predictors for the outcome was assessed using logistic regression and adjusting for age and gender. These variables were used as confounding variables in the logistic regression analysis.⁹⁹

Logistic regression analyses were performed to assess the combined effect of factors associated with the risk of developing root caries, and to identify the best predictors of root caries.¹⁰⁰ The models were identified according to the framework proposed by Lawrence et al.⁶⁵ First, a dental model composed of those oral factors bivariately associated with the root caries measure at $p < 0.20$ were selected for inclusion by a forward selection procedure, using $p < 0.20$ as

the variable entry level. Second, significant oral factors were forced to enter into another forward selection procedure with entry set at $p < 0.15$. At this step, individual factors that were not significantly related to root caries with respect to their Mantel-Haenszel chi-square test or bivariate correlation were given a chance to contribute to the regression models. Once forward selection was completed, a backward elimination process with the criterion set at $p < 0.05$ were used to eliminate any weakly associated variables. A similar approach was adopted for building a model that included the sociodemographic, medical, nutritional, and psychosocial factors and was termed the nondental model.

The strategy for the regression analysis was to achieve the best-fitting equation from the dental variables first and then to see if any nondental variables would improve the fit when added at subsequent steps.

CHAPTER 4

RESULTS

Descriptive Results

Population Sociodemographic Characteristics

The sociodemographic characteristics of the survey population are reported in Table 6. The study population consisted of 3,313 subjects, of whom 51% were female and 49% male. Sixty-one percent of the study population were Caucasians, 19% African-Americans, and 20% Mexican-Americans. Among the Caucasians, 46% were young-old (65-74), 41% old (75-84), and 13% old-old (85+). Among African-Americans, 64% were 65-74 years old, 29% were 75-84 years old and 7% were 85+ years old. Mexican-Americans 69% were (65-74), 26% (75-84) and 5% (85+) years. The age of the survey population ranged from 65-90 years with a median age of 74 years.

When compared to Mexican-Americans and African-Americans, Caucasians had a higher level of education completed (12%, 14%, and 28%) with high school diplomas for Mexican-Americans, African-Americans, and Caucasians, respectively, and (6%, 13%, and 26%) with college education for Mexican-Americans, African-Americans, and Caucasians, respectively. The

African-Americans (75%) and Mexican-Americans (84%) were also more likely than Caucasians (54%) to report incomes below the poverty level. For all sociodemographic characteristics, there were statistically significant differences among the three ethnic groups.

TABLE 6. SOCIODEMOGRAPHIC CHARACTERISTICS BY RACE/ETHNICITY OF NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994				
	Caucasian N=2026 n(%)	African-Amer. N=641 n(%)	Mexican-Amer. N=646 n(%)	P
Age				
65-74	938(46)	413(64)	447(69)	.011
75-84	835(41)	186(29)	166(26)	
85 +	253(13)	42(7)	33(5)	
Education				
No School	23(1)	44(7)	163(25)	.000
Elem./Intermediate	903(45)	422(66)	366(57)	
High School	567(28)	92(14)	77(12)	
College Education	533(26)	83(13)	40(6)	
Income				
Below Poverty Level	1097(54)	478(75)	542(84)	.000
> \$ 20,000	929(46)	163(25)	104(16)	

The sociodemographic characteristics of the survey population by root caries status are reported in Table 7. The root caries group (RCG) presented 57% in the young-old (65-74) as compared to the no root caries group (NRCG) with 54% in that age group, but this difference was not statistically significant ($p=.166$). Male were more likely to present root caries 58% for males vs. 42% for female with root caries lesions ($p=.000$). Minorities groups were more likely to

present root caries 58%, (African-Americans 28% and Mexican-Americans 30%, when compared to the Caucasians with 42% ($p=.000$). The RCG were found to have fewer years of education completed ($p=.000$). This finding is of interest because a person more likely to report income below the poverty level is more likely to present root caries. Statistically significant differences were noted between the RCG and the NRCG, with respect to gender ($p=.000$), ethnicity ($p=.000$), and income level ($p=.000$).

TABLE 7. SOCIODEMOGRAPHIC CHARACTERISTICS BY ROOT CARIES STATUS OF NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994			
	No Root Caries N=2666 n (%)	Root Caries N=647 n (%)	P
Age			
65-74	1427 (54)	371 (57)	.166
75-84	959 (36)	228 (35)	.608
85 +	280 (10)	48 (8)	.126
Gender			
Male	1256 (47)	375 (58)	.000
Female	1410 (53)	272 (42)	.000
Race/Ethnicity			
Caucasian	1755 (66)	271 (42)	.000
African-American	461 (17)	180 (28)	.001
Mexican-American	450 (17)	196 (30)	.000
Education			
No School	147 (5)	83 (13)	.000
Elem./Intermediate	1335 (50)	356 (55)	.022
High School	633 (24)	103 (16)	.000
College Education	551 (21)	105 (16)	.005
Income			
Below Poverty Level	1650 (62)	467 (72)	.000
> \$ 20,000	1016 (38)	180 (28)	.008

Health Status

The health status by root caries condition is presented in Table 8. Sixty-seven percent of the survey population perceived their health as "Good" or better. When comparing the NRCG vs. the RCG, the root caries group perceived themselves as less healthy ($p = .008$). With respect to smoking/tobacco use, about 34% in the RCG were currently smoking vs. 23% in the NRCG that were currently smoking ($p = .000$). In the NRCG 31% were currently drinking vs. 28% in the RCG ($p = .136$). Both the RCG and NRCG group presented similarities with respect to number of chronic conditions present. In the survey population there is a range of 0 to 11 diseases present with a median of 2.00 diseases. Seventy-one percent of those surveyed took between 1 to 4 medications, with a range of 1 to 15 and a median of 3.00 medications. With respect to xerostomic effect and dependency in Activities of Daily Living (ADLs), although not statistically significant 31% ($p = .649$), presented xerostomic effect in the RCG and 8% ($p = .057$), presented some type of dependency in the ADLs.

Dental Caries Indexes

Table 9 presents the mean number of coronal and root decayed and filled surfaces among the older adults dentate population. A mean number of 21 teeth present were observed in the survey population. Overall, 23 coronal surfaces per person were decayed or filled (CDFs). The number of decayed coronal surfaces (CDs) was 2.03. Dentate older adults had on average 2.17 decayed or filled root

surfaces (RDFs). Other characteristics with respect to root caries are as follows: they were found to have 0.47 teeth with gum recession, 0.65 teeth with filled root surface (RFs), and 1.52 teeth with root decayed (RDs).

TABLE 8. HEALTH AND ROOT CARIES STATUS OF NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994			
	No Root Caries N=2666 n (%)	Root Caries N=647 N (%)	P
Perceived Health			
Excellent	318 (12)	40 (6)	.000
Very Good	582 (22)	123 (19)	.094
Good	921 (35)	238 (37)	.353
Fair	655 (24)	187 (29)	.008
Poor	190 (7)	59 (9)	.089
Alcohol use			
Yes	838 (31)	180 (28)	.136
No	1828 (69)	467 (72)	.135
Smoking/Tobacco use			
Yes	621 (23)	220 (34)	.000
No	2045 (77)	427 (66)	
Polypharmacy			
1-4	1904 (71)	439 (68)	.134
> 5	762 (29)	208 (32)	.133
Chronic conditions			
No disease	314 (12)	99 (15)	.040
1-2	1248 (47)	298 (46)	.667
> 3	1104 (41)	250 (39)	.341
Xerostomic Effect			
Yes	852 (32)	202 (31)	.649
No	1814 (68)	445 (69)	
Activities of Daily Living			
Dependent	155 (6)	50 (8)	.057
Not Dependent	2511 (94)	597 (92)	

TABLE 9. FREQUENCY OF SELECTED CORONAL AND ROOT CARIES INDEX OF NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994			
	N	Mean	Standard Deviation
# Teeth	70772	21.37	7.09
# Teeth with gum recession	1567	0.47	0.50
CDFs ^a	50161	23.04	20.99
CDs ^b	6719	2.03	6.51
CFs ^c	43442	19.95	21.63
RDFs ^d	7192	2.17	5.88
RFs ^e	2157	0.65	2.19
RDs ^f	5035	1.52	5.53

^a Coronal Decayed, Filled surface; ^b Coronal Decayed surface; ^c Coronal Filled surface; ^d Root Decayed, Filled surface; ^e Root Filled surface; ^f Root Decayed surface

The ratio of the mean decayed surfaces to the mean decayed and filled surfaces for both coronal and root decayed that is derived by dividing (CDs/CDFs & RDs/RDFs) values in Table 9. Untreated coronal caries accounts for 8.8% of the surfaces with treated and untreated coronal caries. In contrast, untreated root caries accounts for 70.0% of the surfaces with treated and untreated root caries.

Scores on the root caries index (RCI) in the survey population ranged from 0 to 100, with a mean of 39.07. A RCI of 39.07 means that of all teeth with gingival recession, 39.07% were decayed or filled on the root surface. The RCI in the mandibular and maxillary arches were of 30.29 for the mandibular arch and 31.89 for the maxillary arch.

Dental Care Needs

Table 10 presents the frequency of visits to the dentist, dental coverage and the dental care needs by root caries. The RCG was least likely to have dental coverage (7% vs. 10%) $p=.017$. The RCG visit the dentist less frequently 23% visit the dentist once a year as compared to 35% of the NRCG that goes to the dentist more frequently ($p=.000$). Sixty-seven percent in the RCG visits the dentist whenever needed vs. 55% in the NRCG ($p=.000$). The RCG demonstrated a greater need for dental treatment (33% vs. 12%) needed fillings ($p=.000$), (13% vs. 9%) needed cleaning ($p=.002$), (31% vs. 5%) needed extraction ($p=.000$), (7% vs. 2%) needed gum treatment ($p=.000$), and (30% vs. 14%) needed dentures ($p=.000$).

TABLE 10. DENTAL COVERAGE, VISIT TO THE DENTIST AND DENTAL CARE NEEDS BY ROOT CARIES STATUS OF NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994			
	No Root Caries N=2666 n (%)	Root Caries N=647 n (%)	P
Dental Coverage			
Yes	256 (10)	43 (7)	.017
No	2410 (90)	604 (93)	.016
Visit Dentist			
Once a year	896 (34)	147 (23)	.000
Every 2 years	37 (1)	9 (1)	.199
Whenever needed	1454 (55)	437 (68)	.000
Doesn't go anymore	127 (5)	11 (2)	.366
Dental Care needed			
Filling	312 (12)	212 (33)	.000
Cleaning	262 (9)	84 (13)	.002
Gum treatment	69 (2)	48 (7)	.000
Extraction	139 (5)	201 (31)	.000
Dentures	385 (14)	199 (30)	.000

**TABLE 11. CORONAL AND ROOT CARIES INDEX BY RACE/ETHNICITY AND AGE OF NON-INSTITUTIONALIZED
U.S. OLDER ADULTS 1988-1994**

	DMFt ^a		CDFs ^b		CDs ^c		CFs ^d		RDFs ^e		RFs ^f		RDs ^g	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Caucasian														
65-74	21.56	21.32	33.39	32.05	1.23	0.62	32.16	31.43	2.07	1.26	1.17	0.87	0.90	0.39
75-84	23.41	22.82	26.54	26.82	1.35	0.76	25.19	26.06	1.92	1.42	0.85	0.89	1.08	0.53
85 +	24.59	23.72	25.72	22.57	1.27	0.74	24.45	21.83	1.99	1.22	0.87	0.70	1.12	0.52
African-American														
65-74	18.70	19.88	11.32	9.49	4.74	2.37	6.58	7.12	3.81	1.81	0.18	0.19	3.63	1.61
75-84	23.51	23.23	6.76	9.19	5.31	3.02	1.45	6.17	3.90	2.44			3.89	2.37
85 +	23.29	24.88	7.63	4.06	4.18	2.84	3.45	1.22	4.88	2.16	0.18	0.24	3.24	1.92
Mexican-American														
65-74	18.90	14.91	13.91	12.17	2.83	4.15	11.08	8.02	2.11	3.47	0.28	0.37	1.83	3.09
75-84	21.36	19.36	12.95	13.58	4.97	2.69	7.98	10.89	4.59	2.02	0.36	0.27	4.23	1.76
85 +	25.64	24.21	4.79	11.50	0.79	4.93	4.00	6.57	0.86	4.57	0.14	0.36	0.71	4.21

^aDecayed, Missing, Filled teeth; ^bCoronal decayed, Filled surface; ^cCoronal Decayed surface; ^dCoronal Filled surface;

^eRoot Decayed, Filled surface; ^fRoot Filled surface; ^gRoot Decayed surface

Table 11 presents coronal and root caries index of non-institutionalized U.S. older adults. The DMFt increased with age across all race/ethnic groups and genders. The CDFs decreased with age for both genders and all race/ethnic groups with the exception of the African-Americans males that there is a slightly increased in the 85+ age group. The findings regarding RDFs for the male population were as follows: in the Caucasians there is a tendency to decreased with age; in the African-Americans and Mexican-Americans the tendency is to increased with age with the exception in the 85+ age group Mexican-Americans that there is a decreased. The RDFs in the female population showed a tendency to decreased with age with the exception of the Mexican-Americans that decreased in the 75-84 years old group and then increased in the 85+ years old group.

TABLE 12. RATIO OF DECAYED SURFACES TO DECAYED AND FILLED SURFACES FOR CORONAL AND ROOT CARIES BY RACE/ETHNICITY AND AGE OF NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994				
	CDs/CDFs (%)		RDs/RDFs (%)	
	M	F	M	F
Caucasians				
65-74	3.68	1.93	43.48	30.95
75-84	5.08	2.83	56.25	37.32
85 +	4.94	3.28	56.28	42.62
African-Americans				
65-74	41.87	24.97	95.28	88.95
75-84	78.55	32.86	99.74	97.13
85 +	54.78	69.95	66.39	88.88
Mexican-Americans				
65-74	20.35	34.10	86.73	89.05
75-84	38.38	19.81	92.16	87.13
85 +	16.49	42.87	82.56	92.12

The ratio of the Ds to the DFs for coronal and root caries by race/ethnicity and age is shown in Table 12. For coronal caries Ds/DFs increased with age in the female group, in the male it shows and increased with age but for the African-Americans and Mexican-Americans there is a decreased in the 85+ years group. Untreated coronal caries is higher in the African-Americans population presenting (79%) of untreated caries in the 74-84 age group for male and (70%) for female in the 85+ age group. For the Mexican-Americans males (38%) of untreated caries in the 74-84 age group and females (43%) in the 85+ age group. The Caucasians presents the least percentage of untreated caries with (5%) for male in the 74-84 age group and (3%) for female in the 85+ age group.

The root caries ratio increased with age by gender and race/ethnicity. The Caucasian male presented a (56%) of untreated root caries lesions in the 85+ year's age group and the female in the same age bracket presents (43%) of untreated root caries lesions. The African-Americans and Mexican-Americans presented similar pattern of untreated root caries lesions. For African-Americans males is goes at high as (99.74%) in the 74-84 age group and for female (97.13%) in the same age group. The Mexican-Americans presents (92.16%) for males and (92.12%) for females.

Analytic Results

Although gingival recession is a necessary condition for root caries, it is clearly not the only predictor. It thus appears that other conditions must exist for

root caries to develop. In this study potential precursors of root caries were examined. Root caries were significantly correlated with race/ethnicity, gender, education, income, and medical conditions, dental and oral conditions and dietary factors.

A stepwise multiple regression analysis was performed to determine what influence the variables of age, gender, ethnicity, education, medical conditions, oral and dental conditions and diet exerted on the number of decayed root surfaces. When the data were analyzed, 27% of the variance was explained by CDs, 30% by CFs, 31% by number of teeth, and 32% by liquid sugar snacks.

The mean intakes of snacks by cariogenicity potential of the subjects are shown in Table 13. The surveyed population presented a mean of 56.41 starchy snacks eaten per/day. Solid sugar snacks and liquid sugars snacks account for 28.43 and 18.67 respectively of the snacks eaten per/day. A Stepwise Multiple Regression Analysis was performed to determine the influence of the different food by cariogenicity potential on root caries and the best predictor model was when starches snacks were eaten in combination with liquid and solid sugars snacks ($p < 0.0001$).

TABLE13. MEAN DAILY INTAKE OF SNACKS BY CARIOGENICITY POTENTIAL OF NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994		
	Mean	Standard Deviation
Non cariogenic snacks	35.45	27.34
Low cariogenic snacks	57.67	37.99
Starches snacks	56.41	33.88
Solid sugars snacks	28.43	25.95
Liquid sugars snacks	18.67	23.12

Table 14 presents odds ratios obtained from models of root caries for each ethnic group separately. Predisposing sociodemographic variables were significant predictors of root caries in the three ethnic groups. Males were almost 1.5 times likely to report root caries when compared to females among all ethnic groups. Reporting and income below poverty level and no formal education increased the risks for root caries among all ethnic groups. Not having a usual source of dental care significantly increased the probability of having root caries. On the other hand having contact with a primary care physician decreased the risks for root caries. Among the predisposing oral factors for root caries were using partial dentures, gingival recession ≥ 2 mm., and use of tobacco that increased the risks. The alcohol consumption decreased the risk for root caries among all ethnic groups.

The prediction model for root caries among the non-institutionalized U.S. older adults consisted of a nondental model (Table 15), a dental model (Table 16) and dietary model (Table 17). Age increased the risk of root caries in the nondental model; however when dental and dietary factors were added to the model; this risk predictor did not remain statistically significant. All univariate, bivariate and multivariate relations were examined for distributive normality, additivity, linearity, and multi-collinearity. No significant, patterned violations of these statistical assumptions were revealed.

TABLE 14. ODDS RATIO OBTAINED FROM MODELING ROOT CARIES BY RACE/ETHNICITY GROUP AMONG NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994

	Caucasians		African-Americans		Mexican-Americans	
	Odds Ratio	95% C.I.	Odds Ratio	95% C.I.	Odds Ratio	95% C.I.
Male	1.5030	1.2445-1.8152	1.5206	1.2617-1.8327	1.5509	1.2966-1.8552
Education-No School	1.6865	1.1789-2.4126	2.8640	2.0443-4.0122	1.9200	1.3217-2.7893
Income Below Poverty Level	1.4680	1.1979-1.7989	1.5809	1.2931-1.9329	1.5746	1.2882-1.9246
No Dental Insurance	1.6545	1.1497-2.3810	1.7356	1.2043-2.5013	1.5545	1.0814-2.2346
Primary Care Physician	0.7666	0.5988-0.9815	0.6732	0.5282-0.8581	0.7108	0.5563-0.9084
Alcohol Use	0.7705	0.6287-0.9443	0.7244	0.5929-0.8851	0.7295	0.5961-0.8928
Tobacco Use	1.7606	1.4450-2.1452	1.7411	1.4280-2.1229	2.0579	1.6890-2.5074
Using Partial Dentures	1.4737	1.1288-1.9240	1.5423	1.1853-2.0069	1.7239	1.3169-2.2565
Gingival Recession \geq 2 mm.	4.2876	3.1574-5.8223	4.5022	3.3180-6.1090	4.2057	3.0990-5.7076

TABLE 15. NONDENTAL LOGISTIC REGRESSION MODEL OF ROOT CARIES AMONG NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994		
	ODDS RATIO	95% C.I.
Male	1.5474	1.3008-1.8408
African-Americans	2.5201	2.0370-3.1178
Mexican-Americans	3.1751	2.5566-3.9432
Education-No School	3.4702	2.5224-4.7741
Education 8 years or less	1.5023	1.2466-1.8104
Income Below Poverty Level	1.6000	1.3287-1.9268
Dental Coverage	0.6705	0.4796-0.9374
Primary Care Physician	0.6770	0.5435-0.8434
Perceived Health (Excellent)	0.4878	0.3471-0.6856
No Chronic Conditions	1.3531	1.0599-1.7276
Tobacco Use	1.6965	1.4088-2.0429

In this logistic model male older adults were 1.55 times more likely than female to have root caries (O.R. 1.55; 95% C.I. 1.30 – 1.84). Non-institutionalized older adults' with race/ethnicity background, African-Americans or Mexican-Americans are at a higher risk (2.5 and 3.2 respectively) of having root caries than Caucasians. In the survey population having an education of 8 years or less is a predictor of root caries, with people with no school being at a higher risk (O.R. 3.47; 95% C.I. 2.52 – 4.77). People that report having income below poverty level were more likely to have root decayed than people with higher income did (O.R. 1.60; 95% C.I. 1.33 –1.93). Those having dental services covered by their health insurance having a primary care physician and perceiving their health as excellent were less likely to have root caries. The use of tobacco increases the likelihood of having root caries (O.R. 1.70; 95% C.I. 1.41 – 2.04).

The oral and dental factors that increased the likelihood of having root caries were as follows: CDs (O.R. 1.78; 95% C.I. 1.67 – 1.90); RFs (O.R. 1.61; 95% C.I. 1.54 – 1.68). Other dental factors were having less than 14 teeth, using partial dentures (O.R. 1.78; 95% C.I. 1.38 – 2.29); and having a gingival recession ≥ 2 mm. (O.R. 3.30; 95% C.I. 2.39 – 4.52).

TABLE 16. DENTAL LOGISTIC REGRESSION MODEL OF ROOT CARIES AMONG NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994		
	ODDS RATIO	95% C.I.
Coronal Decayed Surface	1.7839	1.6741-1.9009
Coronal Filled Surface	0.9846	0.9779-0.9915
Root Filled Surface	1.6083	1.5427-1.6767
14 teeth or less	1.4235	1.1536-1.7566
Using Partial Dentures	1.7773	1.3781-2.2921
Gingival Recession ≥ 2 mm.	3.2889	2.3924-4.5243

Participants who were taking food classified, as starches or liquid sugars were more likely to have root caries than those who were not taking that type of food were. The likelihood for starches (O.R. 1.52; 95% C.I. 1.26 – 1.83) and for liquid sugars (O.R. 1.75; 95% C.I. 1.44 – 2.11).

TABLE 17. DIETARY LOGISTIC REGRESSION MODEL OF ROOT CARIES AMONG NON-INSTITUTIONALIZED U.S. OLDER ADULTS 1988-1994		
	ODDS RATIO	95% C.I.
Non-cariogenic Snacks	0.5488	0.4033-0.7467
Starchy Foods	1.5179	1.2568-1.8333
Liquid Sugars Snacks	1.7457	1.4418-2.1135

CHAPTER 5

DISCUSSION

This study examined associated potential risk factors for root caries in a population-based sample of non-institutionalized U.S. older adults of diverse race/ethnic groups and age cohorts. Overall findings suggest that there are disparities between the Caucasians and the two minority ethnic groups. Caucasians had higher educational attainment, more positive self-reported general health status, and a greater proportion of individuals with dental benefits. Income differences suggest that the Caucasians have a higher number of individuals in the higher categories of income when compared to African-Americans and Mexican-Americans individuals. Similar results are reported by Atchison et al. (1997).¹⁰¹ Studies have shown, Atchison (1997) and Gift (1997), that personal characteristics of an individuals such as higher educational attainment and higher income have been shown to be positively associated with dental services use.^{26,101}

The Healthy People 2010 Objectives reports that only 15 % of older adults have any private dental insurance, and more than 22% of older adults African-Americans had at least one dental visit in the preceding year.¹⁰² The 1995 Oral Health Report for the State of Texas, reported that 11% of the non-

institutionalized population have not seen a dentist in 5+ years. Fifty percent reported any kind of dental insurance and a higher proportion of older adults with lower income, and lower education attainment.¹⁰³ The demographic changes that are anticipated in the next decades magnify the importance of addressing disparities in health status. The segment of the population that is experiencing poor oral health status are expected to grow as a proportion of the total U.S. population; therefore, the future of oral health will be influenced substantially by our success in improving the health of racial and ethnic minorities.¹⁰²

The mean number of teeth in this study for 65+ age groups was higher than other studies, National Institute of Dental Research Seniors Study (1987), Graves et al. (1992), and Locker et al. (1989).^{3,30,59} But lower than a study by Wallace et al. (1988) subjects recruited for a clinical trial.⁶⁰ The prevalence of coronal decayed, filled surfaces (CDFs) was 23, in U.S. studies a prevalence from a high of 37 to a low of 14 is reported.⁵¹ The population surveyed was a slightly younger cohort of older adults compared to the current study. The prevalence of root decayed, filled surfaces (RDFs) was 2.17, in U.S. studies from 1982-1993 the severity measured of root caries prevalence reported range from 6.5 to 1.8.⁵¹ The prevalence as measured by the Root Caries Index (RCI) was 39.07, previous studies reported range from 8.1 to 28.⁵¹ An explanation for this is that this is a cohort of older adults 65+ in comparison with previous studies that considered working adults 20 and over. Katz et al. (1982) reported that RCI increases with age.⁵⁶ In relation to the intraoral pattern of distribution of root

caries Katz et al. (1982) found that maxillary rates exceeded that of the mandibular teeth.⁵⁶ In the surveyed population the mandibular teeth exceeded the rates of the maxillary is consistent with the results of Lawrence et al. (1995) that the maxillary rates was higher than the mandibular rate.⁶⁵ The ratio of decayed surfaces to decayed and filled surfaces (D/DFs) for coronal caries was 9% and for root caries 70% this may be due to the fact that either root caries go undetected in dental offices or are difficult to restore, thus leading to high rates.⁶³

A multivariate approach is useful in relating dental and oral conditions to factors that should influence those conditions. The lack of association between age and root caries in this cohort of older adults was found, similar findings are reported by Beck et al. (1985).⁵⁸ Other conditions that made significant contributions to the regression models were: number of teeth with coronal decayed surfaces (CDs), suggesting there may be some shared risk factor for the two caries processes.⁵⁸ Dietary studies on patients with periodontal disease have found significant correlation between liquid sugar consumption and root caries.⁴⁰

Reporting errors are common on 3-d records and foods recording may not be representative of usual food intakes. Memory errors are considerable when data such as food-frequency or recall methods are used. Another limitation is a tendency to underreport intakes of cariogenic foods is to be expected especially when subjects know data are being used in oral health study. Correlations between cariogenic snacks and root caries were similar to those obtained by

researchers in other studies. Papas et al. (1995) reported that both amount and frequency of sugar consumption are important factors in the development of root caries.⁸³ In two different studies when sugars were separated into categories based on form and retention. Those who developed root caries consumed almost twice the amount of sugary liquids and 25% more solids sugars than those who did not have root caries.⁴⁰ Hoffman et al. (1988) reported that the cariogenicity of starchy foods is greatly enhanced when sugar is present. That cooking increases the cariogenicity of starch, especially if the diet contains glucose or sucrose, because the starchy base is retained longer in the mouth and has increased oral clearance times.⁷⁷

The logistic model shows males to be at higher risk for root caries than females. Fejerskov et al. (1996) reports that this only reflects different lifestyles and not that gender as such represents a risk factor; other papers suggest that there is no difference between the genders.¹⁰⁴ Race/Ethnicity (African-Americans and Mexican-Americans), low educational attainment, low income increased the odds of having root caries. Atchison (1997) and Gift (1997) reports that certain personal characteristics predispose the individuals to a higher risk of poor health status. This likely occur because individuals in minority groups with low income and low level of education do not have the motivation to follow preventive measure to improve their health status.^{26,101}

In this study, subjects with root caries lesions were found to have higher scores for gingival recession compared to those who did not develop root caries.

These results support the findings of Lawrence et al. (1995).⁶⁵ In the final regression model, the wearing of a partial dentures increased the risk for root caries. Similar findings are reported by Lawrence et al. (1995) and Hellyer et al. (1990).^{65,105} It was found that root caries have a negative relationship with the number of teeth present. The more teeth a subject had, the less likely that there would be root caries. This could be a reflection of the individual's resistance to dental disease.⁷¹

Tobacco users were found to have a higher odds of having root caries than non-users. Since gingival recession is a necessary condition for root caries. Ryder et al. (1996) and Zambon et al. (1996) reported a clearer relationship between smoking and periodontal diseases. In comparison between smoker and non-smoker groups, the smoker group had more sites with deeper pockets. In addition, alveolar bone loss was greater in smokers, especially in older patients.^{106,107} The odds ratio obtained by modeling root caries by race/ethnicity alcohol use indicated a protective effect for root caries, there is evidence associating alcohol in the presence of tobacco use to oral cancer but not to coronal or root caries. A plausible explanation could be that the two habits are often found together there could be some degree of confounding between alcohol and tobacco use in the root caries process.

Limitations of the Study

The limitations of the study are divided in two: those due to the database and the ones related to the statistical analysis.

- NHANES III database present a good sampling methods, with calibrated examiner and accurate quality of data.
- As with other studies involving diet methodology, there is the limitation to attempting to associate the life time caries experience with a short-term diet survey.
- Since the data was previously obtained, (secondary data) proxy variables were used: for example, the ideal in the case of partial denture use was to know the position of the clasp in the tooth involved, but that was not available. In xerostomic effect drugs known to produce dryness of the mouth was used as a proxy.
- Microbiological data of the individuals was not available in the data set. This presents a limitation in the analysis to correlate the predictors of root caries with the microbiological findings.
- Although analyzing NHANES III data has been productive and useful, it has the limitations of a cross-sectional study that allows for the identification of risk indicators rather than risk factors.

Utility of the Model

In the model determinants of oral health outcomes as measured by perceived oral health status (self-rated oral health status) and evaluated oral health status (the ratio of decayed/decayed and filled teeth). Insights can be gained by the analyses showing which types of variables distinguish the older adults and racial/ethnic groups. For example, gender and educational attainment are immutable characteristics. They are not going to change through health promotion activities. However, they might be useful in defining groups in need of health promotion programs. Since a lower educational level was associated with root caries status, programs might be targeted toward less-well –educated older people.

The measure $D/D+F$ indicator serves, as an indicator of treatment needs. In the case of the older adults population oral health program allocation decisions may be with limited resources. This approach ($D/D+F$), explicitly defined and replicable and might be used as a starting point or guide for those making the hard policy judgements.

The model points towards a group in the population who are at higher risk for root caries. These should form the primary focus for screening and preventive programs. Although older adults present problems with respect to accessibility, there is a group that is more accessible. These would include the elderly in collective living centers such as nursing homes, chronic hospitals, senior citizens club, senior citizens apartments building. In-service training and case

identification to the employee and referred for treatment to the private sector. Through the model and understanding of the distribution and etiology of root caries can be attained and based on this knowledge developed programs that facilitate access to oral health services, and provide activities for those at greater risk.

Conclusion

Supported by the data in this study the sector of the population at higher risk of root caries would be a male African-American or Mexican-American with a level of education less than 8 years living with an income below poverty level. Others characteristics include: smoking, presenting decayed in the coronal surface of the teeth, previous root caries experience, wearing a partial denture, with 14 teeth or less, and consuming starchy and liquid sugars snacks.

In conclusion, these findings suggest that Caucasians had less risk of root caries than African-Americans and Mexican-Americans and that poor periodontal status increased the risk of root caries. Additionally, Older Adults in the U.S. population have a great need for dental treatment.

Culturally sensitive intervention related to oral health needs to be developed focusing on minority population (African-Americans and Mexican-Americans). When developing this intervention, especially with the Hispanic population (clinicians, researchers, and health educators) have to adapt to the needs of the community. Although, there is a common linguistic link, they are

diverse in the understanding of health and disease, cultural values, personal beliefs, and intercultural communication patterns.

Additional epidemiologic studies are needed and should focus on those social and behavioral factors that put individuals at risk for developing root caries.

APPENDIX A
LIST OF STATES AND COUNTIES
FROM WHERE THE SAMPLE WAS OBTAINED

DMPFIPSR	State	DMPCNTYR	County
4	Arizona	13	Maricopa
6	California	1	Alameda
6	California	19	Fresno
6	California	37	Los Angeles
6	California	59	Orange
6	California	71	San Bernardino
6	California	73	San Diego
6	California	85	Santa Clara
6	California	111	Ventura
12	Florida	25	Dade
12	Florida	31	Duval
12	Florida	99	Palm Beach
17	Illinois	31	Cook
25	Massachusetts	17	Middlesex
26	Michigan	125	Oakland
26	Michigan	163	Wayne
29	Missouri	189	St Louis
36	New York	29	Erie
36	New York	47	Kings
36	New York	59	Nassau
36	New York	61	New York
36	New York	81	Queens
36	New York	119	Westchester
39	Ohio	35	Cuyahoga
39	Ohio	61	Hamilton
42	Pennsylvania	3	Allegheny
42	Pennsylvania	45	Delaware
42	Pennsylvania	101	Philadelphia
44	Rhode Island	7	Providence
48	Texas	29	Bexar
48	Texas	113	Dallas
48	Texas	141	El Paso
48	Texas	201	Harris
48	Texas	439	Tarrant
53	Washington	33	King

APPENDIX B
THE HOUSEHOLD ADULT QUESTIONNAIRE

Department of Health and Human Services Public Health Service Centers for Disease Control National Center for Health Statistics	Third National Health and Nutrition Examination Survey NHANES III
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FAMILY QUESTIONNAIRE

NOTICE - Information contained on this form which would permit identification of any individual or establishment has been collected with a guarantee that it will be held in strict confidence, will be used only for purposes stated for this study, and will not be disclosed or released to others without the consent of the individual or the establishment in accordance with section 308(d) of the Public Health Service Act (42 USC 242m).

Public reporting burden for complete participation in the NHANES III is estimated to average five hours. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to PHS Reports Clearance Office: Room 721-B, Humphrey Building; 200 Independence Avenue, SW; Washington, DC 20201; ATTN: PRA, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.


CASE NO.:

Stand No.
Segment No.
Serial No.

Book ____ of ____ books

FAMILY NO.

DECK NO.


 ** 7 5 3 **

ADDRESS:

Apt No.			
City			
State			
Zip Code			

INTERVIEWER NO.

EDITOR NO.:

DATE OF INTERVIEW

____/____/____

MONTH
DAY
YEAR

TIME BEGAN

____:____
1 ☐ am

2 ☐ pm

3 ☐ noon

LANGUAGE OF INTERVIEW

1 ☐ English

2 ☐ Spanish

3 ☐ Other
4 _____

specify

TIME ENDED

____:____
1 ☐ am

2 ☐ pm

3 ☐ noon

A. INDIVIDUAL CHARACTERISTICS	
FILL FIRST COLUMN FOR HEAD OF FAMILY, THEN COMPLETE REMAINING COLUMN(S) FOR (OTHER) SAMPLE PERSON(S) IN FAMILY	SAMPLE NUMBER
	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div>
A1. NAME (TRANSCRIBE FROM SCREENER)	NAME
A2. SP NUMBER (TRANSCRIBE FROM SCREENER; USE 99 FOR HEAD, IF NOT SP)	_____ (HEAD OF FAMILY)
A3. AGE (TRANSCRIBE FROM SCREENER, IF AVAILABLE)	<input type="checkbox"/> less than 1 yr. _____ <div style="text-align: right;">enter months</div> <input type="checkbox"/> 1 yr + _____ <div style="text-align: right;">enter years</div>
A4. SEX	1 <input type="checkbox"/> MALE 2 <input type="checkbox"/> FEMALE
A5. ENTER OBSERVED RACE IF YOU ARE ABLE TO OBSERVE	1 <input type="checkbox"/> W 2 <input type="checkbox"/> B 3 <input type="checkbox"/> O 9 <input type="checkbox"/> Not Obs.
A6. In what state or foreign country was - born? ENTER NAME OF THE STATE OR FOREIGN COUNTRY.	<div style="border: 1px solid black; width: 60px; height: 20px; margin: 0 auto;"></div> <div style="text-align: center;">State or foreign country</div>
IF UNDER 5 YEARS OLD, MARK "NEVER ATTENDED." A7. What is the highest grade or year of regular school - has ever attended? CIRCLE APPROPRIATE NUMBER.	00 <input type="checkbox"/> NEVER ATTENDED OR KINDERGARTEN ONLY (A9) Elem 1 2 3 4 5 6 7 8 High 9 10 11 12 College 1 2 3 4 5+
A8. Did - finish (NUMBER IN A7) (grade/year)?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N
HAND CARD F1.	
A9. Are any of those groups -'s national origin or ancestry? (Where did -'s ancestors come from?)	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (A11)
A10. Which of those groups <u>best</u> describes -'s national origin or ancestry? Please give me the number of the group.	1 <input type="checkbox"/> Mexican/Mexican American 2 <input type="checkbox"/> other Latin/American or other Spanish 3 _____ <div style="text-align: right;">specify</div>
HAND CARD F2.	
A11. What is the number of the group that <u>best</u> represent -'s race? <div style="display: flex; justify-content: space-between;"> <div> 1 - Aleut, Eskimo, or American Indian 2 - Asian or Pacific Islander 3 - Black </div> <div> 4 - White 5 - Another group not listed - specify </div> </div>	CIRCLE ONLY ONE <div style="display: flex; justify-content: space-around;"> 1 2 3 4 5 </div> <div style="text-align: right;">↓</div> 6 _____ <div style="text-align: right;">specify</div>
A12. IF UNDER 14, MARK FIRST BOX AND GO TO A13. OTHERWISE ASK: Is - <u>now</u> married, living together with someone as married, widowed, divorced, separated or has - never been married?	0 <input type="checkbox"/> UNDER 14 1 <input type="checkbox"/> married - spouse in HH 2 <input type="checkbox"/> married - spouse not in HH 3 <input type="checkbox"/> living as married 4 <input type="checkbox"/> widowed 5 <input type="checkbox"/> divorced 6 <input type="checkbox"/> separated 7 <input type="checkbox"/> never married
IF UNDER 17 YEARS OLD, MARK BOX AND GO TO NEXT SP OR B1. OTHERWISE ASK: A13. Did - ever serve in the Armed Forces of the United States?	0 <input type="checkbox"/> UNDER 17 (NP) 1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N

B. HEALTH INSURANCE

B1. Medicare is a Social Security health insurance program for certain disabled persons and for persons 65 years old and over. People covered by Medicare have a card that looks like this. **HAND CARD F3.**

During the last month (were/was) (NAME(S) OF ALL SPs IN FAMILY) covered by Medicare?

- 1 ☐ Yes, one or more SPs covered
2 ☐ No, no SPs covered (86)

ASK TO DETERMINE WHICH SPs IN FAMILY ARE COVERED.
MARK BOX IN EACH COLUMN BEFORE ASKING B3.

B2. During the last month was – covered by Medicare?

- 1 ☐ covered
2 ☐ not covered
9 ☐ DK
- } (NP)

FOR EACH SP WITH "COVERED" IN B2, ASK B3.

B3. May I please see the Medicare card(s) for – (and –) to record the claim number and type of coverage?

TRANSCRIBE THE INFORMATION FROM THE CARD OR MARK THE *CARD NOT AVAILABLE* BOX.

[illegible]

CARD NUMBER

TYPE OF COVERAGE

- 1 ☐ hospital only (Part A)
2 ☐ medical only (Part B)
3 ☐ both
- (B6)

0 ☐ CARD NOT AVAILABLE - ASK
B4 AND B5

IF *CARD NOT AVAILABLE* ASK B4-B5.

B4. During the last month was -- covered by the part of Medicare that pays for hospital bills?

- 1 ☐ Y 2 ☐ N 9 ☐ DK

B5. Medicare has an optional feature that costs extra and helps pay for doctor bills. During the last month was – covered by the part of Medicare that pays for doctor's bills?

- 1 ☐ Y 2 ☐ N (NP) 9 ☐ DK (NP)

B6. There is a national program called Medicaid which pays for health care for persons in need. (In this State it is also called —.)

During the last month (were/was) (NAME(S) OF ALL SPs IN FAMILY) covered by Medicaid (or -)?

- 1 ☐ Yes, one or more
SPs covered
- 2 ☐ No, no SPs
covered (B8)

ASK FOR EACH SP:

B7. During the last month was – covered by Medicaid?

- 1 ☐ covered
2 ☐ not covered (NP)
9 ☐ DK (NP)

<p>B8. During the <u>last month</u> (were/was) (NAME(S) OF ALL SPs IN FAMILY) covered by CHAMPUS, CHAMPVA, the VA, or military health care?</p> <p>(These programs cover active duty and retired career military personnel and their dependents and survivors and also disabled veterans and their dependents and survivors.)</p> <p>1 <input type="checkbox"/> Yes, one or more SPs covered 2 <input type="checkbox"/> No, no SPs covered (B10)</p>	
<p>ASK FOR EACH SP:</p> <p>B9. During the <u>last month</u> was -- covered by CHAMPUS, CHAMPVA, the VA or military health care?</p>	<p>1 <input type="checkbox"/> covered 2 <input type="checkbox"/> not covered 9 <input type="checkbox"/> DK } (NP)</p>
<p>B10. We are interested in all kinds of health insurance plans except those that pay only for accidents.</p> <p>(Not counting Medicare, Medicaid, or Veteran's Payments) During the <u>last month</u> (were/was) (NAME(S) OF ALL SPs IN FAMILY) covered by a health insurance plan obtained privately or through a current or former employer or union that pays any part of a hospital stay or routine doctor's care? Include membership in a health maintenance organization.</p> <p>1 <input type="checkbox"/> Yes, one or more SPs covered 2 <input type="checkbox"/> No, no SPs covered (B12)</p>	
<p>ASK B11-B11d FOR EACH SP BEFORE ASKING B12.</p> <p>B11. During the <u>last month</u> was -- covered by one or more health insurance plans obtained privately or through an employer or union?</p>	<p>1 <input type="checkbox"/> covered (B11a) 2 <input type="checkbox"/> not covered 9 <input type="checkbox"/> DK } (NP)</p>
<p>FOR EACH SP WITH "COVERED" IN B11, ASK B11a-B11d.</p> <p>B11a. Did any of these plans cover any part of hospital expenses?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>
<p>B11b. Did any of these plans cover any part of the costs of routine doctor's care?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>
<p>B11c. Did any of these plans cover any part of dental care?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>
<p>B11d. Are any of these plans from someone's current or former employer or union?</p>	<p>1 <input type="checkbox"/> Y (NP) 2 <input type="checkbox"/> N (NP) 9 <input type="checkbox"/> DK (NP)</p>
<p>ASK FOR EACH SP:</p> <p>B12. Has -- ever been refused health insurance or limited in the kind of insurance coverage (he/she) could obtain because of poor health?</p>	<p>1 <input type="checkbox"/> Y (NP) 2 <input type="checkbox"/> N (NP) 9 <input type="checkbox"/> DK (NP)</p>

B9.	<input type="checkbox"/> covered <input type="checkbox"/> not covered <input type="checkbox"/> DK	<input type="checkbox"/> covered <input type="checkbox"/> not covered <input type="checkbox"/> DK	<input type="checkbox"/> covered <input type="checkbox"/> not covered <input type="checkbox"/> DK
B11.	<input type="checkbox"/> covered (B11a) <input type="checkbox"/> not covered <input type="checkbox"/> DK	<input type="checkbox"/> covered (B11a) <input type="checkbox"/> not covered <input type="checkbox"/> DK	<input type="checkbox"/> covered (B11a) <input type="checkbox"/> not covered <input type="checkbox"/> DK
B11a.	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> DK	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> DK	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> DK
B11b.	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> DK	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> DK	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> DK
B11c.	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> DK	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> DK	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> DK
B11d.	<input type="checkbox"/> Y (NP) <input type="checkbox"/> N (NP) <input type="checkbox"/> DK (NP)	<input type="checkbox"/> Y (NP) <input type="checkbox"/> N (NP) <input type="checkbox"/> DK (NP)	<input type="checkbox"/> Y (NP) <input type="checkbox"/> N (NP) <input type="checkbox"/> DK (NP)
B12.	<input type="checkbox"/> Y (NP) <input type="checkbox"/> N (NP) <input type="checkbox"/> DK (NP)	<input type="checkbox"/> Y (NP) <input type="checkbox"/> N (NP) <input type="checkbox"/> DK (NP)	<input type="checkbox"/> Y (NP) <input type="checkbox"/> N (NP) <input type="checkbox"/> DK (NP)

<p>B13. CHECK ITEM. REVIEW RESPONSES TO B2, B7, B9, AND B11 AND MARK BOX FOR EACH SP. <u>IF ALL COVERED, GO TO C1.</u> IF NOT CONTINUE.</p>	<p>1 <input type="checkbox"/> 'COVERED' IN B2, B7, B9, OR B11 (C1)</p> <p>2 <input type="checkbox"/> 'NOT COVERED'</p> <p>9 <input type="checkbox"/> DK</p>
<p>B14. Many people do not carry health insurance for various reasons. HAND CARD F4:</p> <p>Which of these statements describes why – is currently not covered by any health insurance?</p>	<p>2 3 4 5 6 7</p> <p>9 → 10 _____ (NP)</p> <p style="text-align: center;">specify</p>
<p>B15. Any other reasons?</p>	<p>1 <input type="checkbox"/> Y (REASK B14 <u>AND</u> B15)</p> <p>2 <input type="checkbox"/> N</p>
<p>MARK BOX IF ONLY ONE REASON IS GIVEN IN B14, OTHERWISE ASK:</p> <p>B16. What is the <u>main</u> reason – is currently not covered by any health insurance?</p>	<p>0 <input type="checkbox"/> ONLY ONE REASON IN B14</p> <p>2 3 4 5 6 7</p> <p>9 → 10 _____ (NP)</p> <p style="text-align: center;">specify</p>
<p>C. FAMILY BACKGROUND</p>	
<p>C1. CHECK ITEM: REFER TO AGE OF SP AND MARK BOX.</p>	<p>1 <input type="checkbox"/> 17+ YEARS OLD (NP)</p> <p>2 <input type="checkbox"/> UNDER 17 YEARS OLD (C2)</p>
<p>C2. Now I have some questions about –'s <u>biological</u> parents.</p> <p>How much (does –'s mother/do you) weigh?</p> <p>IF PREGNANT, RECORD WEIGHT BEFORE PREGNANCY.</p>	<p>_____ pounds</p> <p style="text-align: center;">or</p> <p>_____ kilograms</p> <p>999 <input type="checkbox"/> DK</p>
<p>C3. How tall (is –'s mother/are you)?</p>	<p>_____ feet/ _____ inches</p> <p style="text-align: center;">or</p> <p>_____ centimeters</p> <p>999 <input type="checkbox"/> DK</p>
<p>C4. How much (does –'s father/do you) weigh?</p>	<p>_____ pounds</p> <p style="text-align: center;">or</p> <p>_____ kilograms</p> <p>999 <input type="checkbox"/> DK</p>
<p>C5. How tall (is –'s father/are you)?</p>	<p>_____ feet/ _____ inches</p> <p style="text-align: center;">or</p> <p>_____ centimeters</p> <p>999 <input type="checkbox"/> DK</p>

B13.	<input type="checkbox"/> 'COVERED' IN B2, B7, B9, OR B11 (C1) <input type="checkbox"/> 'NOT COVERED' <input type="checkbox"/> DK	<input type="checkbox"/> 'COVERED' IN B2, B7, B9, OR B11 (C1) <input type="checkbox"/> 'NOT COVERED' <input type="checkbox"/> DK	<input type="checkbox"/> 'COVERED' IN B2, B7, B9, OR B11 (C1) <input type="checkbox"/> 'NOT COVERED' <input type="checkbox"/> DK
B14.	<div style="text-align: center;">2 3 4 5 6 7</div> 9 → 10 _____ (NP) <div style="text-align: center;">specify</div>	<div style="text-align: center;">2 3 4 5 6 7</div> 9 → 10 _____ (NP) <div style="text-align: center;">specify</div>	<div style="text-align: center;">2 3 4 5 6 7</div> 9 → 10 _____ (NP) <div style="text-align: center;">specify</div>
B15.	<input type="checkbox"/> Y (REASK B14 <u>AND</u> B15) <input type="checkbox"/> N	<input type="checkbox"/> Y (REASK B14 <u>AND</u> B15) <input type="checkbox"/> N	<input type="checkbox"/> Y (REASK B14 <u>AND</u> B15) <input type="checkbox"/> N
B16.	<input type="checkbox"/> ONLY ONE REASON IN B14 <div style="text-align: center;">2 3 4 5 6 7</div> 9 → 10 _____ (NP) <div style="text-align: center;">specify</div>	<input type="checkbox"/> ONLY ONE REASON IN B14 <div style="text-align: center;">2 3 4 5 6 - 7</div> 9 → 10 _____ (NP) <div style="text-align: center;">specify</div>	<input type="checkbox"/> ONLY ONE REASON IN B14 <div style="text-align: center;">2 3 4 5 6 7</div> 9 → 10 _____ (NP) <div style="text-align: center;">specify</div>
C1.	<input type="checkbox"/> 17+ YEARS OLD (NP) <input type="checkbox"/> UNDER 17 YEARS OLD (C2)	<input type="checkbox"/> 17+ YEARS OLD (NP) <input type="checkbox"/> UNDER 17 YEARS OLD (C2)	<input type="checkbox"/> 17+ YEARS OLD (NP) <input type="checkbox"/> UNDER 17 YEARS OLD (C2)
C2.	_____ pounds or _____ kilograms 999 <input type="checkbox"/> DK	_____ pounds or _____ kilograms 999 <input type="checkbox"/> DK	_____ pounds or _____ kilograms 999 <input type="checkbox"/> DK
C3.	_____ feet/_____ inches or _____ centimeters 999 <input type="checkbox"/> DK	_____ feet/_____ inches or _____ centimeters 999 <input type="checkbox"/> DK	_____ feet/_____ inches or _____ centimeters 999 <input type="checkbox"/> DK
C4.	_____ pounds or _____ kilograms 999 <input type="checkbox"/> DK	_____ pounds or _____ kilograms 999 <input type="checkbox"/> DK	_____ pounds or _____ kilograms 999 <input type="checkbox"/> DK
C5.	_____ feet/_____ inches or _____ centimeters 999 <input type="checkbox"/> DK	_____ feet/_____ inches or _____ centimeters 999 <input type="checkbox"/> DK	_____ feet/_____ inches or _____ centimeters 999 <input type="checkbox"/> DK

<p>C6. Has either of --'s <u>biological</u> parents ever been told by a doctor that he or she had . . .</p> <p>a. High blood pressure or stroke before the age of 50?</p>	<p>1 <input type="checkbox"/> Y - Which, --'s { 1 <input type="checkbox"/> father 2 <input type="checkbox"/> N (b) 2 <input type="checkbox"/> mother, or 9 <input type="checkbox"/> DK (b) 3 <input type="checkbox"/> both?</p>
<p>b. Heart attack or angina before the age of 50?</p>	<p>1 <input type="checkbox"/> Y - Which, --'s { 1 <input type="checkbox"/> father 2 <input type="checkbox"/> N (c) 2 <input type="checkbox"/> mother, or 9 <input type="checkbox"/> DK (c) 3 <input type="checkbox"/> both?</p>
<p>c. High blood cholesterol at any age?</p>	<p>1 <input type="checkbox"/> Y - Which, --'s { 1 <input type="checkbox"/> father 2 <input type="checkbox"/> N (d) 2 <input type="checkbox"/> mother, or 9 <input type="checkbox"/> DK (d) 3 <input type="checkbox"/> both?</p>
<p>d. Asthma or hay fever at any age?</p>	<p>1 <input type="checkbox"/> Y - Which, --'s { 1 <input type="checkbox"/> father 2 <input type="checkbox"/> N (e) 2 <input type="checkbox"/> mother, or 9 <input type="checkbox"/> DK (e) 3 <input type="checkbox"/> both?</p>
<p>e. Diabetes at any age?</p>	<p>1 <input type="checkbox"/> Y - Which, --'s { 1 <input type="checkbox"/> father 2 <input type="checkbox"/> N 2 <input type="checkbox"/> mother, or 9 <input type="checkbox"/> DK 3 <input type="checkbox"/> both?</p>
<p>C7. How long has -- lived at this address?</p>	<p>_____ { 1 <input type="checkbox"/> weeks number 2 <input type="checkbox"/> months 3 <input type="checkbox"/> years</p> <p>00 <input type="checkbox"/> WHOLE LIFE (C10)</p>
<p>C8. How long has -- lived in this (city/town/area)?</p>	<p>_____ { 1 <input type="checkbox"/> weeks number 2 <input type="checkbox"/> months 3 <input type="checkbox"/> years</p> <p>00 <input type="checkbox"/> WHOLE LIFE (C10)</p>
<p>C9. How many times has -- moved?</p>	<p>_____ times number</p> <p>99 <input type="checkbox"/> DK</p>
<p>C10. In what country (was --'s mother/were you) born?</p>	<p>1 <input type="checkbox"/> 50 U.S. states 2 <input type="checkbox"/> other 3 _____ specify</p>
<p>C11. In what country (was --'s father/were you) born?</p>	<p>1 <input type="checkbox"/> 50 U.S. states 2 <input type="checkbox"/> other 3 _____ specify</p>

D. OCCUPATION OF FAMILY HEAD		
D1. CHECK ITEM	1 <input type="checkbox"/> HEAD OF FAMILY IS AN SP (E1) 2 <input type="checkbox"/> HEAD OF FAMILY NOT AN SP (ASK D2-D12 FOR HEAD OF FAMILY) 3 <input type="checkbox"/> HEAD OF FAMILY ACTIVE MILITARY LIVING AT HOME (D10)	
D2. During the past 2 weeks, did – work at any time at a job or business, not counting work around the house? INCLUDE UNPAID WORK IN THE FAMILY FARM OR BUSINESS.	1 <input type="checkbox"/> Y (D7) 2 <input type="checkbox"/> N	
D3. Even though – did not work during those 2 weeks, did – have a job or business?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N	
D4. Was – looking for work or on layoff from a job?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (D6)	
D5. Which, looking for work or on layoff from a job?	1 <input type="checkbox"/> looking (D8) 2 <input type="checkbox"/> layoff (D7) 3 <input type="checkbox"/> both (D7)	
D6. CHECK ITEM. MARK A BOX ONLY IF "NO" IN D4.	1 <input type="checkbox"/> "Y" IN D3 (D7) 2 <input type="checkbox"/> "N" IN D3 (E1)	
D7. For whom did – work? ENTER NAME OF COMPANY, BUSINESS, ORGANIZATION, OR OTHER EMPLOYER. RECORD RESPONSE AND SKIP TO D9.	Employer	
D8. For whom did – work at – <u>last</u> full-time civilian job or business lasting 2 consecutive weeks or more? ENTER NAME OF COMPANY, BUSINESS, ORGANIZATION, OR OTHER EMPLOYER.		
D9. What kind of business or industry is this? (For example, TV and radio, manufacturing, retail shoe store, State Labor Department, farm.)	Industry	
D10. What kind of work was – doing? (For example, electrical engineer, stock clerk, typist, farmer.)	Occupation	
D11. What were –'s <u>most important</u> activities or duties at that job? (For example, types, keeps account books, files, sells cars, operates printing press, finishes concrete.)	Duties	
D12. COMPLETE FROM ENTRIES IN D7 THRU D11. IF NOT CLEAR ASK: <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Was – an employee of a <u>private</u> company, business or individual for wages, salary or commission? P</p> <p>– a <u>Federal</u> government employee? ... F</p> <p>– a <u>State</u> government employee? S</p> <p>– a <u>Local</u> government employee? L</p> </div> <div style="width: 45%;"> <p>– self-employed in <u>own</u> business, professional practice, or farm? IF NOT FARM, ASK: Is the business incorporated? Yes I No SE</p> <p>– working <u>without pay</u> in business or farm? WP</p> <p>– <u>never worked</u> or never worked at a full-time civilian job lasting 2 weeks or more NEV</p> </div> </div> <div style="margin-top: 10px;"> Class of worker 01 <input type="checkbox"/> P 02 <input type="checkbox"/> F 03 <input type="checkbox"/> S 04 <input type="checkbox"/> L 05 <input type="checkbox"/> I 06 <input type="checkbox"/> SE 07 <input type="checkbox"/> WP 08 <input type="checkbox"/> ARMED FORCES 00 <input type="checkbox"/> NEV </div>		

E. HOUSING CHARACTERISTICS	
E1. When was this (house/structure) originally built? (Was it . . . ?)	1 <input type="checkbox"/> before 1946 2 <input type="checkbox"/> 1946-1973 3 <input type="checkbox"/> 1974 to present
E2. How many rooms are in this home? Count the kitchen but not the bathroom.	_____ rooms number
E3. How long has your family lived at this address?	_____ years number
E4. Is your home drinking water bottled or from the tap (faucet)?	1 <input type="checkbox"/> bottled (E7) 2 <input type="checkbox"/> tap
E5. What is the source of your home tap water?	1 <input type="checkbox"/> private or public water company 2 <input type="checkbox"/> private or public well 3 <input type="checkbox"/> spring 9 <input type="checkbox"/> DK
E6. Does your home drinking water have a water softening or conditioning system? This includes both systems at the (tap/faucet) and systems for the entire home.	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK
E7. Do any pets live in this home?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (E9)
E8. What kind of pet lives here . . .	
a. a dog?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N

b. a cat?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N

c. a bird?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N

d. any other pet(s)?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N ↓ 3 _____ specify
E9. During the <u>past 12 months</u> was a furnace that forces out hot air used to heat this place?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (E11) 9 <input type="checkbox"/> DK (E11)
E10. Was the hot-air furnace fueled by oil, by gas, by electricity or by something else?	1 <input type="checkbox"/> oil 2 <input type="checkbox"/> gas 3 <input type="checkbox"/> electricity 4 <input type="checkbox"/> other 5 _____ specify 9 <input type="checkbox"/> DK
E11. During the <u>past 12 months</u> was one or more space heaters used to heat this place? We are interested only in heaters that are not vented to the outside.	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (E13) 9 <input type="checkbox"/> DK (E13)
E12. Was the room or space heater fueled by electricity, kerosene, propane, or by something else?	1 <input type="checkbox"/> electricity 2 <input type="checkbox"/> kerosene 3 <input type="checkbox"/> propane 4 <input type="checkbox"/> other 5 _____ specify
E13. During the <u>past 12 months</u> was one or more wood stoves used here?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK

<p>F6. Which of the following reasons explains why (you have/your family has) had this problem?</p> <p>a. because of transportation problems?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N</p>												
<p>b. because you did <u>not</u> have working appliances for storing or preparing foods (such as a stove or refrigerator)?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N</p>												
<p>c. because you did <u>not</u> have enough money, food stamps, or WIC vouchers to buy food or beverages?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N</p>												
<p>d. any other reason?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N</p> <p>→ 3 _____ specify</p>												
<p>F7. Thinking about the <u>past month</u>, did (you/adult members of your family) ever cut the size of your meals because there was not enough money for food?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>												
<p>REFER TO SCREENER. IF CHILDREN LESS THAN AGE 17 ASK THIS, OTHERWISE SKIP TO F9.</p>													
<p>F8. Thinking about the <u>past month</u>, did you cut the size of your children's meals or did they skip meals because there was not enough money for food?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>												
<p>F9. Did (you/any member of this family) receive benefits from the WIC program, that is, the Women, Infants, and Children program in (NAME OF LAST MONTH)?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N</p>												
<p>F10. Did (you/any member of this family) receive food stamps in <u>any</u> of the <u>last 12 months</u>?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (F12a) 9 <input type="checkbox"/> DK (F12a)</p>												
<p>F11. (Are you/Is your family) receiving food stamps at the <u>present time</u>?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>												
<p style="background-color: #cccccc; text-align: center;">SECTION 3: FAMILY INCOME</p>													
<p>The following questions are about different types of <u>family income</u>. We ask them to see if there is a relationship between <u>family income</u> and health.</p> <p>F12a. During the <u>last month</u>, did anyone in the <u>family</u> receive income from working for an employer or from self-employment?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (F13a) 9 <input type="checkbox"/> DK (F13a)</p>												
<p>F12b. Who was that?</p>	<p>REFER TO <u>SCREENER HOUSEHOLD COMPOSITION TABLE</u> AND CODE THE <u>LINE NO.</u> FOR EACH <u>FAMILY MEMBER</u> RECEIVING THIS INCOME.</p> <p>CODE ALL THAT APPLY.</p> <table border="0"> <tr> <td>01 <input type="checkbox"/></td> <td>07 <input type="checkbox"/></td> </tr> <tr> <td>02 <input type="checkbox"/></td> <td>08 <input type="checkbox"/></td> </tr> <tr> <td>03 <input type="checkbox"/></td> <td>09 <input type="checkbox"/></td> </tr> <tr> <td>04 <input type="checkbox"/></td> <td>10 <input type="checkbox"/></td> </tr> <tr> <td>05 <input type="checkbox"/></td> <td>11 <input type="checkbox"/></td> </tr> <tr> <td>06 <input type="checkbox"/></td> <td>12 <input type="checkbox"/></td> </tr> </table>	01 <input type="checkbox"/>	07 <input type="checkbox"/>	02 <input type="checkbox"/>	08 <input type="checkbox"/>	03 <input type="checkbox"/>	09 <input type="checkbox"/>	04 <input type="checkbox"/>	10 <input type="checkbox"/>	05 <input type="checkbox"/>	11 <input type="checkbox"/>	06 <input type="checkbox"/>	12 <input type="checkbox"/>
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04 <input type="checkbox"/>	10 <input type="checkbox"/>												
05 <input type="checkbox"/>	11 <input type="checkbox"/>												
06 <input type="checkbox"/>	12 <input type="checkbox"/>												
<p>F12c. Anyone else?</p>	<p>1 <input type="checkbox"/> Y (REASK F12b AND F12c) 2 <input type="checkbox"/> N</p>												

F13a. During the <u>last month</u> , did anyone in the <u>family</u> receive Social Security or Railroad Retirement payments?		<input type="checkbox"/> Y <input type="checkbox"/> N (F14a) <input type="checkbox"/> DK (F14a)	
F13b. Who was that?		REFER TO <u>SCREENER HOUSEHOLD COMPOSITION TABLE</u> AND CODE THE <u>LINE NO.</u> FOR EACH <u>FAMILY MEMBER</u> RECEIVING THIS INCOME. CODE ALL THAT APPLY. <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> 01 <input type="checkbox"/> 02 <input type="checkbox"/> 03 <input type="checkbox"/> 04 <input type="checkbox"/> 05 <input type="checkbox"/> 06 </div> <div> <input type="checkbox"/> 07 <input type="checkbox"/> 08 <input type="checkbox"/> 09 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 </div> </div>	
F13c. Anyone else?		<input type="checkbox"/> Y (REASK F13b AND F13c) <input type="checkbox"/> N	
F13d. RECORD A SEPARATE ANSWER FOR EACH PERSON LESS THAN 65 ANSWERING YES TO F13a. What is the reason – is getting Social Security or Railroad Retirement? Is it because – is retired, disabled, widowed, a surviving child, a spouse or a dependent child?	LINE NO. _____ <input type="checkbox"/> 1 retired <input type="checkbox"/> 2 disabled <input type="checkbox"/> 3 widowed <input type="checkbox"/> 4 surviving child <input type="checkbox"/> 5 spouse <input type="checkbox"/> 6 dependent child <input type="checkbox"/> 9 DK	LINE NO. _____ <input type="checkbox"/> 1 retired <input type="checkbox"/> 2 disabled <input type="checkbox"/> 3 widowed <input type="checkbox"/> 4 surviving child <input type="checkbox"/> 5 spouse <input type="checkbox"/> 6 dependent child <input type="checkbox"/> 9 DK	LINE NO. _____ <input type="checkbox"/> 1 retired <input type="checkbox"/> 2 disabled <input type="checkbox"/> 3 widowed <input type="checkbox"/> 4 surviving child <input type="checkbox"/> 5 spouse <input type="checkbox"/> 6 dependent child <input type="checkbox"/> 9 DK
F14a. During the <u>last month</u> , did anyone in the <u>family</u> receive any SSI (Supplemental Security Income) payments from the Federal Government?		<input type="checkbox"/> Y <input type="checkbox"/> N (F15a) <input type="checkbox"/> DK (F15a)	
F14b. Who was that?		REFER TO <u>SCREENER HOUSEHOLD COMPOSITION TABLE</u> AND CODE THE <u>LINE NO.</u> FOR EACH <u>FAMILY MEMBER</u> RECEIVING THIS INCOME. CODE ALL THAT APPLY. <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> 01 <input type="checkbox"/> 02 <input type="checkbox"/> 03 <input type="checkbox"/> 04 <input type="checkbox"/> 05 <input type="checkbox"/> 06 </div> <div> <input type="checkbox"/> 07 <input type="checkbox"/> 08 <input type="checkbox"/> 09 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 </div> </div>	
F14c. Anyone else?		<input type="checkbox"/> Y (REASK F14b AND F14c) <input type="checkbox"/> N	
F15a. During the <u>last month</u> , did anyone in the <u>family</u> receive any pension or disability payment other than Social Security or Railroad Retirement?		<input type="checkbox"/> Y <input type="checkbox"/> N (F16a) <input type="checkbox"/> DK (F16a)	
F15b. Who was that?		REFER TO <u>SCREENER HOUSEHOLD COMPOSITION TABLE</u> AND CODE THE <u>LINE NO.</u> FOR EACH <u>FAMILY MEMBER</u> RECEIVING THIS INCOME. CODE ALL THAT APPLY. <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> 01 <input type="checkbox"/> 02 <input type="checkbox"/> 03 <input type="checkbox"/> 04 <input type="checkbox"/> 05 <input type="checkbox"/> 06 </div> <div> <input type="checkbox"/> 07 <input type="checkbox"/> 08 <input type="checkbox"/> 09 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 </div> </div>	
F15c. Anyone else?		<input type="checkbox"/> Y (REASK F15b AND F15c) <input type="checkbox"/> N	

F16a. During the <u>last month</u> , did anyone in the <u>family</u> receive Public assistance or welfare payments from the State or Local welfare office? Do not include SSI.	<input type="checkbox"/> Y <input type="checkbox"/> N (F17a) <input type="checkbox"/> DK (F17a)												
F16b. Who was that?	<p>REFER TO <u>SCREENER HOUSEHOLD COMPOSITION TABLE</u> AND CODE THE <u>LINE NO.</u> FOR EACH <u>FAMILY MEMBER</u> RECEIVING THIS INCOME.</p> <p>CODE ALL THAT APPLY.</p> <table> <tr><td>01 <input type="checkbox"/></td><td>07 <input type="checkbox"/></td></tr> <tr><td>02 <input type="checkbox"/></td><td>08 <input type="checkbox"/></td></tr> <tr><td>03 <input type="checkbox"/></td><td>09 <input type="checkbox"/></td></tr> <tr><td>04 <input type="checkbox"/></td><td>10 <input type="checkbox"/></td></tr> <tr><td>05 <input type="checkbox"/></td><td>11 <input type="checkbox"/></td></tr> <tr><td>06 <input type="checkbox"/></td><td>12 <input type="checkbox"/></td></tr> </table>	01 <input type="checkbox"/>	07 <input type="checkbox"/>	02 <input type="checkbox"/>	08 <input type="checkbox"/>	03 <input type="checkbox"/>	09 <input type="checkbox"/>	04 <input type="checkbox"/>	10 <input type="checkbox"/>	05 <input type="checkbox"/>	11 <input type="checkbox"/>	06 <input type="checkbox"/>	12 <input type="checkbox"/>
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04 <input type="checkbox"/>	10 <input type="checkbox"/>												
05 <input type="checkbox"/>	11 <input type="checkbox"/>												
06 <input type="checkbox"/>	12 <input type="checkbox"/>												
F16c. Anyone else?	<input type="checkbox"/> Y (REASK F16b AND F16c) <input type="checkbox"/> N												
F16d. During the <u>last month</u> , did anyone in the <u>family</u> receive "Aid to Families with Dependent Children," sometimes called AFDC or ADC?	<input type="checkbox"/> Y <input type="checkbox"/> N (F17a) <input type="checkbox"/> DK (F17a)												
F16e. Who was that?	<p>REFER TO <u>SCREENER HOUSEHOLD COMPOSITION TABLE</u> AND CODE THE <u>LINE NO.</u> FOR EACH <u>FAMILY MEMBER</u> RECEIVING THIS INCOME.</p> <p>CODE ALL THAT APPLY.</p> <table> <tr><td>01 <input type="checkbox"/></td><td>07 <input type="checkbox"/></td></tr> <tr><td>02 <input type="checkbox"/></td><td>08 <input type="checkbox"/></td></tr> <tr><td>03 <input type="checkbox"/></td><td>09 <input type="checkbox"/></td></tr> <tr><td>04 <input type="checkbox"/></td><td>10 <input type="checkbox"/></td></tr> <tr><td>05 <input type="checkbox"/></td><td>11 <input type="checkbox"/></td></tr> <tr><td>06 <input type="checkbox"/></td><td>12 <input type="checkbox"/></td></tr> </table>	01 <input type="checkbox"/>	07 <input type="checkbox"/>	02 <input type="checkbox"/>	08 <input type="checkbox"/>	03 <input type="checkbox"/>	09 <input type="checkbox"/>	04 <input type="checkbox"/>	10 <input type="checkbox"/>	05 <input type="checkbox"/>	11 <input type="checkbox"/>	06 <input type="checkbox"/>	12 <input type="checkbox"/>
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04 <input type="checkbox"/>	10 <input type="checkbox"/>												
05 <input type="checkbox"/>	11 <input type="checkbox"/>												
06 <input type="checkbox"/>	12 <input type="checkbox"/>												
F16f. Anyone else?	<input type="checkbox"/> Y (REASK F16e AND F16f) <input type="checkbox"/> N												
F17a. During the <u>last month</u> , did anyone in the <u>family</u> receive income from any other source such as veteran's payments, workman's compensation, rental income, interest and dividend income, or child support and alimony?	<input type="checkbox"/> Y <input type="checkbox"/> N (F18) <input type="checkbox"/> DK (F18)												
F17b. Who was that?	<p>REFER TO <u>SCREENER HOUSEHOLD COMPOSITION TABLE</u> AND CODE THE <u>LINE NO.</u> FOR EACH <u>FAMILY MEMBER</u> RECEIVING THIS INCOME.</p> <p>CODE ALL THAT APPLY.</p> <table> <tr><td>01 <input type="checkbox"/></td><td>07 <input type="checkbox"/></td></tr> <tr><td>02 <input type="checkbox"/></td><td>08 <input type="checkbox"/></td></tr> <tr><td>03 <input type="checkbox"/></td><td>09 <input type="checkbox"/></td></tr> <tr><td>04 <input type="checkbox"/></td><td>10 <input type="checkbox"/></td></tr> <tr><td>05 <input type="checkbox"/></td><td>11 <input type="checkbox"/></td></tr> <tr><td>06 <input type="checkbox"/></td><td>12 <input type="checkbox"/></td></tr> </table>	01 <input type="checkbox"/>	07 <input type="checkbox"/>	02 <input type="checkbox"/>	08 <input type="checkbox"/>	03 <input type="checkbox"/>	09 <input type="checkbox"/>	04 <input type="checkbox"/>	10 <input type="checkbox"/>	05 <input type="checkbox"/>	11 <input type="checkbox"/>	06 <input type="checkbox"/>	12 <input type="checkbox"/>
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03 <input type="checkbox"/>	09 <input type="checkbox"/>												
04 <input type="checkbox"/>	10 <input type="checkbox"/>												
05 <input type="checkbox"/>	11 <input type="checkbox"/>												
06 <input type="checkbox"/>	12 <input type="checkbox"/>												
F17c. Anyone else?	<input type="checkbox"/> Y (REASK F17b AND F17c) <input type="checkbox"/> N												

<p>F18. Including wages, salaries, self-employment, and any other source of income we just talked about, was the <u>total combined family income</u> during the <u>last 12 months</u> - (that is, yours, READ NAMES OF ALL FAMILY MEMBERS, INCLUDING ARMED FORCES MEMBERS LIVING AT HOME) - more or less than \$20,000?</p>	<p>1 <input type="checkbox"/> Less than \$20,000 (HAND CARD F5)</p> <p>2 <input type="checkbox"/> \$20,000 or more (HAND CARD F6)</p> <p>0 <input type="checkbox"/> No income (F21)</p>	
<p>READ PARENTHETICAL PHRASE IF ARMED FORCES MEMBER LIVING AT HOME OR IF NECESSARY.</p> <p>F19. Of those income groups, which letter best represents the <u>total combined family income</u> during the <u>last 12 months</u> (that is, yours, READ NAMES, INCLUDING ARMED FORCES MEMBERS LIVING AT HOME)? Include all sources of income we just talked about.</p>	<p>CARD F5</p> <p>01 <input type="checkbox"/> A 02 <input type="checkbox"/> B 03 <input type="checkbox"/> C 04 <input type="checkbox"/> D 05 <input type="checkbox"/> E 06 <input type="checkbox"/> F 07 <input type="checkbox"/> G 08 <input type="checkbox"/> H 09 <input type="checkbox"/> I 10 <input type="checkbox"/> J</p>	<p>CARD F6</p> <p>11 <input type="checkbox"/> K 12 <input type="checkbox"/> L 13 <input type="checkbox"/> M 14 <input type="checkbox"/> N 15 <input type="checkbox"/> O 16 <input type="checkbox"/> P 17 <input type="checkbox"/> Q 18 <input type="checkbox"/> R 19 <input type="checkbox"/> S 20 <input type="checkbox"/> T</p> <p>21 <input type="checkbox"/> U 22 <input type="checkbox"/> V 23 <input type="checkbox"/> W 24 <input type="checkbox"/> X 25 <input type="checkbox"/> Y 26 <input type="checkbox"/> Z 27 <input type="checkbox"/> ZZ 28 <input type="checkbox"/> AA 29 <input type="checkbox"/> BB 30 <input type="checkbox"/> CC</p> <p>99 <input type="checkbox"/> DK</p>
<p>HAND CARD F7.</p> <p>F20. Now, please think about your <u>family income</u> during (NAME OF LAST MONTH). Which letter best represents the <u>total combined family income</u> during (NAME OF LAST MONTH) (that is, yours, READ NAMES, INCLUDING ARMED FORCES MEMBERS LIVING AT HOME)? Again, include all sources of income we just talked about.</p>	<p>CARD F7</p> <p>01 <input type="checkbox"/> A 02 <input type="checkbox"/> B 03 <input type="checkbox"/> C 04 <input type="checkbox"/> D 05 <input type="checkbox"/> E 06 <input type="checkbox"/> F 07 <input type="checkbox"/> G 08 <input type="checkbox"/> H 09 <input type="checkbox"/> I 10 <input type="checkbox"/> J</p> <p>11 <input type="checkbox"/> K 12 <input type="checkbox"/> L 13 <input type="checkbox"/> M 14 <input type="checkbox"/> N 15 <input type="checkbox"/> O 16 <input type="checkbox"/> P 17 <input type="checkbox"/> Q 18 <input type="checkbox"/> R 19 <input type="checkbox"/> S 20 <input type="checkbox"/> T</p> <p>21 <input type="checkbox"/> Respondent indicates annual income as reported in F19 divided by 12.</p> <p>99 <input type="checkbox"/> DK</p>	

<p>F21. The National Center for Health Statistics may wish to contact you again to obtain additional health related information. Please give me the name, address, and telephone number of <u>two</u> relatives or friends who would know where you could be reached in case we have trouble reaching you. Please give me the names of persons who are <u>not currently living in the household</u>. <u>PRINT ITEMS F21 a-e AND F22 a-e.</u></p>				
<p>a. NAME OF <u>FIRST</u> CONTACT PERSON (PRINT) LAST</p>	<p>FIRST</p>	<p>MIDDLE</p>		
<p>b. ADDRESS (NUMBER AND STREET)</p>				
<p>c. CITY</p>	<p>STATE</p>	<p>ZIP CODE</p>		
<p>d. AREA CODE/TELEPHONE NUMBER</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">-</div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">-</div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> </div> <div style="margin-top: 5px;"> <p>0 <input type="checkbox"/> NONE</p> <p>7 <input type="checkbox"/> REFUSED</p> <p>9 <input type="checkbox"/> DK</p> </div>			<p>PRINT NAME PHONE NUMBER LISTED UNDER</p> <div style="border-bottom: 1px solid black; text-align: center; margin-bottom: 5px;">FIRST</div> <div style="border-bottom: 1px solid black; text-align: center; margin-bottom: 5px;">MIDDLE</div> <div style="border-bottom: 1px solid black; text-align: center;">LAST</div>	
<p>e. What is (CONTACT'S) relationship to you?</p>				
<p>F22. <u>SECOND</u> CONTACT PERSON</p>				
<p>a. NAME OF <u>SECOND</u> CONTACT PERSON (PRINT) LAST</p>	<p>FIRST</p>	<p>MIDDLE</p>		
<p>b. ADDRESS (NUMBER AND STREET)</p>				
<p>c. CITY</p>	<p>STATE</p>	<p>ZIP CODE</p>		
<p>d. AREA CODE/TELEPHONE NUMBER</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">-</div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">-</div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> </div> <div style="margin-top: 5px;"> <p>0 <input type="checkbox"/> NONE</p> <p>7 <input type="checkbox"/> REFUSED</p> <p>9 <input type="checkbox"/> DK</p> </div>			<p>PRINT NAME PHONE NUMBER LISTED UNDER</p> <div style="border-bottom: 1px solid black; text-align: center; margin-bottom: 5px;">FIRST</div> <div style="border-bottom: 1px solid black; text-align: center; margin-bottom: 5px;">MIDDLE</div> <div style="border-bottom: 1px solid black; text-align: center;">LAST</div>	
<p>e. What is (CONTACT'S) relationship to you?</p>				
<p>F23. WHO RESPONDED TO FAMILY QUESTIONNAIRE</p> <p>REFER TO SCREENER.</p> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="border-bottom: 1px solid black; width: 150px;"></div> <div style="border-bottom: 1px solid black; width: 150px;"></div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <p>FAMILY NO.</p> <p>LINE NO.</p> </div>				

APPENDIX C

MEC ADULT QUESTIONNAIRE

Department of Health and Human Services
Public Health Service
Centers for Disease Control
National Center for Health Statistics

Third National Health and Nutrition Examination Survey

NHANES III

MEC ADULT QUESTIONNAIRE (AGES 17 + YEARS)

NOTICE - Information contained on this form which would permit identification of any individual or establishment has been collected with a guarantee that it will be held in strict confidence, will be used only for purposes stated for this study, and will not be disclosed or released to others without the consent of the individual or the establishment in accordance with section 308(d) of the Public Health Service Act (42 USC 242m).

Public reporting burden for complete participation in the NHANES III is estimated to average five hours. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to PHS Reports Clearance Officer, Room 721-H, Humphrey Building, 200 Independence Avenue, SW, Washington, DC 20201; ATTN: PRA, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503

CASE
NO:

Stand No. Segment No. Serial No.

FAMILY
NO:

NAME (First, Middle, Last)

SP NO:

AGE

SEX

1 ☐ Male
2 ☐ Female

SAMPLE
NO:

DECK
NO:



7 2 0

TIME BEGAN

1 ☐ am
2 ☐ pm
3 ☐ noon

TIME ENDED

1 ☐ am
2 ☐ pm
3 ☐ noon

INTERVIEWER NO:

LANGUAGE OF INTERVIEW

1 ☐ English
2 ☐ Spanish
3 ☐ Other

4

SPECIFY

DATE OF EXAMINATION

MO. / DAY / YR.

MEC ADULT QUESTIONNAIRE
AGES 17+ YEARS

<u>TOPIC</u>	<u>PAGE</u>
A. TOBACCO	1
B. COGNITIVE FUNCTION - PART A	2
C. SELECTED CONDITIONS/MEDICINE, VITAMIN, AND MINERAL USAGE	3
D. COGNITIVE FUNCTION - PART B	4
E. ALCOHOL/DRUG USE	5
F. REPRODUCTIVE HEALTH	7
G. DIS	13
H. RESPONDENT	22

READ INTRODUCTION TO ALL SPs:

This interview includes questions covering a number of health-related practices, behaviors, and experiences. All of your responses will be kept strictly confidential.

ALCOHOL/DRUG USE (17+ YRS.)

<p>E1. These next questions are about drinking alcoholic beverages. Alcoholic beverages include beer, ale, wine, wine coolers, liquor such as whiskey, gin, rum, or vodka, and cocktails and mixed drinks containing liquor.</p> <p>In your entire life, have you had at least 12 drinks of any kind of alcoholic beverage? Do not count small tastes.</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (E8)</p>
<p>E2. In the <u>past 12 months</u> did you have at least 12 drinks of <u>any</u> kind of alcoholic beverage?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (E7)</p>
<p>E3. In the <u>past 12 months</u>, on the average, how many days per week, month, or year did you drink <u>any</u> alcoholic beverages?</p>	<p>_____ days per { <input type="checkbox"/> week number <input type="checkbox"/> month <input type="checkbox"/> year</p> <p><input type="checkbox"/> DK</p>
<p>E4. On the average, on the days that you drank alcohol, how many drinks did you have a day? (By a drink, I mean a 12-oz beer, a 4-oz glass of wine, or an ounce of liquor.)</p>	<p>_____ drinks per day number</p> <p><input type="checkbox"/> DK</p>
<p>E5. In the past 12 months, how many days per week, month, or year did you have 9 or more drinks on a single day? Include all types.</p>	<p><input type="checkbox"/> none <input type="checkbox"/> week _____ days per { <input type="checkbox"/> month number <input type="checkbox"/> year</p> <p><input type="checkbox"/> DK</p>
<p>E6. In the past 12 months, how many days per week, month, or year did you have 5 or more drinks on a single day? Include all types. (Include the (NUMBER IN E5) days you had 9 or more drinks.)</p>	<p><input type="checkbox"/> none <input type="checkbox"/> week _____ days per { <input type="checkbox"/> month number <input type="checkbox"/> year</p> <p><input type="checkbox"/> DK</p>
<p>E7. Was there <u>ever</u> a time or times in your life when you <u>drank 5 or more drinks</u> of any kind of alcoholic beverage <u>almost every day</u>?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>
<p>E8. CHECK ITEM. REFER TO AGE OF SP.</p>	<p>1 <input type="checkbox"/> 60+ YRS. (F1) 2 <input type="checkbox"/> LESS THAN 60 YRS.</p>
<p>The next few questions are about your experience with drugs.</p>	
<p>E9. Have you <u>ever</u> used marijuana?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (E12)</p>
<p>E10. About how many times in your lifetime have you used marijuana?</p>	<p>1 <input type="checkbox"/> 1 or 2 times 2 <input type="checkbox"/> 3 to 10 times 3 <input type="checkbox"/> 11 to 99 times 4 <input type="checkbox"/> 100 or more times</p>
<p>E11. During the past month, on how many days did you use marijuana?</p>	<p><input type="checkbox"/> none in past month _____ days number</p>

E12. Have you <u>ever</u> used crack or cocaine in any form?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (F1)
E13. About how many times in your lifetime have you used crack or cocaine (in any form)?	1 <input type="checkbox"/> 1 or 2 times 2 <input type="checkbox"/> 3 to 10 times 3 <input type="checkbox"/> 11 to 99 times 4 <input type="checkbox"/> 100 or more times
E14. During the past month, on how many days did you use crack or cocaine (in any form)?	<input type="checkbox"/> none in past month _____ days number

} (F1)

FOOD FREQUENCY (AGES 17+ YEARS)

HAND CARD HAQ-5.

Now I'm going to ask you how often you usually eat certain foods. When answering think about your usual diet over the past month. Tell me how often you usually ate or drank these foods per day, per week, per month, or not at all.

N1. MILK AND MILK PRODUCTS

First are milk and milk products. Do not include their use in cooking.

a. How often did you have chocolate milk and hot cocoa?

Times	Day	Week	Month		Never	DK
_____ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK

_____ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
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b. How often did you have milk to drink or on cereal? Do not count small amounts of milk added to coffee or tea.

_____ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
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c. CHECK ITEM. REFER TO RESPONSES IN N1a AND N1b.

1 ☐ "NEVER" IN BOTH N1a AND N1b (N1e)
2 ☐ OTHER

d. What type of milk was it? Was it usually whole, 2%, 1%, skim, nonfat, or some other type?

IF SP CANNOT PROVIDE USUAL TYPE, MARK ALL THAT APPLY.

01 ☐ whole/regular
02 ☐ 2%/low fat
03 ☐ 1%
04 ☐ skim/nonfat
05 ☐ buttermilk
06 ☐ evaporated
07 ☐ other 08 _____ specify
99 ☐ DK

e. Yogurt and frozen yogurt

_____ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
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f. Ice cream, ice milk, and milkshakes

_____ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
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g. Cheese, all types including American, Swiss, cheddar, and cottage cheese

_____ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
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h. Pizza, calzone, and lasagna

_____ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
-----------	------------------------------	------------------------------	------------------------------	----	------------------------------	-------------------------------

i. Cheese dishes such as macaroni and cheese, cheese nachos, cheese enchiladas, and quesadillas

_____ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
-----------	------------------------------	------------------------------	------------------------------	----	------------------------------	-------------------------------

N2. MAIN DISHES, MEAT, FISH, CHICKEN, AND EGGS

Next are main dishes, meat, fish, chicken, and eggs.

Times	Day	Week	Month	Never	DK
___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK

a. How often did you eat any type of stew or soup containing vegetables, including minestrone, tomato, and split pea?

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

b. Spaghetti and pasta with tomato sauce

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

c. Bacon, sausage (chorizo) and luncheon meats such as hot dogs, salami, and bologna

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

d. Liver and other organ meats such as heart; kidney, tongue, and tripe (menudo)

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

e. Beef, including hamburger, steaks, roast beef, and meatloaf

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

f. Pork and ham, including roast pork, pork chops, and spare ribs

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

g. Shrimp, clams, oysters, crab, and lobster

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

h. Fish including fillets, fish sticks, fish sandwiches, and tuna fish

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

i. Chicken, all types, including baked, fried, chicken nuggets, and chicken salad. Include turkey

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

j. How often did you have eggs including scrambled, fried, omelettes, hard-boiled eggs, and egg salad?

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

N3. FRUIT AND FRUIT JUICES

Next are fruit juices and fruit. Include all forms - fresh, frozen, canned, and dried.

a. How often did you have orange juice, grapefruit juice and tangerine juice?

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

b. Other fruit juices such as grape juice, apple juice, cranberry juice, and fruit nectars

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

c. Citrus fruits including oranges, grapefruits, and tangerines

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

d. Melons including cantaloupe, honeydew, and watermelon

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

e. Peaches, nectarines, apricots, guava, mango, and papaya

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

f. How often did you have any other fruits such as apples, bananas, pears, berries, cherries, grapes, plums, and strawberries? (Include plantains.)

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

N4. VEGETABLES

These next questions are about vegetables. Please remember to include fresh, raw, frozen, canned, and cooked vegetables.

Times	Day	Week	Month		Never	DK
___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK

a. How often did you have carrots and vegetable mixtures containing carrots?

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

b. Broccoli

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

c. Brussels sprouts and cauliflower

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

d. White potatoes, including baked, mashed, boiled, french-fries, and potato salad

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

e. Sweet potatoes, yams, and orange squash including acorn, butternut, hubbard, and pumpkin

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

f. Tomatoes including fresh and stewed tomatoes, tomato juice, and salsa

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

g. Spinach, greens, collards, and kale

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

h. Tossed salad

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

i. Cabbage, cole slaw, and sauerkraut

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

j. Hot red chili peppers. Do not count ground red chili peppers

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

k. Peppers including green, red, and yellow peppers

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

l. Any other vegetables such as green beans, corn, peas, mushrooms, and zucchini

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

N5. BEANS, NUTS, CERÉALS, AND GRAIN PRODUCTS

a. How often did you have beans, lentils, and (chickpeas/garbanzos)? Include kidney, pinto, refried, black, and baked beans.

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

b. Peanuts, peanut butter, other types of nuts, and seeds

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

Now I'm going to ask how often you ate certain cereals.

c. How about All-Bran, All-Bran Extra Fiber, 100% Bran, and Fiber One

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

d. Total, Product 19, Most, and Just Right

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

N5. BEANS, NUTS, CEREALS, AND GRAIN PRODUCTS (cont.)		Times	Day	Week	Month	Never	DK
		___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
e.	All other cold cereals like corn flakes, Cheerios, Rice Krispies, and presweetened cereals	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
f.	Cooked, hot cereals like oatmeal, cream of wheat, cream of rice, and grits	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
Now let's talk about white bread products only. I'll ask about dark breads next.							
g.	How often did you have white bread, rolls, bagels, biscuits, English muffins, and crackers? Include those used for sandwiches.	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
h.	Dark breads and rolls, including whole wheat, rye, and pumpernickel	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
i.	Corn bread, corn muffins, and corn tortillas	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
j.	Flour tortillas	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
k.	Rice	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
l.	<u>Salted</u> snacks such as potato chips, taco chips, corn chips, and salted pretzels and popcorn	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
N6. DESSERTS, SWEETS, AND BEVERAGES							
a.	How often did you have cakes, cookies, brownies, pies, doughnuts, and pastries?	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
b.	Chocolate candy and fudge	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
Next are hot and iced beverages.							
c.	How often did you have Hi-C, Tang, Hawaiian Punch, Koolaid, and other drinks with <u>added vitamin C</u> ?	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
d.	Diet colas, diet sodas, and diet drinks such as Crystal Light	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
e.	Regular colas and sodas, not diet	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
f.	Regular coffee with caffeine	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
g.	Regular tea with caffeine	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
h.	Beer and lite beer	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
i.	Wine, wine coolers, sangria, and champagne	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK
j.	Hard liquor such as tequila, gin, vodka, scotch, rum, whiskey and liqueurs, either alone or mixed	___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or 4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK

N7. FATS

How often were these items added to your foods after preparation? For example, this would include on top of vegetables or baked potatoes, or as a spread on bread.

a. Margarine

b. Butter

c. Oil and vinegar, mayonnaise and salad dressings such as Italian and Thousand Island, including those added to salads and sandwiches

Times	Day	Week	Month		Never	DK
___ per	1 <input type="checkbox"/> D	2 <input type="checkbox"/> W	3 <input type="checkbox"/> M	or	4 <input type="checkbox"/> N	9 <input type="checkbox"/> DK

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

N8. Have I missed any other foods or beverages that you had at least once per week in the past month?

1 ☐ Y (specify)  2 ☐ N (N9)

a. 1 _____

b. 1 _____

c. 1 _____

d. 1 _____

e. 1 _____

f. 1 _____

PROBE: How often did you eat ... in the past month?

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

___ per 1 ☐ D 2 ☐ W 3 ☐ M or 4 ☐ N 9 ☐ DK

N9. CHECK ITEM. REFER TO AGE OF SP.

1 ☐ UNDER 20 YEARS (P1)

2 ☐ 20+ YEARS

N10. REFER TO AGE OF SP. HAND CARD HAQ-6.
READ RESPONSE CATEGORIES TO SP IF NECESSARY.

Now I am going to ask how often you drank milk over your lifetime. Try to remember whether you were a milk drinker or a non-milk drinker during different times in your life. Then think of certain events that might have occurred during each time period; for example, were you in school, at home with children, on a farm, or in the service.

How often did you drink any type of milk, including milk added to cereal, when you were a _____? Do not count small amounts of milk added to coffee or tea.

Time period (age)	more than once per day	once per day	less than once per day but more than once per week	once per week	less than once per week	never	don't know
a. Child (5-12)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	0 <input type="checkbox"/>	9 <input type="checkbox"/>
b. Teenager (13-17)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	0 <input type="checkbox"/>	9 <input type="checkbox"/>
c. Young adult (18-35)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	0 <input type="checkbox"/>	9 <input type="checkbox"/>
d. Middle-aged adult (36-65)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	0 <input type="checkbox"/>	9 <input type="checkbox"/>
e. Older adult (over 65)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	0 <input type="checkbox"/>	9 <input type="checkbox"/>

DENTAL CARE AND STATUS (AGES 17+ YEARS)

<p>Q1. How would you describe the condition of your natural teeth: excellent, very good, good, fair or poor?</p>	<p>1 <input type="checkbox"/> excellent</p> <p>2 <input type="checkbox"/> very good</p> <p>3 <input type="checkbox"/> good</p> <p>4 <input type="checkbox"/> fair</p> <p>5 <input type="checkbox"/> poor</p> <p>6 <input type="checkbox"/> HAS NO NATURAL TEETH</p>
<p>Q2. What type of dental care do you need now?</p> <p>HAND CARD HAQ-7.</p> <p>MARK ALL REPORTED.</p>	<p>01 <input type="checkbox"/> teeth filled or replaced (for example, fillings, crowns and/or bridges)</p> <p>02 <input type="checkbox"/> teeth pulled</p> <p>03 <input type="checkbox"/> gum treatment</p> <p>04 <input type="checkbox"/> denture work</p> <p>05 <input type="checkbox"/> relief of pain</p> <p>06 <input type="checkbox"/> work to improve appearance (for example, braces or bonding)</p> <p>10 <input type="checkbox"/> CLEANING</p> <p>07 <input type="checkbox"/> other 08 _____ specify</p> <p>09 <input type="checkbox"/> NOTHING</p> <p>99 <input type="checkbox"/> DK</p>
<p>Q3. How long ago was your <u>last</u> visit to a dentist <u>or</u> dental hygienist?</p>	<p>_____ } 1 <input type="checkbox"/> days</p> <p>number } 2 <input type="checkbox"/> weeks</p> <p>3 <input type="checkbox"/> months</p> <p>4 <input type="checkbox"/> years</p> <p>00 <input type="checkbox"/> NEVER (Q5)</p>
<p>Q4. How often do you go to the dentist <u>or</u> dental hygienist?</p> <p>MARK <u>FIRST</u> APPLICABLE BOX.</p>	<p>1 <input type="checkbox"/> at least once a year</p> <p>2 <input type="checkbox"/> every 2 years</p> <p>3 <input type="checkbox"/> less often than every 2 years</p> <p>4 <input type="checkbox"/> whenever needed - no regular schedule</p> <p>5 <input type="checkbox"/> other 6 _____ specify</p> <p>9 <input type="checkbox"/> DK</p>
<p>Q5. Have you had "cold sores" or "fever blisters" on your lips in the <u>past 12 months</u>?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>
<p>Q6. Have you had "canker sores" or other ulcers or sores inside your mouth in the <u>past 12 months</u>?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>
<p>Q7. CHECK ITEM. REFER TO AGE OF SP.</p>	<p>1 <input type="checkbox"/> 50+ YEARS (R1)</p> <p>2 <input type="checkbox"/> UNDER 50 YEARS</p>

<p>Q8. Have you <u>ever</u> received orthodontic treatment such as wearing braces, bands, or removable appliances to straighten your teeth?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (R1)</p>
<p>Q9. How old were you when you <u>started</u> your <u>most recent</u> orthodontic treatment?</p>	<p style="text-align: center;">_____ age</p> <p>99 <input type="checkbox"/> DK</p>

TOBACCO (AGES 17+ YEARS)

Now I'd like to ask you about tobacco use.	
R1. Have you smoked at least 100 cigarettes during your entire life? APPROXIMATELY 5 PACKS.	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (R14)
R2. How old were you when you <u>first</u> started smoking cigarettes fairly regularly?	<u> </u> age 000 <input type="checkbox"/> NEVER SMOKED REGULARLY 999 <input type="checkbox"/> DK
R3. Do you smoke cigarettes <u>now</u> ?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (R11)
R4. About how many cigarettes do you smoke per day?	000 <input type="checkbox"/> LESS THAN 1 PER DAY <u> </u> number } 1 <input type="checkbox"/> cigarettes per day 2 <input type="checkbox"/> packs per day 666 <input type="checkbox"/> VARIES
R5. For approximately how many years have you smoked this amount?	<u> </u> years number
R6. Was there ever a period of a year or more when you smoked more than (NUMBER IN R4) cigarettes per day?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (R9)
R7. During the period when you were smoking the most, about how many cigarettes per day did you <u>usually</u> smoke?	<u> </u> number } 1 <input type="checkbox"/> cigarettes per day 2 <input type="checkbox"/> packs per day 666 <input type="checkbox"/> VARIED
R8. For how many years did you smoke that amount?	<u> </u> years number
R9. Have you ever quit smoking for a period of <u>one year or longer</u> ?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (R14)
R10. Since you <u>first</u> started smoking; how many years <u>altogether</u> have you stayed off cigarettes?	000 <input type="checkbox"/> LESS THAN 1 YEAR (R14) <u> </u> years (R14) number
R11. About how old were you when you <u>last</u> smoked cigarettes (fairly regularly)? PROBE: How old were you when you quit smoking cigarettes?	<u> </u> age 999 <input type="checkbox"/> DK
R12. About how many cigarettes per day did you <u>usually</u> smoke at that time?	000 <input type="checkbox"/> LESS THAN 1 PER DAY <u> </u> number } 1 <input type="checkbox"/> cigarettes per day 2 <input type="checkbox"/> packs per day 666 <input type="checkbox"/> VARIED
R13. Did you quit smoking because you <u>had</u> a health problem that was caused <u>or</u> made worse by smoking?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK
R14. Have you <u>ever</u> used chewing tobacco <u>or</u> snuff?	1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (R23)

<p>R15. At what age did you <u>first</u> start using chewing tobacco or snuff fairly regularly?</p> <p>IF BOTH USED, ENTER EARLIEST AGE.</p>	<p>_____ age</p> <p>000 <input type="checkbox"/> NEVER USED REGULARLY (R20)</p> <p>999 <input type="checkbox"/> DK</p>
<p>R16. Do you use chewing tobacco or snuff <u>now</u>?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (R20)</p>
<p>R17. Which - chewing tobacco or snuff?</p>	<p>1 <input type="checkbox"/> chewing tobacco 2 <input type="checkbox"/> snuff 3 <input type="checkbox"/> both</p>
<p>R18. How many containers do you use per day or per week?</p> <p>RECORD FOR SNUFF OR CHEWING TOBACCO OR BOTH.</p>	<p>1 <input type="checkbox"/> snuff _____ per containers } 1 <input type="checkbox"/> day 2 <input type="checkbox"/> week</p> <p>2 <input type="checkbox"/> chew _____ per containers } 1 <input type="checkbox"/> day 2 <input type="checkbox"/> week</p>
<p>R19. Where in your mouth do you <u>usually</u> place the (chewing tobacco/snuff)?</p> <p>a. In the right side, left side, or front of your mouth?</p>	<p>1 <input type="checkbox"/> right 2 <input type="checkbox"/> left 3 <input type="checkbox"/> front</p>
<p>b. In the top or bottom of your mouth?</p>	<p>1 <input type="checkbox"/> top 2 <input type="checkbox"/> bottom 3 <input type="checkbox"/> OTHER 4 _____ SPECIFY } (R23) 5 <input type="checkbox"/> NO SPECIAL PLACE</p>
<p>R20. About how old were you when you <u>last</u> used (chewing tobacco/ snuff) fairly regularly?</p>	<p>_____ age</p> <p>999 <input type="checkbox"/> DK</p>
<p>R21. Which did you use - chewing tobacco or snuff?</p>	<p>1 <input type="checkbox"/> chewing tobacco 2 <input type="checkbox"/> snuff 3 <input type="checkbox"/> both</p>
<p>R22. Did you quit using (chewing tobacco/snuff) because you had a problem that was caused or made worse because you used (it/them)?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK</p>
<p>R23. Have you <u>ever</u> smoked at least 20 cigars in your entire life?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (R26)</p>
<p>R24. Do you <u>now</u> smoke cigars?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (R26)</p>
<p>R25. How many cigars do you smoke per day?</p>	<p>_____ cigars number</p>
<p>R26. Have you <u>ever</u> smoked at least 20 pipefuls of tobacco in your entire life?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (S1)</p>
<p>R27. Do you <u>now</u> smoke a pipe?</p>	<p>1 <input type="checkbox"/> Y 2 <input type="checkbox"/> N (S1)</p>
<p>R28. How many pipefuls of tobacco do you smoke per day?</p>	<p>_____ pipefuls number</p>

PRESCRIPTION MEDICINES: RECORD LABEL INFORMATION AND ASK X11-X12 FOR EACH MEDICATION.

MEDICATION #1	MEDICATION #2	MEDICATION #3
X9. NAME:	X9. NAME:	X9. NAME:
<p>X10. CHECK ITEM.</p> <p>1 <input type="checkbox"/> CONTAINER SEEN.</p> <p>2 <input type="checkbox"/> CONTAINER NOT SEEN - MEDICATION INFORMATION FURNISHED BY RESPONDENT.</p>	<p>X10. CHECK ITEM.</p> <p>1 <input type="checkbox"/> CONTAINER SEEN.</p> <p>2 <input type="checkbox"/> CONTAINER NOT SEEN - MEDICATION INFORMATION FURNISHED BY RESPONDENT.</p>	<p>X10. CHECK ITEM.</p> <p>1 <input type="checkbox"/> CONTAINER SEEN.</p> <p>2 <input type="checkbox"/> CONTAINER NOT SEEN - MEDICATION INFORMATION FURNISHED BY RESPONDENT.</p>
<p>X11. What is the health problem you had for which you took the (MEDICINE)?</p> <p>PROBE FOR SYMPTOM OR CONDITION.</p>	<p>X11. What is the health problem you had for which you took the (MEDICINE)?</p> <p>PROBE FOR SYMPTOM OR CONDITION.</p>	<p>X11. What is the health problem you had for which you took the (MEDICINE)?</p> <p>PROBE FOR SYMPTOM OR CONDITION.</p>
<p>X12. For how long have you been taking (MEDICINE)?</p> <p>number } 1 <input type="checkbox"/> days } 2 <input type="checkbox"/> weeks } 3 <input type="checkbox"/> months } 4 <input type="checkbox"/> years</p> <p>999 <input type="checkbox"/> DK</p>	<p>X12. For how long have you been taking (MEDICINE)?</p> <p>number } 1 <input type="checkbox"/> days } 2 <input type="checkbox"/> weeks } 3 <input type="checkbox"/> months } 4 <input type="checkbox"/> years</p> <p>999 <input type="checkbox"/> DK</p>	<p>X12. For how long have you been taking (MEDICINE)?</p> <p>number } 1 <input type="checkbox"/> days } 2 <input type="checkbox"/> weeks } 3 <input type="checkbox"/> months } 4 <input type="checkbox"/> years</p> <p>999 <input type="checkbox"/> DK</p>

APPENDIX D
24-HOUR DIETARY RECALL FORM

Department of Health and Human Services
Public Health Service
Centers for Disease Control
National Center for Health Statistics

Third National Health and Nutrition Examination Survey

NHANES III

24-HOUR DIETARY RECALL FORM

NOTICE - Information contained on this form which would permit identification of any individual or establishment has been collected with a guarantee that it will be held in strict confidence, will be used only for purposes stated for this study, and will not be disclosed or released to others without the consent of the individual or the establishment in accordance with section 308(d) of the Public Health Service Act (42 USC 242m)

Public reporting burden for complete participation in the NHANES III is estimated to average five hours. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to PHS Reports Clearance Officer, Room 721-H, Humphrey Building, 200 Independence Avenue, SW, Washington, DC 20201; ATTN: PRA, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

CASE
NO:

Stand No. Segment No. Serial No.

FAMILY
NO:

SP NO:

NAME (First, Middle, Last)

SAMPLE
NO:

AGE

1 ☐ Mos.
2 ☐ Yrs.

SEX

1 ☐ Male
2 ☐ Female

TIME BEGAN

1 ☐ am
2 ☐ pm
3 ☐ noon

DECK
NO:

602

602



AGES 20 + :

12-HOUR FASTING STATUS

1 ☐ yes 2 ☐ no

DATE OF RECALL

MO / DAY / YR

INTERVIEWER NO:

LANGUAGE OF INTERVIEW

1 ☐ English
2 ☐ Spanish
3 ☐ Other

4 _____
SPECIFY

DATE OF EXAMINATION

MO / DAY / YR

DAY OF RECALL (MARK ONE)

1 ☐ Sunday
2 ☐ Monday
3 ☐ Tuesday
4 ☐ Wednesday
5 ☐ Thursday
6 ☐ Friday
7 ☐ Saturday

1. How does the amount of food (you/____) consumed yesterday compare with (your/his/her) usual consumption for that day of the week? Was it much more than usual, usual, or much less than usual?	<input type="checkbox"/> much more than usual <input type="checkbox"/> usual <input type="checkbox"/> much less than usual <input type="checkbox"/> DK
2. How much plain water (do you/does____) usually drink in a 24-hour period? (Include only tap water and spring water.)	000 <input type="checkbox"/> none _____ } <input type="checkbox"/> glasses/cups _____ no. specify ounces <input type="checkbox"/> ounces 999 <input type="checkbox"/> DK
3. What type of salt (do you/does____) usually add to (your/his/her) food <u>at the table</u> ?	<input type="checkbox"/> none (5) <input type="checkbox"/> ordinary salt <input type="checkbox"/> lite salt <input type="checkbox"/> salt substitute <input type="checkbox"/> DK
4. How often (do you/does____) add (ANSWER IN 3) to (your/his/her) food <u>at the table</u> ? Is it rarely, occasionally, or very often?	<input type="checkbox"/> rarely <input type="checkbox"/> occasionally <input type="checkbox"/> very often <input type="checkbox"/> DK
5. Thinking about the <u>past month</u> , how many days did you have no food or money to buy food (for _____)?	00 <input type="checkbox"/> none (7) _____ (6) no. of days 99 <input type="checkbox"/> DK (7)
6. Is that because there wasn't enough money to buy food or is there another reason?	<input type="checkbox"/> not enough money (7) <input type="checkbox"/> another reason (12) <input type="checkbox"/> DK (7)
7. During the <u>past month</u> did (you/____) skip any meals because there wasn't enough food or money to buy food?	<input type="checkbox"/> Y 2 <input type="checkbox"/> N (12) 9 <input type="checkbox"/> DK (9)
8. How many days in the <u>past month</u> did (you/____) skip any meals because there wasn't enough food or money to buy food?	_____ no. of days 99 <input type="checkbox"/> DK
9. Did (you/____) skip any meals <u>yesterday</u> because there wasn't enough food or money to buy food?	<input type="checkbox"/> Y 2 <input type="checkbox"/> N 9 <input type="checkbox"/> DK
10. During the <u>past month</u> , were there any days when (you/____) did not eat at all because there wasn't enough food or money to buy food?	<input type="checkbox"/> Y 2 <input type="checkbox"/> N (12) 9 <input type="checkbox"/> DK (12)

APPENDIX E
DENTIST'S EXAM

DENTIST'S EXAM

(Ages 1 and Older)

STAFF NO.

SAMPLE NO.

1. Has a doctor or dentist ever told you that you must take antibiotics (e.g., penicillin) before you get a dental check-up or care? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

Before we begin, I'd like to read you a list of health conditions that some people have. As I read off each condition, please tell me whether or not a doctor has ever told you that you have the condition. Has a doctor ever told you that you have:

2. A heart problem? 1 ☐ Yes 2 ☐ No (Q8)

Was the heart problem due to . . .

3. Congenital heart murmurs? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

4. A heart valve problem? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

5. Congenital heart disease? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

6. Bacterial endocarditis? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

Has a doctor ever told you that you have:

7. Rheumatic fever? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

8. Kidney disease requiring renal dialysis? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

9. Hemophilia? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

Do you have:

10. A pacemaker or other artificial material in your heart, veins or arteries? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

11. A hip, bone, or joint replacement? 1 ☐ Yes (MEDICAL EXCLUSION) 2 ☐ No

12. CHECK ITEM A.

- 1 ☐ Age 18 or older
2 ☐ Age under 18 (Q25)

13-14. CHECK ITEM B
(DENTIST OBSERVATION)

EDENTULOUS IN
UPPER JAW

- 1 ☐ No (END)
2 ☐ Yes, denture
present (Q17)
3 ☐ Yes, no denture
visible

EDENTULOUS IN
LOWER JAW

- 1 ☐ No (END)
2 ☐ Yes, denture
present (Q18)
3 ☐ Yes, no denture
visible

15-16. Do you have (a) denture(s) or (a) plate(s)
for your (upper/lower) jaw?

- 1 ☐ Yes
2 ☐ No (Q23)

- 1 ☐ Yes
2 ☐ No (Q24)

17-18. Do you usually wear your (upper/lower)
denture(s) (plate)...

- 1 ☐ All the time
2 ☐ Only when awake
3 ☐ Only occasionally
4 ☐ Don't wear them

- 1 ☐ All the time
2 ☐ Only when awake
3 ☐ Only occasionally
4 ☐ Don't wear them

19-20. During the past year, have you had
problems with your denture(s) (plate)?

- 1 ☐ Yes
2 ☐ No

- 1 ☐ Yes
2 ☐ No

21-22. Do you think that you need (a) new
denture(s) (plate) or that the one you
have needs refitting?

- 1 ☐ Yes
2 ☐ No

- 1 ☐ Yes
2 ☐ No

23-24. How long has it been since you had any
natural teeth to chew with
in your (upper/lower) jaw?

- 1 ☐ Less than one year
2 ☐ 1-4 years
3 ☐ 5-9 years
4 ☐ 10-19 years
5 ☐ 20 or more years

- 1 ☐ Less than one year
2 ☐ 1-4 years
3 ☐ 5-9 years
4 ☐ 10-19 years
5 ☐ 20 or more years

25. CHECK ITEM C. CHECK ALL THAT APPLY.

- 1 ☐ Furcations incomplete due to pain/safety
1 ☐ Loss of attachments incomplete due to pain/safety
1 ☐ Some components incomplete other than for age
or medical exclusion reasons, or pain/safety reasons
for the furcations or loss of attachment
components

26. REASONS TEST INCOMPLETE OR NOT DONE:

- 1 ☐ Hardware malfunction or lack of supplies
- 2 ☐ Insufficient time available or room not available
- 3 ☐ Examinee refused or uncooperative
- 4 ☐ Examinee unable to physically cooperate
- 5 ☐ Comments: _____

APPENDIX F
DRUG CLASS DESCRIPTION AND ICD-9-CM

CODE	DRUG CLASS DESCRIPTION
0100	ANESTHETICS
0117	ANESTHETICS, LOCAL
0118	ANESTHETICS, GENERAL
0119	ANESTHESIA, ADJUNCTS TO/ANALEPTICS
0120	MEDICINAL GASES
0121	ANESTHETICS, TOPICAL
0122	ANESTHETICS, OPHTHALMIC
0123	ANESTHETICS, RECTAL
0200	ANTIDOTES
0281	ANTIDOTES, SPECIFIC
0283	ANTIDOTES, GENERAL
0285	ANTITOXINS/ANTIVENINS
0286	ANAPHYLAXIS TREATMENT KIT
0300	ANTIMICROBIALS
0346	PENICILLINS
0347	CEPHALOSPORINS
0348	LINCOSAMIDES/MACROLIDES
0349	POLYMYXINS
0350	TETRACYCLINE
0351	CHLORAMPHENICOL/DERIVATIVES
0352	AMINOGLYCOSIDES
0353	SULFONAMIDES/RELATED COMPOUNDS
0354	ANTISEPTICS, URINARY TRACT
0355	ANTIBACTERIALS, MISCELLANEOUS
0356	ANTIMYCOBACTERIALS (INCL ANTI LEPROSY)
0357	QUINOLONES/DERIVATIVES
0358	ANTIFUNGALS
0388	ANTIVIRALS
0400	HEMATOLOGICS
0408	DEFICIENCY ANEMIAS
0409	ANTICOAGULANTS/THROMBOLYTICS
0410	BLOOD COMPONENTS/SUBSTITUTES
0411	HEMOSTATICS
0500	CARDIOVASCULAR-RENAL
0501	CARDIAC GLYCOSIDES
0502	ANTIARRHYTHMICS
0503	ANTIANGINALS
0504	VASCULAR DISORDERS, CEREBRAL/PERIPHERAL
0505	HYPOTENSION/SHOCK
0506	ANTIHYPERTENSIVES
0507	DIURETICS
0508	CORONARY VASODILATORS
0509	RELAXANTS/STIMULANTS, URINARY TRACT
0510	CALCIUM CHANNEL BLOCKERS
0511	CARBONIC ANHYDRASE INHIBITORS
0512	BETA BLOCKERS
0513	ALPHA AGONISTS/ALPHA BLOCKERS
0514	ACE INHIBITORS
0600	CENTRAL NERVOUS SYSTEM

CODE	DRUG CLASS DESCRIPTION
0626	SEDATIVES/HYPNOTICS
0627	ANTIANXIETY
0628	ANTIPSYCHOTICS/ANTIMANICS
0630	ANTIDEPRESSANTS
0631	ANOREXIANTS/CNS STIMULANTS
0632	CNS, MISCELLANEOUS
0633	ALZHEIMER-TYPE DEMENTIA
0634	SLEEP AID PRODUCTS, PRIMARY OTC
0635	ANTIEMETICS
0700	CONTRAST MEDIA/ RADIOPHARMACEUTICALS
0789	DIAGNOSTICS, RADIOPAQUE & NONRADIOACTIVE
0790	DIAGNOSTICS RADIOPHARMACEUTICALS
0791	THERAPEUTICS RADIOPHARMACEUTICALS
0792	DIAGNOSTICS-MISC.
0800	GASTROINTESTINALS
0874	DISORDERS, ACID/PEPTIC
0875	ANTIDIARRHEALS
0876	LAXATIVES
0877	GASTROINTESTINAL, MISCELLANEOUS
0878	ANTISPASMODICS/ANTICHOLINERGICS
0879	ANTACIDS
0900	METABOLICS/NUTRIENTS
0912	HYPERLIPIDEMIA
0913	VITAMINS/MINERALS
0914	NUTRITION, ENTERAL/PARENTERAL
0915	REPL/REGS OF ELECTROLYTES/WATER BALANCE
0916	CALCIUM METABOLISM
0917	HEMATOPOIETICS
1000	HORMONES/HORMONAL MECHANISMS
1032	ADRENAL CORTICOSTEROIDS
1033	ADROGENS/ANABOLIC STEROIDS
1034	ESTROGENS/PROGESTINS
1035	ANTERIOR PITUITARY/HYPOTHALMIC FUNCTION
1036	BLOOD GLUCOSE REGULATORS
1037	THYROID/ANTITHYROID
1038	ANTIDIURETICS
1039	RELAXANTS/STIMULANTS, UTERINE
1040	CONTRACEPTIVES
1041	INFERTILITY
1042	DISORDERS OF GROWTH HORMONE SECRETION
1100	IMMUNOLOGICS
1180	VACCINES/ANTISERA
1181	IMMUNOMODULATORS
1182	ALLERGENIC EXTRACTS
1183	IMMUNE SERUMS (INCLUDES IMMUNE GLOBULINS)
1200	SKIN/MUCOUS MEMBRANES
1264	ANTISEPTICS/DISINFECTANTS
1265	DERMATOLOGICS
1266	KERATOLYTICS

CODE	DRUG CLASS DESCRIPTION
1267	ANTIPERSPIRANTS
1268	TOPICAL STEROIDS
1269	BURN/SUNBURN, SUNSCREEN
1270	ACNE PRODUCTS
1271	TOPICAL ANTI-INFECTIVES
1272	ANORECTAL PRODUCTS
1273	PERSONAL CARE PRODUCTS
1274	DERMATITIS/ANTIPURETICS
1275	TOPICAL ANALGESICS
1300	NEUROLOGICS
1371	EXTRAPYRAMIDAL MOVEMENT DISORDERS
1372	MYASTHENIA GRAVIS
1373	SKELETAL MUSCLE HYPERACTIVITY
1374	ANTICONVULSANTS
1400	ONCOLYTICS
1479	ANTINEOPLASTICS
1480	ANTINEOPLASTICS-HORMONAL/BIOLOGICAL RESPONSE
1481	ANTINEOPLASTICS-ANTIMETABOLITES
1482	ANTINEOPLASTIC AGENTS
1483	ANTINEOPLASTICS-DNA DAMAGING AGENTS
1500	OPHTHALMICS
1566	GLAUCOMA
1567	CYCOPLEGICS/MYDRIATICS
1568	OCULAR ANTI-INFECTIVE/ANTI-INFLAMMATORY
1569	OPHTHALMICS, MISCELLANEOUS
1570	OPHTHALMICS-DECONGESTANTS/ANTI-ALLERGY AGENTS
1571	CONTACT LENS PRODUCTS
1600	OTICS
1670	OTICS, TOPICAL
1671	VERTIGO/MOTION SICKNESS/VOMITING
1700	RELIEF OF PAIN
1720	ANALGESICS, GENERAL
1721	ANALGESICS, NARCOTIC
1722	ANALGESICS, NON-NARCOTIC
1723	ANTIMIGRAINE/OTHER MEADACHES
1724	ANTIARTHRITICS
1725	ANTIGOUT
1726	CENTRAL PAIN SYNDROMES
1727	NSAID-NONSTEROIDAL ANTI-INFLAMMATORY DRUGS
1728	ANTIPYRETICS
1729	MENSTRUAL PRODUCTS
1800	ANTIPARASITICS
1860	ANTIPROTOZOALS
1862	ANTHELMINTICS
1863	SCABICIDES/PEDICULICIDES
1864	ANTIMALARIALS
1900	RESPIRATORY TRACT
1940	ANTIASTHMATICS/BRONCODILATORS
1941	NASAL DECONGESTANTS

CODE	DRUG CLASS DESCRIPTION
1943	ANTITUSSIVES/EXPECTORANTS/MUCOLTICS
1944	ANTI HISTAMINES
1945	COLD REMEDIES
1946	LOZENGE PRODUCTS
1947	CORTICOSTEROIDS-INHALATION/NASAL
2000	OTHER
2087	QUESTION OF USE
2095	PHARMACEUTICAL AIDS
2096	SURGICAL AIDS
2097	DENTAL PREPARATIONS
2098	DENTRIFICE/DENTURE PRODUCTS
2099	MOUTH PAIN, COLD SORE, CANKER SORE PRODUCTS
2100	HOMEOPATHIC PRODUCTS
9900	NO CLASS ASSIGNED
9998	MULTIPLE USES OF DRUG

ICD-9-CM

Code	Description
=====	=====
V01.1	Contact with or exposure to tuberculosis
V07.31	Prophylactic fluoride administration
V07.9	Unspecified prophylactic measure
V15.0	Personal history of allergy, other than medicinal agents
V25.9	Encounter for unspecified contraceptive management
V26.2	Procreative management, investigation and testing
V40.9	Unspecified mental or behavioral problem
003.9	Salmonella infection, unspecified
005.9	Food poisoning, unspecified
008.8	Enteritis due to other organism, not elsewhere classified
011.9	Pulmonary tuberculosis, unspecified
033.9	Whooping cough, unspecified organism
034.0	Streptococcal sore throat
034.1	Scarlet fever
038.9	Unspecified septicemia
041.0	Streptococcus, unspecified bacterial infection
041.1	Staphylococcus bacterial infection, unspecified
052.9	Varicella without mention of complication
053.9	Herpes zoster without mention of complication
054.9	Herpes simplex without mention of complication
075	Infectious mononucleosis
078.1	Viral warts, unspecified
079.9	Unspecified viral and chlamydial infections
110.0	Dermatophytosis of scalp and beard
110.9	Dermatophytosis of unspecified site
112.0	Candidiasis of mouth
112.9	Candidiasis of unspecified site
117.9	Other and unspecified mycoses
126.9	Ancylostomiasis and necatoriasis, unspecified
127.4	Enterobiasis
128.9	Helminth infection, unspecified
133.0	Scabies
136.9	Unspecified infectious and parasitic diseases
244.9	Unspecified hypothyroidism
246.9	Unspecified disorder of thyroid
250.0	Diabetes mellitus without mention of complication, type II
253.9	Unspecified disorders of pituitary gland
276.6	Fluid overload
276.9	Electrolyte and fluid disorders not elsewhere classified
277.0	Cystic fibrosis without mention of meconium ileus
279.2	Combined immunity deficiency
282.6	Sickle-cell anemia, unspecified
285.9	Anemia, unspecified
286.9	Other and unspecified coagulation defects
300.0	Anxiety state, unspecified
300.9	Unspecified neurotic disorder
307.23	Gilles de la Tourette's disorder

ICD-9-CM

Code	Description
=====	=====
311	Depressive disorder, not elsewhere classified
312.9	Unspecified disturbance of conduct
314.0	Attention deficit disorder without mention of hyperactivity
314.9	Unspecified hyperkinetic syndrome
322.9	Meningitis, unspecified
345.9	Epilepsy, unspecified without mention of intractable epilepsy
346.9	Migraine, unspecified without mention of intractable migraine
360.0	Purulent endophthalmitis, unspecified
372.3	Conjunctivitis, unspecified
373.11	Hordeolum externum
375.9	Unspecified disorder of lacrimal system
379.9	Disorder of eye, unspecified
380.12	Acute swimmers' ear
380.9	Unspecified disorder of external ear
382.9	Unspecified otitis media
386.3	Labyrinthitis, unspecified
388.7	Otalgia, unspecified
388.8	Other disorders of ear
388.9	Unspecified disorder of ear
391.9	Acute rheumatic heart disease, unspecified
401.9	Unspecified essential hypertension
427.9	Cardiac dysrhythmia, unspecified
428.0	Congestive heart failure
429.9	Heart disease, unspecified
460	Acute nasopharyngitis common cold
462	Acute pharyngitis
463	Acute tonsillitis
464.4	Croup
465.9	Acute upper respiratory infections of unspecified site
473.9	Unspecified sinusitis (chronic)
477.8	Allergic rhinitis due to other allergen
477.9	Allergic rhinitis cause unspecified
478.1	Other diseases of nasal cavity and sinuses
478.29	Other diseases of pharynx, not elsewhere classified
486	Pneumonia, organism unspecified
487.1	Influenza with other respiratory manifestations
487.8	Influenza with other manifestations
490	Bronchitis, not specified as acute or chronic
491.9	Unspecified chronic bronchitis
493.9	Asthma, unspecified without mention of status asthmaticus
514	Pulmonary congestion and hypostasis
518.89	Other diseases of lung, not elsewhere classified
519.9	Unspecified disease of respiratory system
520.7	Teething syndrome
521.9	Unspecified disease of hard tissues of teeth
522.9	Other and unspecified diseases of pulp and periapical tissues

ICD-9-CM

Code	Description
=====	=====
525.1	Loss teeth due to accident/extraction/local periodontal disease
525.9	Unspecified disorder of the teeth and supporting structures
528.5	Diseases of lips
528.9	Other and unspecified diseases of the oral soft tissues
529.9	Unspecified condition of the tongue
530.81	Esophageal reflux
530.9	Unspecified disorder of esophagus
536.8	Dyspepsia and other specified disorders of function of stomach
536.9	Unspecified functional disorder of stomach
555.9	Enteritis of unspecified site
558.9	Other and unspecified noninfectious gastroenteritis and colitis
564.0	Constipation
564.9	Unspecified functional disorder of intestine
590.9	Infection of kidney, unspecified
593.9	Unspecified disorder of kidney and ureter
595.9	Cystitis, unspecified
596.9	Unspecified disorder of bladder
599.0	Urinary tract infection, site not specified
599.7	Hematuria
599.9	Unspecified disorder of urethra and urinary tract
614.9	Unspec inflammatory disease of female pelvic organs and tissues
620.2	Other and unspecified ovarian cyst
625.3	Dysmenorrhea
626.2	Excessive or frequent menstruation
626.9	Unspecified disorders of menstruation
680.9	Carbuncle and furuncle of unspecified site
681.02	Onychia and paronychia of finger
681.1	Cellulitis and abscess of toe, unspecified
681.11	Onychia and paronychia of toe
682.3	Other cellulitis and abscess of upper arm and forearm
682.7	Other cellulitis and abscess of foot, except toes
682.8	Other cellulitis and abscess of other specified sites
683	Acute lymphadenitis
684	Impetigo
686.9	Unspecified local infection of skin and subcutaneous tissue
691.0	Diaper or napkin rash
691.8	Other atopic dermatitis and related conditions
692.6	Contact dermatitis/eczema of due to plants except food
692.9	Unspecified cause
696.1	Other psoriasis
698.9	Unspecified pruritic disorder
701.1	Keratoderma, acquired
701.4	Keloid scar
705.9	Unspecified disorder of sweat glands
706.1	Other acne
708.9	Urticaria, unspecified

ICD-9-CM

Code	Description
=====	=====
709.9	Unspecified disorder of skin and subcutaneous tissue
714.0	Rheumatoid arthritis
719.97	Unspecified disorder of joint, ankle and foot
723.1	Cervicalgia
724.5	Backache, unspecified
728.85	Spasm of muscle
728.9	Unspecified disorder of muscle, ligament, and fascia
780.3	Convulsions
780.6	Pyrexia of unknown origin
780.9	Other general symptoms
782.1	Rash and other nonspecific skin eruption
782.2	Localized superficial swelling, mass, or lump
782.3	Edema
783.9	Other symptoms concerning nutrition, metabolism, development
784.0	Headache
784.7	Epistaxis
784.9	Other symptoms involving head and neck
785.2	Undiagnosed cardiac murmurs
786.0	Respiratory abnormality, unspecified
786.09	Other dyspnea and respiratory abnormalities
786.2	Cough
786.5	Chest pain, unspecified
786.7	Abnormal chest sounds
787.01	Nausea with vomiting
787.03	Vomiting alone
787.3	Flatulence, eructation, and gas pain
788.3	Urinary incontinence, unspecified
789.0	Abdominal pain
790.9	Other nonspecific findings on examination of blood
795.5	Nonspecific reaction to tuberculin test
799.2	Nervousness
799.9	Other unknown and unspecified cause of morbidity and mortality
818.0	Ill-defined closed fractures of upper limb
826.0	Closed fracture of one or more phalanges of foot
827.0	Closed other, multiple, and ill-defined fractures of lower limb
844.9	Sprains and strains of unspecified site of knee and leg
879.8	Opn wound(s) (multiple) of unspec site(s) w/o ment of complicat
879.9	Open wound(s) (multiple) of unspecified site(s), complicated
892.0	Opn wound foot except toe(s) alone w/o mention of complication
894.0	Multipl/unspec opn wnd lowr limb, w/o mention of complication
915.9	Other and unspecified superficial injury of fingers, infected
916.2	Blister of hip, thigh, leg, and ankle w/o mention of infection
917.8	Other and unspec superficial injury of foot/toes w/o infection
918.9	Other and unspecified superficial injuries of eye
919.4	Insect bite of oth/multipl/unspec site, nonvenomous, w/o infect
919.5	Insect bite of oth/multipl/unspec site, nonvenomous, infected
923.9	Contusion of unspecified part of upper limb

ICD-9-CM

Code	Description
944.2	Blisters, epidermal loss [2nd degree] burn of hand, unspec si
959.0	Face and neck injury, other and unspecified
959.7	Knee, leg, ankle, and foot injury, other and unspecified
959.8	Injury to other specified sites, including multiple
984.9	Toxic effect of unspecified lead compound
995.3	Allergy, unspecified
995.69	Anaphylactic shock due to other specified food
888888	Blank but applicable
999999	Sample person did not know symptom or condition

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