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Racial and ethnic disparities in access and utilization of dental services among children in Iowa:

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RACIAL AND ETHNIC DISPARITIES IN ACCESS AND UTILIZATION OF DENTAL SERVICES AMONG CHILDREN IN IOWA: THE LATINO EXPERIENCE

by
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CERTIFICATE OF APPROVAL

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MASTER'S THESIS

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CHAPTER I

INTRODUCTION

Latinos are now the largest and fastest growing ethnic minority group in the United States (1). According to the U.S Census Bureau, Latinos comprised 15% (about 44.3 million) of the nation's population in 2006. Latinos accounted for one-half of the nation's growth between 2000 and 2006 and by 2050 they are projected to represent approximately 24% of the country's population (2).

The increasing growth of Latinos has been seen not only in metropolitan areas of the United States, but in rural areas as well. In the last two decades the Latino population has doubled from 1.5 to 3.2 million constituting the most rapidly growing segment of non-urban county residents (3). Even though most of the Latinos in the U.S. reside in states like California and Texas (1), the Midwest experienced the largest percentage increase in growth (81%) between 1990 and 2000 (4). In the state of Iowa, the Latino population has experienced a 45% increase in a seven year period (2000-2007). Latinos accounted for 4% of the Iowa population in 2007 and they are projected to account for 9% of the state's population by the year 2030 (5). Despite the increasing growth of Latinos, little has been done to address their oral health needs.

Latinos in general are bearing a disproportionate burden of oral disease. Latino adults are almost two times more likely to have untreated oral diseases than non-Latino whites (6). Latino children are greatly affected by dental caries, especially young children. According to recent U.S. data, Mexican-American

children aged 2-11 years had higher caries experience (55%) in primary teeth than non-Latino white children (38%) (7). In permanent teeth the trend was similar, Mexican-American children aged 6-19 years had 49% caries experience compared to 40% of white children (7).

No clear reasons have been established regarding the disproportionate burden of oral diseases among Latino children. Some of the factors that may be affecting them are the difficulties to access and utilize oral health services. These difficulties are not only related to individual barriers like socioeconomic status and lack of dental insurance but also to socio-cultural and structural barriers like communication issues, immigration status, and acculturation among others.

The Surgeon General in the first oral health report released in 2000 (8) stated that in order to improve oral health and to reduce the existing disparities in the U.S population, there is a need to obtain adequate data related to the oral health status and needs of different disadvantaged groups, among them ethnic minorities, immigrants, and rural populations. In order to address oral health disparities in the future, there is an urgent need for accurate data that will help us to identify the difficulties that Latinos have to access dental care.

In the state of Iowa, Latino children under the age of 5 account for 11.5% of the Latino population living in the state in 2007 (5). Even though Latinos account just for 4% of the total population, among any other race or ethnic group, Latinos have the highest concentration of pre-schoolers in the state (5). At the present time, there is limited data related to the oral health status of Latino

children living in Iowa and their difficulties to access and utilization of dental services.

In the year 2005 some Latino families living in the state of Iowa participated in the Iowa Child and Family Household Health Survey (IHHS). The purpose of this survey was “to provide information to policy makers and health planners about the social and health status of children living in the state of Iowa.” Approximately 3600 families from different racial/ethnic groups participated in the study. The survey was a collaboration of the Iowa Department of Public Health (IDPH) and the University of Iowa Public Policy Center (PPC).

The present study used data from the IHHS to identify the factors that determine dental services access and utilization by children in the state of Iowa. A special emphasis is place to identify factors affecting utilization of services by Latino children. Additionally, the study will describe and compare difficulties to access care among Latino children of parents who answered the survey in English and those who answered it in Spanish.

CHAPTER II

LITERATURE REVIEW

The Surgeon General's Report on Oral Health (8) gave for the first time a national acknowledgement of the importance of oral health as a vital component of general health. One of the most important statements made was that "oral health means much more than healthy teeth…Oral health is integral to general health. You cannot be healthy without oral health. Oral health and general health should not be interpreted as separate entities" (8). In other words, oral diseases, if not treated, could have long-lasting negative health consequences beyond the mouth and teeth. However, prevention, early diagnosis, and early intervention can stop the progress of the majority of oral diseases.

Even though the oral health status of the general population in the United States has improved in the last 50 years, there are segments of the population that have been left behind (8). Specific subgroups still experience dental caries and oral diseases to a disproportionate level. These subgroups include rural populations, racial and ethnic minorities, low income populations, and the elderly. At the present time, about 25 million of Americans live in areas without adequate dental services (8).

The oral health in the Latino population, like other minority groups, is relatively poor and by some measures these discrepancies are more severe. The poor oral health status of Latinos is especially affected by the lack of access to oral care and preventive services. Latino preschoolers – the fastest growing child population in the US - had 2.5 times more tooth decay than white children

according to the latest U.S. national data (9). Latino adults had 40% more untreated dental diseases than whites (6) and just 27% of Latinos reported having a dental visit compared with 48% of non-Latino Whites (9).

A policy analysis made by Guay in 2004 reported about the difficulties that several underserved populations have to access dental care. The author stated that solving the problem of access to care in vulnerable populations is a very complex issue that is not easily resolved. He suggested that the first step that should be taken into address this problem is to understand the barriers to care for specific groups and make specific strategic plans to address those issues taking in to account the demand for care, the dental work force, and the economic environment (10).

Questions still remain about the possible causes of oral health disparities among different subgroups of the population. More attention has been paid lately to understand racial and ethnic disparities in medical care but less attention has been given to racial/ethnic oral health disparities, especially among children.

The present chapter will focus on reviewing the existing literature regarding the barriers that Latino children have regarding access and utilization of dental services in the United States. Special attention will be given to socio-cultural barriers affecting Latinos.

It should be noted that the term *Latino* will be used in this paper to refer to persons living in the US whose origins can be traced to the Spanish-speaking regions of Latin America; these will include Central and South America, Mexico, and the Caribbean. The term *Hispanic,* which is still the most common term used

by the federal government, places too much emphasis on the European influence of Spanish colonialism and does not accurately recognize the vital influence of native Indian and African cultures in Latin American history (11), (12).

Disparities in Latino children

One of the two major goals stated in *Healthy people 2010* (13) for the current decade is the elimination of health disparities among the US population. The annual National Healthcare Disparities Report (NHDR) of 2006 stated that disparities in access to health care among different minority groups were reduced or remain the same compared with non-Latino whites (reference group), except for Latinos, where the disparity gap increased (14). Disparities in health care disproportionally affect Latinos all over the country. Increasing disparities in oral health has lately been reported to particularly affect Latino children.

Dental caries, the most common chronic disease affecting children in the country (8), has increased dramatically in Latino children. The NHDR 2007 reported that from 1999-2004, the proportion of children with untreated dental caries was higher for Mexican Americans (31.2%) and African-Americans (24.4%) than for whites (17%) (15). The National Center for Health Statistics recently reported that the proportion of children aged 2-4 years who ever had dental caries in their primary teeth increased from 18% (1988-1994) to 24% (1999- 2004). During the last period (1999-2004) Mexican American children had the highest percent increase (35%) compared to non-Latino African-Americans (26%) and non-Latino white children (20%) (16). Additionally, data from NHANES 1971-1974, 1988-1994, and 1999-2002 for children 2-5 years and 6-17

years of age, shows that Latinos have the highest prevalence of untreated dental caries compare to African-Americans and white children (17).

Regarding utilization of dental services, a study from Macek at el (18) reported findings from the 1996 Medical Expenditure Panel Survey (MEPS) for three different types of dental visits: diagnostic/preventive services, surgical, and restorative services. The population was children 0-18 years of age from different race/ethnic groups. Findings suggested that at that time, AA children had the lowest percent of visits in the mentioned three categories followed by Latinos (18). Nevertheless, more recent data from the National Health Interview Survey 2004 showed that Latino children are getting behind. Just over 60% of Latino children 2-17 years of age reported having a dental visit in the past year compare to around 80% of whites, and over 70% of AA children (17).

Access and utilization of health care

In the last decades, policy makers and administrators as well as the general public have been concerned about the increasing disparities in access to health care and the best way to address them. Access has been defined for some authors as the entry or use of the health system by an individual and for others it refers to the factors influencing entry or use (19).

A framework for the study of access to medical care was suggested first by Aday and Anderson in 1974. These researchers suggested some indicators designed to measure relevant aspects of access. For these authors, access required entry to the health care system, with this entry measured by some process indicators related to both the characteristics of the delivery system and

the characteristics of the population (20). It is also necessary to evaluate the passing of individuals through the system and measure outcome indicators that refer to utilization, satisfaction, and quality of the service received (20).

In 1981, Penchansky and Thomas suggested that the study of access refers to a variety of concepts that enable the fit between the patient and the health system. The five proposed dimensions were availability (existing services), accessibility (location and supply of services), accommodation (organization of supply resources), affordability (prices and patient insurance), and acceptability (patients attitudes toward providers and vice versa). The Penchansky model to study access has been used by researchers in studies that focused on the satisfaction and the quality of services (19).

In 2006, Patrick et al proposed a model to reduce oral health disparities that focus on social and cultural determinants of health. The proposed model was based on the traditional health belief model and the social interaction model, and emphasized the interaction between environment, economy, social context, cultural practice, social integration, individual factors, and biological factors to influence the presence of oral health disparities. The authors suggest different strategies at each level that may lead to improve access and utilization of dental services by minority population (21).

Looking specifically at Latino communities, Betancourt et al in 2004 released a policy analysis describing the main group of barriers that the health care system posses for Latinos to access health promotion and disease prevention services. The authors classified these barriers in three main groups:

organizational, structural, and providers-based barriers (22). Organizational barriers are related to leadership positions and issues related to workforce. Structural barriers are divided in extramural and intramural. Extramural barriers refer to difficulties that the patient experience in the transition from their home to the clinic where he will receive services. On the other hand, intramural barriers are those difficulties experienced from the time that the patient enters the clinic to the provider's office. Provider-based barriers are those experienced during the medical encounter. In the specific case of Latinos, provider-based barriers are more related to socio-cultural differences (22). The authors concluded that all these system barriers may be linked to important factors affecting Latinos such as their underrepresentation in the nation's health care leadership and workforce, or Latino difficulties navigating through the structural process of the health care system, or being cared for by providers who lack an understanding of their language or health beliefs. The authors suggested a multifaceted approach to eliminate organizational, structural, and provider-based barriers to reduce disparities among Latinos (22).

Based on the literature presented above, the next section will focus on analyzing four main group of barriers that may be related to access and utilization of dental services among Latinos – individual barriers, organizational barriers, structural barriers, and socio-cultural barriers (22), (23).

Barriers to access and utilization of dental services among Latino Children

Individual Barriers

Individual barriers include the income level of Latino families, the lack of dental insurance or the limited coverage of dental insurance.

Income level

Income level has been frequently identified as one of the main predictors of access and utilization of health services among the population. Children from low income families are usually at greatest odds of having suboptimal health status than children from a higher income level (24) .

Latinos and African Americans have usually been identified as being the poorest racial/ethnic minority groups in the country. In the year 2004, the poverty rate among Latinos was 22% and this proportion was unchanged from the year 2003 (25). In the year 2000, ten percent of Latino children lived in extreme poverty, compared to 3.7 percent of non-Latino white children (4). More recent data has shown that 28% of Latino children under the age of 18 lived below the federal poverty level in 2006 (26).

In the state of Iowa, the poverty rate of Latinos 25 years and older in 2006 was 25%, more than two times the poverty rate for the state population, which was 11% (5). It is important to note than within the different Latino groups in the country, Mexicans – who account for 79% of the Latinos living in Iowa–, are reported to have less education, earn less money and have the highest poverty rates compared with other immigrant groups (22).

Low income children usually face more difficulties accessing dental care than medical care. Several studies have shown that even when children are enrolled in Medicaid, they tend to access physician visits more easily than dental visits (27). Part of this may be due to the fact that few dentists are willing to treat Medicaid patients.

Lack of health-dental insurance

Latinos have been identified by many researchers as a minority group that has been greatly affected by the lack of health insurance. A study by Flores and Tomany-Korman (28) release in 2008 analyzed the presence of racial and ethnic disparities in dental and medical health, access and use of health services among minority children in the US. The authors used a subset of data from The National Survey of Children's Health (2003-2004) which was a telephone survey that interviewed parents of children 0 to 17 years old (n=102 353). Racial/ethnic groups included white, Latino, African American, Asian/Pacific Islander, Native American, and multiracial children. Multivariate analyses was done adjusting for several factors like language spoken at home, insurance coverage, child's age, parent level of education, parent employment status, poverty level, and number of adults and children in the household. Researchers reported some specific disparities for Latinos including that Latino children had the highest prevalence of being uninsured (21%) compared with whites (6%), African Americans (7%), and Native Americans (15%). Latino children have two times the odds of being uninsured compare to white children (28).

Stark differences in the proportions of uninsured people have been reported between dental care and medical care. The proportion of children lacking dental insurance (36%) is more than two times greater than the proportion of children without medical insurance (14%) (27). The lack of dental insurance limits the capacity of Latinos to access dental care, especially preventive services. It has been reported that persons without dental insurance are 39% less likely to receive dental care than those with dental insurance (29). In a study by Wall et al (1999), researchers reported than among all racial and ethnic groups examined, Latinos had the lowest levels of private dental insurance as well as lower levels of dental visits (30). In a later study made by the same researchers, they reported than among the different Latino subgroups, the level of dental visits and the lack of dental insurance were lowest among Mexican-Americans (31).

The oral health of Latino children has been greatly affected by the lack of dental insurance. Flores and Tomany-Korman (2008) reported that more than one half of Latino children in the country had suboptimal condition of the teeth, being this the highest proportion of any other race/ethnic group (28). Several studies have shown that the high costs of oral care services, as well as the lack of dental insurance, are the primary reason for not seeking needed dental care among Latinos (29).

Organizational barriers

Organizational barriers are those issues related to the workforce and the lack of representation of Latinos in the health care system leadership.

Workforce issues

The difficulties accessing dental care for minority populations has been greatly affected by the decreasing supply of providers in the country. At the present time, there is a ratio of 62 dentists per 100,000 people in large metropolitan areas of the U.S versus 29 dentists per 100,000 people in the majority of rural counties (32). Harrison et al reported that the dentist-to-population ratio began to decline in 1990 and the ratio is anticipated to be 52.7 per 100,000 by 2020. The U.S Health Resources and Services Administration reported that as of March 2009 there are more that 49 million people living in areas designated as Dental Health Professional Shortage Areas (D-HPSA) (33).

It is clear that the professional infrastructure required to meet the oral health needs of the population currently doesn't (34). As of March 2009, there is a need of 9,579 practitioners to meet a population to dentist ratio of at least 3,000:1. The decreasing number of people attending dental schools today and the increasing number of dentist approaching retirement will make even more difficult to meet the dental needs of the population in the future. Further data shows that approximately 35 percent of dentists are older than 55 years and half of all dentists will reach retirement age in the next 10 years (32).

In the state of Iowa during the year 2000, there were 1847 active dentists - a ratio of 63.1 per 100,000 people- which is very similar to the U.S. ratio (35). However, of the 99 counties in the state, forty nine are consider as D-HPSAs meaning that almost half of Iowa's counties have shortages in dental providers to meet the needs of their population. In some of these counties the population to

dentist ratio exceeds 5,000:1 (IDPH). Young children in the state of Iowa have being specially affected by workforce issues because most general dental practitioners are not comfortable seeing children <5 years old (35). It is important to recall that in Iowa Latinos have the highest concentrations of pre-schoolers among any other race/ethnic group (5).

Institutional leadership

Latinos in the US are extremely underrepresented in public sectors and leadership positions. In a country were more than 30% of the population is comprise by minorities, less than 2% of senior leadership positions in health care management are occupied by people from disadvantaged groups. Health care leadership should be a representative sample of the racial/ethnic composition of the population so they can have an understanding of the different issues affecting the communities that they served. Less than 16% of the faculty in public health schools and less than 17% of city/county health officials are from minority groups. An increase of Latino leaders and professionals may help to improve access to care for Latinos since Latino professionals may be more sensitive to the multiple issues affecting this segment of the population (22).

Structural barriers

Structural barriers include immigration status, lack of transportation, lack of a regular source of dental care, poor geographic access to providers, and dentists' operating hours.

Immigrant status

Immigrants who entered the country un-documented are the most vulnerable group among Latinos. Many of these immigrants do not seek medical or dental services because of the fear that health professionals may report their immigration status or may denied the service (36). Between 1996-1997 The Project HOPE (Undocumented Immigrant Health Care Access Survey) was conducted in four different cities of the US, Houston, El Paso, Fresno, and Los Angeles , with representative number of undocumented Latinos. The purpose of the project was to identify to what extent undocumented immigrants have fear seeking for health services and the association between this fear and the inability to obtain necessary care. Researchers reported that 39% of undocumented immigrants expressed fear of not receiving health services because of their immigration status (36). Interestingly, the authors reported that people who reported fear of no receiving health services because of their immigration status were more likely to been unable to get the services at the time they needed it than those who did not report any fear. From those who expressed fear 20% were unable to get dental services at the time they needed it.

In addition, the welfare reform law of 1996 eliminated or restricted the eligibility for Medicaid and other federal public benefits to undocumented immigrants. The law hurt not only individuals, but children and families. Eighty five percent of immigrant families are “mixed status” (families composed of both citizens and noncitizens). In most cases the children of immigrant parents are eligible to

receive health services but parents do not seek care because of the confusion and fear that the law has created (37).

In 1990, a total of 16,700 children in the state of Iowa were reported as being children of immigrants, which represented 2% of the total children population. From 1990 to 2005-2006, the number of children of immigrants growth 178%, they represented 7% of the total children population (38). Not information is available about the number of children in the state who are undocumented, but it is important to have in mind that in Iowa, undocumented children are not illegible to get Medicaid or Hawk-i benefits (39), (40).

Several studies have shown adverse effects in the health of children of immigrant parents. A study by Huang et al (41) reported on data from the National Survey of American families. These researchers found that immigrant children were four times more likely to lack health insurance than children from US-born parents and 1.75 times as likely to not have a dental visit in the past year.

A recent study by Maserejian et al (42) reported about oral health disparities in children of immigrants. The study was part of the New England Children's Amalgam Trial (NECAT) which was a randomized control trial with the primary intent to assess potential neurophysiologic and renal effects of dental amalgams in children. The study provided free dental care for children enrolled in the trial for 5 years. In this secondary analysis researchers compared the caries experience at baseline of the children of US-born parents with the children of immigrants. Additionally they compared new caries increments during the 5-years of the study in the same group of children. Participants were 283 Boston-

area children aged 6 to 10 years with untreated caries. Approximately half or the immigrant parents were Latinos from the Caribbean. The authors found that the children of immigrants had a significantly higher burden of dental caries at baseline compared to the children from US-born parents. However, the parent immigrant status was not important in determining the new caries experience when dental services were freely available. The researchers speculated that some of the reasons for the association between caregiver immigrant status and children's unmet dental needs may be due to differences in access and utilization of services and cultural beliefs (42).

Availability of providers

A second study by Maserejian et al (43), which was part of the New England Children's Amalgam Trial (NECAT) as well, concluded that the underutilization of dental services among underserved populations in Massachusetts were related not only to financial barriers but to the social environment of participants which included oral health values and convenient provider locations. In this secondary analysis the authors compared the utilization of dental service in two different sites, urban Boston, and rural Maine. Additionally, they described the main reasons for missing preventive dental appointments at both sites. They found that in Boston, children from households with some financial stress (welfare, debts, etc.), non-white race\ethnicity, and at further distances from the dental clinic were at greater odds of underutilization of dental care. One limitation of the study regarding their generalization to Latino children was that the main population of Latinos who was concentrated in the

Forsyth clinic in Boston was excluded from the secondary analysis because they had available community transportation and this fact may have created some bias in the analysis.

One of the most important problems affecting low-income populations to access dental care even when they are eligible for Medicaid is the limited number of dentists who participate in the program (27). Some of the reasons expressed by professionals for not treating Medicaid patients are low reimbursement rate, patients that missed appointments frequently, and the documentation required (27).

Insufficient operating hours in dental offices

A study by Kim Young (44) evaluated barriers to care among low income Latino children in the state of Illinois. The author examined the influence of socio-demographic factors, mothers' attitudes, financial barriers, and the health care delivery system on the use of dental services for 4-8 year-old Latino children living in Chicago. Researchers used a survey to interview 320 mothers of children in 17 public schools and Head Start programs. Interviews were made by a bilingual (Spanish/English) interviewer. The author concluded that financial resources, such as dental insurance, are not the only variables associated with access to dental care. Convenient clinic hours and individual's or a family's health beliefs are important social and psychological factors and should be considered in planning dental care programs, particularly in vulnerable populations. Extended clinic hours in the evenings increased the likelihood of the mother's return to the dentist to continue child's care. The researcher found that

provider availability, dental insurance, and family income were related to the frequency of planned dental visits. These results are different with respect to other studies where socioeconomic status and acculturation were the main predictors of health services use.

Lack of transportation

Lack of transportation is an additional structural barrier that Latino communities often face. Public transportation in some urban areas and especially in rural areas is usually inadequate. It is difficult for people to travel long distances in order to get a dental appointment. Older Latinos, Latino woman, and children are the most affected, because in most of the cases they depend on other family members for their transportation. Many times it is difficult for members of the family who drive to take time out from work in order to transport other members of the family to the dentist (45).

Maserejian et al in 2008 reported that in Boston one of the main predictors of underutilization of dental services was the distance from home to the clinic which is related to the difficulties with transportation. Latinos were identified as the group that was more likely to underutilize dental services when they were freely provided and the lack of transportation was an important barrier for this group (43).

Lack of a regular source of dental care

Lack of a regular source of care is a very important structural barrier, especially regarding preventive services. The lack of a dental home office makes it more difficult to provide any kind of preventive services. According to Vazquez

and Swan (2003), Latinos were less likely to have a regular source of care than any other racial and ethnic group in the country (46). When services were obtained, they were generally in response to pain, rather than for prevention.

A study by Macek et al (47) found that school children in Maryland were more likely to have a usual source of medical (96%) care than a usual source of dental care (83%). White and African-American children were more likely to have a regular source of dental care than Latinos. Data were obtained from the Survey of the Oral Health Status of Maryland School Children (2001). Children included in the analyses were Kindergarteners and third graders. One important feature of the study was the inclusion of two measures for utilization of dental service. The authors included a visit to the dentist in the last year and whether or not the visit involved preventive services like prophylaxis.

A study by Grembowski et al (48) estimated whether young low income children who had mothers with a regular source of dental care at baseline, were more likely to use dental services in the subsequent year. A baseline survey was given to mothers of low income children enrolled in Medicaid in the state of Washington aged 3 to 6 years (n=11305). One year later researchers analyzed children's dental use from Medicaid dental claims (2005) in the children of mothers who had a regular source of dental care (RSDC). Analysis was done in 4 racial/ethnic groups: Black (3791), Latinos (2806), White (1902), and other racial/ethnic groups (2806). Researchers found that 38% of mothers had a RSDC. Having a mother with a RSDC was associated with greater odds of receiving any dental care service in the next year for Latinos and black children.

Latino children received an average of 1.10 more preventive services when their mother had RSDC. The researchers concluded that having a mother with a RSDC increased used of dental services among Latino and black children. Having RSDC may help mothers to overcome some of the barriers to care for their children, especially the difficulties related to the low rate of dentist participating in Medicaid. Mothers with a RSDC may enroll their child more easily in the same dental office were they receive dental services.

Socio-cultural barriers

The increasing cultural diversity of the Latino population living in the United States may represent a challenge to oral care providers who are increasingly called upon to provide cultural competent services to this population. Socio-cultural barriers related to Latino populations include: Parent's level of education, health literacy, acculturation, provider's cultural competency, linguistic factors, and care-seeking behaviors (22,23), (23).

Parent's level of education

The educational level of Latinos is generally lower than the level of education of other groups living in the U. S., especially for undocumented immigrants. National data (26) regarding the educational attainment of Latinos 25 years and older indicate that 24% of Latinos in 2006 have less than 9th grade of education compared to 6% of the total population. Forty seven percent of Latinos in the country have earned high school diploma compared to 58% of the total population. In the state of Iowa the percentage of Latinos with high school education is higher (53%) than the national level (5).

The education of parents has been increasingly associated with better odds for children to access health care services. Parents who are educated tend to be more conscious about taking care of their children's teeth or to seek preventive services. A study by Flores et al (24) reported that sub-optimal health status of children from different racial/ethnic background in the U.S. was inversely associated with parental education and directly associated with poverty level. Maserejian et al reported than in rural Maine, underutilization of dental services for children was significantly associated with the level of education of parents (43).

A recent study by Noyce et al (49) analyzed data from the Medical Expenditure Panel Survey (MEPS) Household Component 2002-2004 for children 1-18 years of age from different racial/ethnic groups to investigate factors associated with two main outcome variables: Having a preventive dental visit in the indicated year (defined as having a check-up, cleaning, x-rays, fluoride, or sealants treatment) or a routine dental visit (define as preventive, restorative, surgical, or orthodontic care). Authors reported that the main factor associated with having a dental visit for either prevention or routine dental care was parental education. Compare to children of parents who do not have high school education, children of parents with more than high school have twice the odds of having a dental visit.

Health literacy

Health literacy is defined by the Institute of Medicine as "the degree to which individuals have the capacity to obtain, process, and understand basic

health information and services needed to make appropriate health decisions". Results from the 2003 National Assessment of Adult Literacy in the United States (50) reveled that there are important differences in the level of literacy of adults from different racial/ethnic groups. In general, whites and Asian/Pacific Islanders adults had higher average health literacy scores than African-Americans and Latinos. Latino adults had the lowest average health literacy score (197) from all racial groups. Important differences were found as well between adults who reported spoken only English before beginning school (higher scores) than those who reported spoken other languages. Poverty level was directly correlated to the health literacy level.

The 2003 assessment was done in more than 19,000 adults from ages 16 and older in households or prisons. Three literacy scales: prose, document, and quantitative scales, were used to measure clinical, prevention, and navigation of the health system. Four literacy levels were used for each scale: *Below basic, basic, intermediate,* and *proficient*. Forty one percent of Latinos participating in the assessment were classified in the *below basic* level (lowest group), followed by 25% of American Indian/Alaska Native, and 24% of African-Americans.

It is important to add that people with lower levels of literacy reported receiving more information about health issues from radio or television while people with higher levels of literacy got more information from written sources including the internet.

Acculturation

Research suggests that acculturation (the process to adapt to a new culture) influences Latinos' use of health services. Scott and Simile (29) reported that the use of dental care services for foreign-born Latinos increased with the number of years they had resided in the United States. People that were less acculturated (less adapted to the new culture), were less likely to use dental care services and to have dental insurance coverage than those with high levels of acculturation (29), (51). Stewart et al (52) found that among different subgroups of Latinos (e.g., Mexican-Americans, Cuban-Americans and Puerto Ricans), the ones ranking low on acculturation measures, such as language, had fewer visits to the dentist compared to the people ranking high on the same measures.

In a recent study, Jaramillo et al (53) analyzed data from Latino adults (aged ≥ 18 years) from the 2006 Behavioral Risk Factor Surveillance System (BRFSS) to assess the influence of acculturation in the use of dental services. Latino participants in the survey (n=21,958) had the opportunity to chose between doing the interview in English or Spanish. The language used for the interview was used as a proxy measure for acculturation. Dependent variable was having had a dental visit in the last 12 months. Logistic regression was used to determine if acculturation significantly predict the use of dental services. Authors reported that after controlling for age, sex, education, income, smoking status, marital status, and health care insurance, the language used in the interview was not significantly associated with having a dental visit in the last 12

months. Factors that were related to having a dental visit were income, education, sex, and having health insurance.

Provider's cultural competency

The cultural competency of providers is another important issue. According to Cruz et al (23), the term "cultural competency" embodies not only a familiarity with the sociopolitical situations and culturally influenced health beliefs, values, and behaviors of individuals in a community, but also the ability to communicate properly in their own language if necessary. A culturally competent dental home should be a place where all efforts are made to establish communication that promotes ongoing care (23).

In the year 1999, Latinos dentist accounted for 2.8% of the total dentist population in the U.S. However, it is important to note that not all dentists who are of Latino origin are able to communicate adequately in Spanish. The need to increase culturally competent providers that will give Latinos, especially children, a more pleasant and familiar experience is evident not only at the state but also the national level. In the state of Iowa just 1% of the physicians are of Latino origin (54), data related to the number of Latino dentists in the state is not available.

Linguistic Factors

In the United States approximately fifty five million of Americans (1 in 5) speak a language at home different than English. Latino immigrants are especially affected by the lack of ability to communicate in English with health providers. Interpreters, mainly in hospitals settings, have been used lately to

bridge the gap that may encourage more immigrants to seek needed health services. However, the lack of confidentiality and misinterpretation are still factors related to the use of interpreters. In the dental area, there are relatively few dental offices and clinics that can offer the use of an interpreter to help in the process of delivering services and even fewer dentists who can communicate in a language other than English. This communication barrier may affect greatly the health of Latino children.

A study by Flores et al (55) analyzed disparities in medical and oral health, access to care, and use of services among children from non-English-primary-language (NEPL) households in comparison with children from English-primary-language (EPL) households. Researchers analyzed data from the National Survey of Childhood Health (NSCH) 2003-2004. The NSCH is the largest and most diverse national database to date containing information related to primary language spoken at home. The NSCH used a telephone survey to interview parents of 102,353 children ages 0 to 17 years old from 50 states and the District of Columbia. Interviews were done in English and Spanish. The study included 7912 children from NEPL households, 83% of them (6591) were Spanish speaking households.

The authors reported that children from NEPL households were more likely to report their teeth to be in good or fair condition (56% vs. 26%), to be uninsured (27% vs. 6%), and to lack dental insurance (39% vs. 20%) than were children from EPL households. Nineteen percent of NEPL reported they have never seen a dentist compared to 13% of EPL children. Thirty four percent of

NEPL children reported that they had been more than one year without visiting the dentist. Using multivariate analysis, the researchers found that NEPL children had approximately double the odds of EPL children of unmet dental needs and more than triple the odds of unmet dental care needs due to the dentist not knowing how to treat or provide care to them. Among the group of children from NEPL households the authors compared the same variables within three specific racial/ethnic groups: Latinos, Asian and Pacific Islanders (API), and Whites. They found that Latino children were more likely to report teeth in fair/poor condition (29%), and to lack dental (41%) and health (29%) insurance. Approximately 25% of the parents of Latino children reported the need for an interpreter to speak with the child's health care provider vs. 6% of the parents of white children and 0.2% of the APIs children.

The authors mentioned some limitations of the study. First, researchers only collected information from households where the primary interviewee spoke English or Spanish fluently. The inclusion of households that spoke a language different than English or Spanish was limited, so the comparison between different racial/ethnic groups could be misleading. Second, study findings were based on self-reported information from parents or caregivers; no information was collected directly from primary physicians.

Overall, the results of the study suggest that NEPL children are at significantly higher risk of limited access to medical and dental care including preventive and treatment services. The authors suggest that providing health and dental insurance to this population may help to reduce financial barriers, but

there is also a need for improving outreach and enrollment interventions such as the use of community health workers. In summary, Latino children from households where the primary language spoken at home was not English were at higher risk of having poorer self-reported teeth conditions and suboptimal health, lack health and dental insurance, and have more unmet dental needs.

Recent studies by Noyce et al (49) investigate the relationship between primary language spoken at home and children's dental services utilization in the U.S. using data from the Medical Expenditure Panel Survey 2002-2004. Results from multivariate analysis showed no association between language barriers and routine or preventive dental services. However, the authors reported some evidence that children of parents with more than high school education are in disadvantaged to have any preventive visit if Spanish is the primary language spoken at home, but the limited number of Latino parents with more than high school education did not allow detecting any significant effect.

A different study by Flores et al (2005) suggested that parents' Limited English Proficiency (LEP), which is defined as a self-rating of the ability to communicate in English, may be a better indicator of the impact of language barriers in the health of children than the language spoken at home (56).

Even thought in the state of Iowa there is a limited number of Latinos compared to other states, during the year 2006, close to one hundred thousand (97876) children ages 5 and older, reported speaking Spanish at home. However, it is important to add that over half of this kids reported speaking

English “very well” (5). No data was found related to parental English proficiency in Iowa families.

Oral care seeking behaviors

Culture influences values as well as the attitudes and experiences of individuals with the dental care system. Culture also has an effect on decisions about whether or not to seek care and whether or not to follow a suggested treatment (23). Some studies suggest that Latino may perceive their health needs differently than other racial/ethnic groups because of different expectations of access according to their culture (29).

Kim Young (44) in her study regarding barriers to care among low income Latino children in the state of Illinois found that initiating dental care during the preschool years was significantly related to the mothers’ and their social network’s beliefs in the value of preventive dental care. Mothers were almost four times more likely to seek and continue treatment if she believed that dental visits would keep the child’s teeth healthy.

Qualitative Studies

The current literature shows an increased number of qualitative studies which aimed to identify factors that limited access to health care for different populations. Most of the qualitative studies targeting Latinos used focus groups. Focus groups are a very popular method of data collection among minority groups and are used to identify possible causes of health disparities directly from members of the community (45).

A series of focus groups were done by Cristancho et al (45) in rural Illinois. These researchers used a Community Based Participatory Action Research (CBPAR) approach which is and hybrid of two other different models, Community Based Participatory Research (CBPR) and Participatory Action Research (PAR). The main objective of the CBPAR model was “to empower communities by teaching (and learning with) them how to address their major health concerns through the use of partnerships that involve key community stake holders” (45). The vulnerability model was used as a framework to understand how and why the Latino population was vulnerable to poor health. The methodology used for the research was a blend of focus group and small group discussion that they called “focused small group discussion”. Focused small group discussions were conducted in Spanish. Findings reported in the study were basically from participants answering the following open-ended question: *what were the main barriers that they encountered when accessing and utilizing health care services in their community*. The study was conducted in three rural communities in Illinois which had a significantly increased number of Latino residents and some other specific inclusion criteria. The majority of participants were originally from Mexico with a small representation from other Latin American countries. All participants were age 18 years or older. Researchers conducted a total of 19 focused small group discussions with 181 participants during the years 2004 and 2005.

The authors reported that the most constant perceived barriers expressed by participants in the three communities were:

- Lack of health insurance: The newly arrived Latino immigrant group who could not speak English was the group of participants most likely to be uninsured. Immigrants that had lived in the U.S. for several years reported that the lack of required documents and the high cost of health insurance were the main barrier for them to get health insurance. Participants that were insured by their employers reported that major barriers were related to having limited insurance coverage for the other members of their families (wife and children). A considerable group of participants reported a lack of understanding regarding the health services for which they were eligible and how to access them.
- High cost of health services: It was reported as a strong limitation among participants in their ability to access health care as well as the lack of health care financing payments plans.
- Communication: Several communication issues were reported as very important barriers for Latinos to access health care. Some of the major concerns were language-related barriers. It was expressed by participants that their lack of skills to speak and understand English, the lack of professionals who can speak Spanish and the effectiveness of medical interpreters to meet their needs were very important language barriers that limited their ability to access care. Many people expressed that they had been forced to recruit friends and family members to act as interpreters but confidentiality and low quality of interpretation were major concerns in these cases.

- Immigration status: Another important barrier reported was the legal/documentation status of many Latinos and discriminatory attitudes of health providers.
- Transportation: Some of the issues reported as related to transportation were limited public transportation services in small towns and rural areas, the lack of driver's licenses and the high cost of gasoline.

Reported results from this study are important because information was collected directly from participants and put together to identify major barriers to care reported by Latinos in rural Illinois. Findings may be generalized to Latinos living in the state of Iowa because of its similar rural nature and proximity. However, it may not be applicable to Latinos living in other parts of the country like California or Texas, which are less rural.

To summarize findings from this review, the literature has demonstrated that access and utilization of dental care in Latino populations is affected by barriers related to the health system, the individual, and socio-cultural barriers. Some important barriers related to the health system are workforce issues, insufficient operating hours in dental offices, and transportation. Some factors related to individual barriers are the lack of dental insurance and the low income level of Latino families. The health system and individual barriers expressed in this review are usually common to other disadvantaged groups in the U.S. like African Americans or low income populations; however, socio-cultural barriers like language, cultural competency of providers, and acculturation, particularly affect the oral health of Latino children in the country.

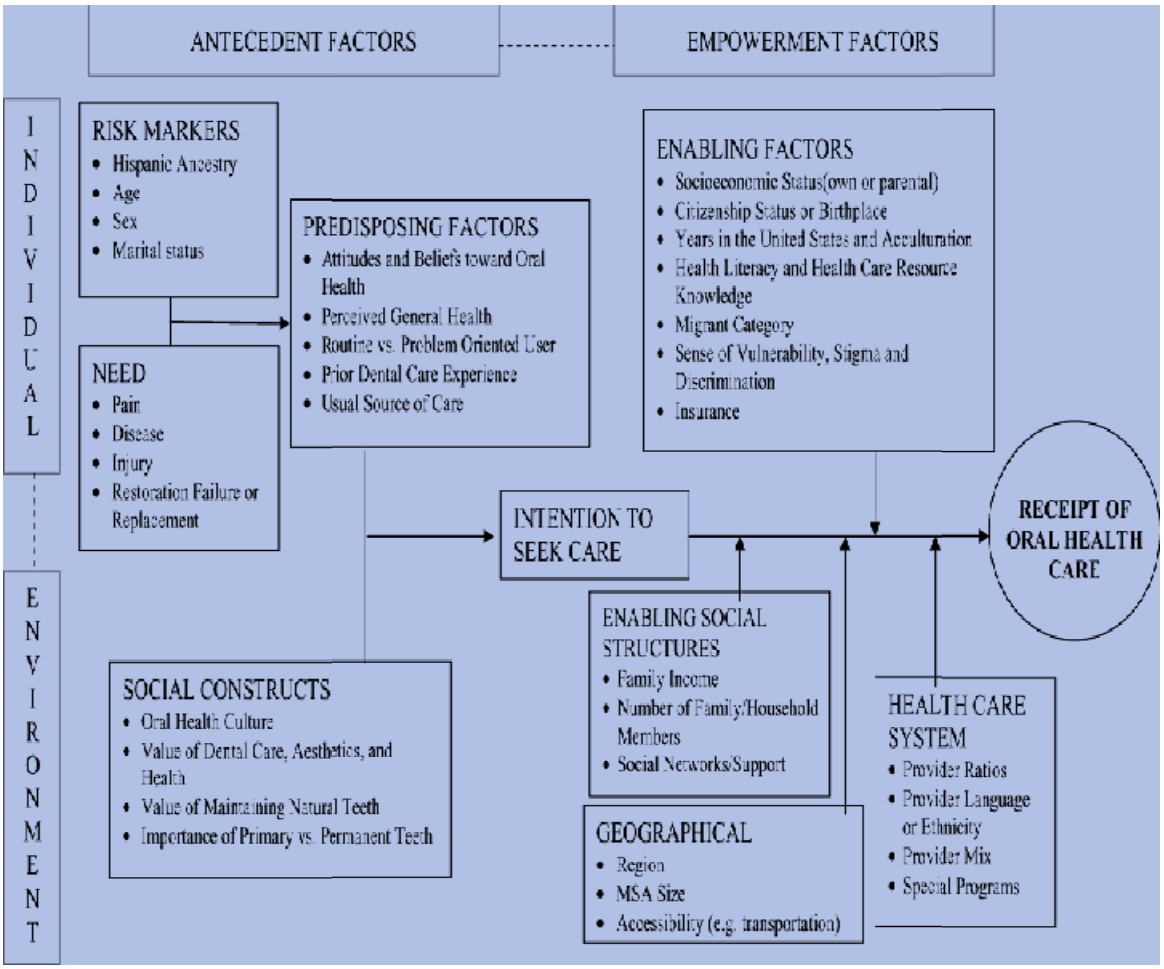
Framework for Utilization of Dental Services

A theoretical framework developed by Mejia et al in 2007 (57) emphasize about several factors that should be considered at the time to study the use of oral health care among Latinos living in the US and how this factors may be correlated. The framework was developed after an extensive literature review about factors that differ among ethnic groups. It was based on models from different fields of knowledge like the Andersen and Newman model of health services utilization, the “theory of planned behavior”, and the Precede-Proceed Planning model. The framework (Figure 1) is divided in individual and environmental constructs and each construct has antecedent factors that express the intention to seek care, and empowerment factors that act as mediators between the intention and the receipt of care. Factors included in individual antecedent factors are risk markers, need, and predisposing factors. Social constructs (population’s health culture) are included in the environmental antecedent factors. Individual empowerment factors include enabling factors that are very pertinent to Latino populations like socio-economic status, acculturation measures, insurance status, and health literacy among others. Finally environmental empowerment factors will include enabling social structures, geographical and health care system measures.

In the present study, “The conceptual framework for Hispanic oral health care” was used as a guide to identify factors that should be considered for inclusion in the study. The aim was not to validate the framework, but to use it as a guide for the analyses. No all factors mentioned in the framework were

included in the study because this is a secondary analysis of data that was already collected, but at least one factor for each domain was included. Specific domains for the present study will be explained in the methods section.

Figure 1. Proposed conceptual framework for the receipt of oral health care among Hispanics in the United States



CHAPTER III

METHODS

Overview

Even though the oral health of Americans has improved greatly in the last 50 years, some specific groups of the population have been left behind. Latinos, identified in this paper as U.S. people whose ancestors can be traced to the regions of Central and South America, México, and the Caribbean, bear a disproportionate burden of oral diseases, especially Latino children.

Latinos face many difficulties to access and utilize dental services. These difficulties are not only related to individual factors in this population like lower levels of socioeconomic status and education but also to organizational, structural and socio-cultural barriers like communication issues, immigration status, and acculturation.

Latino children, the fastest growing minority group of children in the US, are affected disproportionately by oral diseases like dental caries compared to other groups. Understanding the difficulties and barriers that these children have to utilize dental care will help us in the future to develop effective programs to reduce health disparities in this segment of the population.

The purpose of this study is to identify the factors that determine dental services access and utilization by children in the state of Iowa. The key analysis of interest will focus on comparisons of differences in utilization of dental services among different racial/ethnic groups. Additionally, the study will describe and compare difficulties in utilization of care among Latino children whose parents

answered the survey in English (LE) and those who answered it in Spanish (LS). In order to address these issues existing data from the Iowa Child and Family Household Health Survey 2005 (HHS) were analyzed.

Iowa Child and Family Household Health Survey 2005

The Iowa Child and Family Household Health Survey (IHHS) was conducted in 2000 and 2005. The purpose of the IHHS was to provide information for policymakers and health planners about different issues affecting the social and health status of children in the state. The 2005 survey was a collaboration of the Iowa Department of Public Health (IDPH) and the University of Iowa Public Policy Center (PPC). The project was funded by a grant from the Maternal and Child Health Bureau (MCHB), Health Resources and Services Administration, US Department of Health and Human Services.

The 2005 survey aimed to assess the health of children and families in Iowa as well as an array of different early childhood issues. The IHHS evaluated medical and dental insurance coverage of children and parents and assessed the health of racial and ethnic minority children in the state.

The IHHS was conducted using a population-based telephone interview that included almost 3,600 families plus and oversampling of underrepresented minority families. The survey instrument included approximately 125 questions and it was developed after reviewing other surveys such as the National Survey of American Families (NSAF) and the National Health Interview Survey (NHIS). Parents were given the option of completing the telephone interview in English or Spanish.

The study used a state-wide telephone interview. Data were collected by the University of Northern Iowa (UNI) Center for Social and Behavioral Research. Two different methods were used to get the dialed numbers. Seventy eight percent of the dialed numbers came from a target list of numbers obtained from a private vendor. Different sources were used to collect the target list (white pages, voter registration, magazines subscriptions, etc.). The other 22% of the numbers were randomly dialed. Interviewers asked if the number was connected to a private residence, if the answer was positive then they asked if at least one child was living in the residence. If the household has more than one child the computer chose one randomly. Just one child per household was included in the study. No incentives were given to participants. A total of 3,669 families with children in Iowa were interviewed initially.

The questionnaire included: demographics of children and parents, health status of children, health insurance coverage of children and parents, several health care issues (medical-dental care, behavioral and emotional health care, and emergency room use), child care, and family and social environment. The 2005 study had a particular emphasis in physical activity, nutrition, and different early childhood topics.

Oversample of racial/ethnic children

Initial sample results brought a small number of interviews concerning Latinos (79) and African-American (25) children. Oversampling was done to target communities that were more likely to have parents of racial and ethnic minority children. A total of 331 parents of children identified as African-American

(170) or Latinos (161) were added to the initial sample. A total of 105 Latino parents chose to be interviewed in Spanish (LS) and 135 in English (LE). For analysis purposes, Latinos were divided in two groups: parents of children who answered the survey in Spanish and parents who answered the survey in English.

Participants IHHS 2005

Participants in the IHHS were initially 3,532 families with children that lived in the state of Iowa. In addition, 331 families from minority groups (Latinos and African Americans), who were underrepresented in the initial sample, were oversampled in order to have a representation of at least 200 families from each group. Thus, a total of 3,863 families participated in the IHHS.

Respondents in the study were persons who reported knowing the most about the children living in the household. Seventy five percent of respondents were mothers, 20% were fathers, and 5% were other relatives such as grandparents (2%), step-parents (2%), and others (1%). Because 95% of respondents were identified as the mother or father of the children, we referred to study respondents as parents.

Latino children whose parents answered the survey in Spanish (LS) accounted for 31% of the children under the age of 5, and 37% of the children between 5 to 9 years old (Table 2). Seventy five percent of LS children lived under the 200% federal poverty level, and LS children were identified as the poorest group among the four groups included. Fifty percent of the parents of LS children had achieved an 8th grade level of education or less, compared to 4% of

LEI, 2% of African American and 0% whites, and thirty eight percent of parents of LE children had achieved some college education.

Parents were informed that their participation in the study was voluntary and confidential. They were notified that all their responses would remain anonymous; all responses would be grouped with responses from other families and would never be reported individually. Parents did not report the name of any child; children were only identified by age and gender to protect their identity.

Study sample

Participants in the present study were 3,288 families in Iowa with children 3 to 17 years of age. Children less than 3 years of age were excluded from the study because 78.4% of them have never visited the dentist before (Table 2).

The UI Institutional Review Board (IRB) and the Iowa Department of Public Health (IDPH) approved the present study which was a secondary analysis of data from the 2005 IHHS.

Primary research question

The primary aim of this study was to determine what factors were related to how recent a child had his/her last dental check-up.

Especial emphasis was given to the effect of race ethnicity in utilization of dental services as well as the factors related to utilization for each racial/ethnic group.

Hypothesis

In order to answer the primary research question, the following hypotheses were stated in terms of null hypotheses.

There is no significant relationship between how recent a child had his/her last dental check-up in Iowa and:

a. Child race/ethnicity (African-American, white, Latino)
b. Language used in the interview (English or Spanish)
c. Family income
d. Caregiver level of education
e. Caregiver marital status
f. Number of household members
g. Family living in an urban or rural area
h. Family living in an area designated as Dental HPSA
i. Child age
j. Child medical insurance status
k. Child dental insurance status
l. Caregiver rating of child overall oral health status
m. Child having a regular source of dental care
n. Child brushing habits
o. Child having a dental care need in the last 12 months
p. Caregiver rating of the importance of having good dental health

Variables

The original survey included 125 items related to different health and social topics. This study is based on eleven oral health questions as well as some questions related to general health and demographic information (Appendix 1). Description of the variables is provided as follows:

Dependent variable

The dependent variable was the time since the child last had a dental check-up. Answers were recorded as: “less than 12 months ago”, “between 1 and 2 years ago”, “more than 2 years ago”, and “child has never been to the dentist”. This variable was then collapses into two categories: “Having a dental check-up less than 12 months ago” and “having a dental check-up more than 12 months ago, including never”.

Independent variables

Independent variables were organized following the “Conceptual Framework for Hispanic Oral Health Care” proposed by Mejia et al (57). Figure 2 shows the framework for utilization of dental services among children in Iowa. For analyses purposes, independent variables were organized in four main blocks: individual antecedent factors, environmental antecedent factors, individual empowerment factors, and environmental empowerment factors. Each block will have one or several domains.

Individual antecedent factors

Risk Markers

a. Race and ethnic classification

   Parents answered several questions regarding their race/ethnicity as well as their children’s race. Questions were similar to the ones used in the Census 2000.

   i. Ethnicity: Is child from Hispanic or Spanish origin? The question was intended to identify Latino children.

ii. Race: Race of the child. Several options were given, parents were able to choose more than one: “African-American”, “white”, “American-Indian/Native American/Aleutian” or “Eskimo, Asian/Pacific Islander”, and “Other (specify)”.

Latino children who were identified just with one race were classified as Latinos. Children identified as Latinos with more than one race were not included in this study. The same criteria were used to classify caregiver’s race and ethnicity.

b. Child age: Continuous variable 0-17 years of age. Variable was collapse in three categories: “3-6 years”,”7-12 years” and “13-17 years”. Children between 0-2 years old were not included in the study.
c. Parent’s age: Continuous variable collapsed in 4 categories: “0-29”, “30-39”, 40-49”, and “50+”.
d. Child sex: Categorical variable: “male” and “female”.
e. Marital status: Several options were given: “Married”, “divorced”, “widowed”, “separated”, “never married”, and “marriage-liked relationship”. Variable was collapsed in 2 categories: “Married” and “no married”.

Need factors

a. Dental care need: Child had any dental need in the past 12 months including routine dental check-ups. Answer recorded as “yes” or “no”.

b. Kind of need: Kind of dental need. Three options were given: “check-up or cleaning”, “Emergency dental care”, “other treatment such as fillings”.

c. Recoded dental need: The two mentioned variables, dental care need and kind of dental need, were collapsed as one variable with four options: “No dental need in the last 12 months”, need of “check-up or cleaning”, need of “emergency dental care”, or need of “other treatment such as fillings”.

Predisposing factors

a. Health status: Rating child’s overall health. Answers were recorded as: “excellent”, “very good”, “good”, “fair”, and “poor”. Variable was collapsed in three categories: “excellent”, “very good”, “good/fair/poor”.

b. Dental health status: Rating child’s overall dental health. Answers were recorded as: “excellent”, “very good”, “good”, “fair”, and “poor”. Variable was collapsed in three categories: “excellent”, “very good”, “good/fair/poor”.

c. Regular source of medical care: Child has a personal doctor or nurse where he usually goes for health needs. Answer recorded as “yes” or “no”.

d. Regular source of dental care: Child has a main place where he usually goes for dental care. Answer recorded as “yes” or “no”.

e. Brushing habits: On average how many times the child brushed his /her teeth with or without parents help. Answers were recorded as:

"once", "twice", "three or more times", and "teeth are not brushed". Variable was collapse into: "once", "twice", "three or more times".

Environmental antecedent factors

Social constructs

a. Importance of dental health: Importance of having good oral health compared to other health issues. Answers were recorded as: "more important", "just as important", "less important".

Individual empowerment factors

Individual enabling factors

a. Medical insurance: Child has any kind of health insurance. Answer was recorded as "yes" or "no".
b. Kind of medical insurance: Several options were given: "Your employer", "someone else's employer", "purchased plan", "Hawk-I", "Medicaid", "military/CHAMPUS/VA, "another source".
c. Recoded child medical insurance: Variables "a" and "b" were collapsed in 3 categories: "uninsured", "public insurance", and "private insurance".
d. Parent's medical insurance: Parent has any kind of health insurance. Answers recorded as "yes" or "no".
e. Kind of medical insurance: Same options as child medical insurance.
f. Recoded parent medical insurance: Variables "d" and "e" were collapse in 3 categories: "uninsured", "public insurance", and "private insurance".

g. Dental insurance: Child has any insurance that covered dental care. Answers recorded as “yes” or “no”.

h. Parent level of education: Highest level of education completed by parents. Answers recorded as: “8th grade or less”, “some high school, but did not graduate”, “high school graduate or GED”, “some college or 2-year degree”, “4-year college graduate”, and “more than 4-year college graduate”.

   Variable was collapsed in 4 categories: “Less than high school”, “high school graduate or GED”, “some college or 2-year degree”, “4-year college graduate or more”.

Environmental empowerment factors

Enabling social structures

a. Family income: Total income of all persons living in the household over the past year. Answers were recorded in 17 different categories starting $0 to $5,000. Each category increased by $5,000, with the highest category being $80,000 or more. Responses were collapsed into 4 categories: “Less than $25,000”, “between $25,000 to $50,000”, “between $50,000 to $75,000”, and “more than $75,000”.

b. Household number: Number of people living in household including children and adults. Recorded as a continuous variable from 2 to 7 or more.

Geographical variables

a. Rural/Urban: Based on zip code given during the interview, participants were classified as living in: “mostly rural area”, “urban with adjunction”, and “metro/urban area”.

Health care system

a. Dental Health Professionals Shortage Area (HPSA): Using participants zip code given during the interview and designated Dental Health Professionals Shortage Areas (DHPSA) in Iowa from the U.S. Department of Health and Human Services, Health Resources and Services Administration, participants we classified as living in a “DHPSA designated area” or “no DHPSA designated area”.

Statistical Analysis

The dependent variable for the study was utilization of dental services. This outcome variable was dichotomized as whether or not the child had a dental visit in the last year (yes/no). Characteristics of study subjects were first analyzed through descriptive statistics.

Subsequently bivariate analyses were conducted to assess the association between the dependent variable, the time of the last dental check-up, and independent variables grouped within each of the eight different domains under each block: risk markers, need, predisposing factors, enabling factors, enabling social structures, geographical, health care system, and social construct. The standard chi-square test and Fisher’s exact test were used for nominal categorical variables, the Wilcoxon rank-sum test, were used, as

appropriate, to compare the groups (yes/no the time of last dental check-up) with respect to ordinal variables and quantitative measures.

A total of 18 variables showed significantly ($p \leq 0.10$) in the bivariate analysis were considered candidates for logistic regression models. The multiple logistic regression models were developed to identify factors associated with the time of last dental check-up initially within each of the eight domains. Variables that showed significant results ($p \leq 0.05$) in domain-specific regression models were used to build a final model using forward stepwise logistic regression analysis, verified by backward elimination.

The Homer and Lemeshow Goodness-of-Fit test was used to evaluate the goodness of the model fit. Multicollinearity analysis was conducted in both domain-specific and final logistic regression analyses.

From the analyses of the regression model, seven variables were found associated with having a dental visit in that last year, race/ethnicity was not included. To understand better the role of race regarding time of last dental visit, an unadjusted model was developed between race and the main outcome variable (time of last dental visit) followed by simple logistic regressions using race/ethnicity as an explanatory variable for variables that were found significant in the first logistic analyses. For a final model, variables identified as significant for utilization of dental services in the first logistic model were entered in a simple logistic model that included race. Additionally, logistic regression models were performed for each independent race/ethnic group (whites, African-Americans,

Latinos English, Latinos Spanish) to identify factors associated to dental utilization for each group.

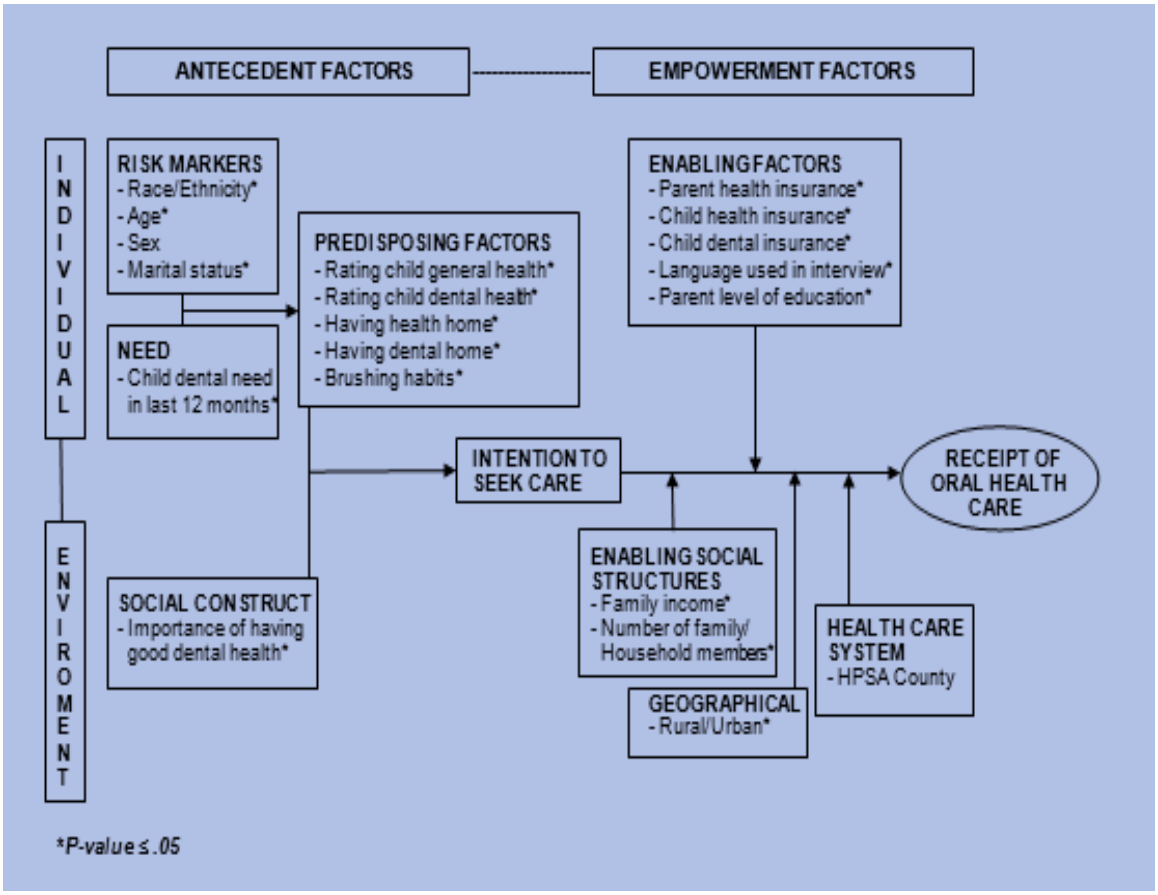
Table 1. Descriptive statistics of last dental check-up by age categories 1-17 years of age IHHS 2005 (n=3719)

	1-2 Years	3-6 Years	7-12 Years	13-17 Years	Total %
Last dental check-up					
<12 months	19.0	78.0	92.2	91.0	79.3
1-2 years	2.6	4.6	5.8	6.6	5.3
>2 years	0.0	1.1	1.2	2.2	1.3
Never	78.4	16.3	0.8	0.2	14.1

Table 2. Demographic characteristics of participants in the Iowa Child and Family Household Health Survey 2005 (n=3863)

	African-Americans (%)	Latinos English (%)	Latinos Spanish (%)	White (%)	Total (%)
Age groups					
0-4 years	24	29	31	24	24
5-9 years	22	30	37	28	28
10-14 years	30	23	20	28	27
15-17 years	25	18	11	20	20
Total (n)	195	135	105	3428	3863
Federal poverty Level					
Up to 133% fpl	34	7	29	3	5
134%-200% fpl	20	16	46	9	10
200+% fpl	46	77	25	88	85
Total (n)	146	109	59	3013	3327
Parent's education					
8th grade or less	2	4	50	0	2
Some high school	6	10	18	1	2
High School or GED	36	27	22	20	22
Some college/ 2-yr degree	37	38	6	35	35
4-yr college grad	13	14	3	30	28
More than 4-yr degree	6	8	2	12	12
Total (n)	195	135	105	3428	3863

Figure 2. Framework for utilization of dental services among children in Iowa, 2010



CHAPTER IV

RESULTS

Introduction

Findings from this study are presented in five main sections. The first section contains descriptive statistics of independent variables by each racial/ethnic group. The second section includes results of bivariate analysis regarding association between time of last dental check-up, outcome of interest, and the independent variables. The third section describes the modeling stage with having a dental visit in the last year as the main outcome. Section four describes the effect of race/ethnicity over the dependent variable, and the last section explains factors related to utilization of dental services for each racial/ethnic group. Each section is organized using four main blocks from our theoretical model for oral health disparities: individual antecedent factors, environmental antecedent factors, individual empowerment factors, and environmental empowerment factors; and eight domains: risk markers, need, predisposing factors, enabling factors, enabling social structures, geographical, health care system, and social construct.

Descriptive Statistics by Race/Ethnicity

The target population for the study was families with children in the state of Iowa. The study included 3288 children from four different racial/ethnic groups (Table 3). White children constituted 89% of the sample population and African-American children 5.1%. Latinos were divided into two different groups: Latino children whose parents answered the survey in English (LE), and those who

answered the survey in Spanish (LS). LE children accounted for 3.4% of sample population and LS children for 2.4%. All possible independent variables are summarized in the following section by racial/ethnic groups as well as the main dependent variable.

Dependent Variable

Table 4 shows the distribution of different racial/ethnic groups regarding time of last dental check-up. Sixty six percent of LS children visited the dentist last year compared to more than eighty percent of LE children, African-Americans, and whites.

Independent Variables

Individual Antecedent Factors

Table 5 summarized racial/ethnic data related to three domains included in this block: risk markers, need, and predisposing factors.

Risk Markers

Variables included in this domain are: child age categories, child sex, and marital status of parents. Forty percent of LS children were younger children (3-6 years) while almost half (46.7%) of the African-American children were in the older category (13-17 years). Child sex was the only variable from all the domains that was not significantly associated to race/ethnicity (*p=0.705*). All other variables are significantly associated with race ethnicity ($p \leq 0.05$).

Need

Child dental need in the last 12 months is the only variable included in this domain. Almost 41% of African-American children reported not having any dental need in the last 12 months compared to 24% of whites and over 30% of Latinos. However, AA children reported more emergency needs (3.6%) than any other group. The LS children reported more need of dental treatment (17.5%). All variables in this domain were significantly associated with race/ethnicity (*p≤0.001*).

Predisposing Factors

Variables included in the domain are: rating of child general and dental health, having a regular source of medical and dental care, and brushing habits. The LS group reported the poorest rating in child general health (good/fair/poor 48.8%) and child dental health (good/fair/poor 76.6%). In the same way, the LS group reported the highest percent of children with no regular source of medical (43%) and dental care (23.8%). However, LS children reported having better oral health habits than any other group. Thirty three percent of LS children brushed their teeth three times a day or more and 49% of them reported brushing two times a day. Over two thirds of white and LE children brushed their teeth two times a day, as well as 56% of AA children.

Environmental Antecedent Factors

Social Constructs

Table 6 summarizes racial/ethnic data related to the social constructs domain. Thirty two percent of AA parents considered oral health more important

than other health issues. Most parents in general agreed that dental health was just as important as any other health issue.

Individual Empowerment Factors

Enabling Factors

Table 7 shows racial/ethnic data related to the enabling factors domain included in this block. Almost 35% of LS children reported not having health insurance compared to 11% of LE children and less than 6% of AA. Almost half (48%) of AA children had public insurance. Ninety percent of white children reported having private insurance. Regarding parent's health insurance, over two thirds (66%) of LS parents did not have any health insurance and AA had the highest percentage of parents who had public health insurance (29%). Ninety percent of AA children had dental insurance compared to 63% of LS children. The level of education of parents indicated that more than 50% of AA, LE and white parents had some college education (2-y or 4y degree), while 67% of LS parents reported having less than a high school education.

Environmental Empowerment Factors

Table 8 summarizes racial/ethnic information regarding three domains included in the environmental empowerment factors block, these are: enabling social structures, geographical, and health care system.

Enabling Social Structures

Income Level

Over 50% of LS families and 43% of AA families reported annual family income of less than $25,000. In contrast 43% of white families reported an income of more than $75,000.

Geographical

Ninety nine percent of AA families participating in the study lived in a metro/urban area compared to 50% of LE families and over 50% of LS and white families. Few families reported living in rural areas, 18% of whites, 15% of LS, and 10% of LE.

Health care system

Ninety eight percent of AA families were living in areas designated as a dental HPSA in Iowa, followed by 71% of LS families, 59% of LE families, and 51% of whites.

To summarize descriptive information by racial/ethnic groups, LS participants reported the smallest proportion of children who had a dental visit last year; AA had the highest proportion of children with no dental need in the last 12 months. There were a high proportion of parents of LS children who perceived the oral health and general health of their children as good/fair/poor. However, LS children reported better brushing habits that any other group. A higher proportion of AA parents considered dental health more important than other health issues. The highest proportion of medically-dentally uninsured was represented by LS children; however, AA children had the highest percentage of

children with public health insurance. Parents of LS children represented the highest proportion with less than a high school education while whites had the highest proportion of parents who were highly educated. The lowest family income level was for LS and AA children while whites had the higher family income. Most AA participants lived in metro/urban areas of Iowa designated as Dental HPSA's. All variables presented were significantly correlated ($p \leq 0.05$) with race/ethnicity except the child sex.

Bivariate Analysis

Crosstabulations of the outcome variable (time of last dental check-up) with all independent variables were developed. Table 9 shows simple descriptive statistics of the outcome variable of interest. The overall percentage of participants reporting having a dental check-up in the last 12 months was 87.9%, 5.9% reported having a check-up 1-2 years ago, 1.5% 2 or more years ago and 4.7% had never had a dental check-up. Separate tables for each block of variables were created to assess the association between the dependent variable and each of the independent variables that may be considered for the final model. Chi-square test was used to evaluate the association of each independent variable with time of last dental visit (outcome variable). In the tables, significant *p-values* are identified with bold text (alpha=0.05).

Individual Antecedent Factors

Table 10 summarizes data for time to last dental visit as related to three domains included in this block: risk markers, need, and predisposing factors.

Risk Markers

Variables included in this domain are: child race/ethnicity, child age categories, child sex, and marital status of parents. All variables were significantly associated to time of last dental check-up (*p≤0.001*) except child sex (*p=0.631*). Children 3-6 years of age were least likely to have had a visit to the dentist (77.7%) last year, as compared to children between 7-12 years (92%) and 13-17 years (89.8%). There was no difference between male and female children regarding utilization of dental services. Children from parents who were married were more likely to visit the dentist for a check-up last year (88%) than children from parents who were not married (83%).

Need

Having a dental need in the last 12 months was significantly associated (p≤.001) with having a dental check-up during the last year. Sixty five percent of those participants who did not have any dental need last year visited the dentist to have a check-up. Almost ninety five percent of people, who expressed having a dental need last year, visited the dentist to have a dental check up, emergency visit, or dental treatment. “Need” could mean any type of perceived need from emergency dental care to a check-up/cleaning.

Predisposing Factors

Participants who rated their general health as excellent were more likely to visit the dentist in the last year (89%) as compared to those who rate their health as very good or good/fair/poor (84%). In the same way, participants who rated their dental health as excellent were more likely to visit the dentist last year

(91.8%) than those who rated it as good/fair/poor (78.8%). Those participants who expressed having a regular source of medical care were more likely to visit the dentist last year (88.6%) than those who don't have it (74%). Similarly, having a regular source of dental care was strongly associated with having a dental check-up last year. Participants who brushed their teeth two times a day were more prone to have a dental visit (89.7%) than those who brushed once a day (82.8%).

Environmental Antecedent Factors

Social Construct

The relationship between the importance of dental health compared to other health issues and visiting the dentist for a dental check-up last year is shown in Table 11. The highest prevalence of having a dental check-up was among participants who considered dental health just as important as any other health issue (87.9%).

Individual Empowerment Factors

Enabling Factors

Table 12 presents crosstabulations between time of last dental check-up and four variables included in this domain. In general, having health insurance increased the likelihood of parents and children to visit the dentist last year (88%). The highest prevalence of visiting the dentist last year was among those who had dental insurance (90.4%). The likelihood of visiting the dentist last year increased significantly for children whose parents had higher levels of education.

Environmental Empowerment Factors

Table 13 presents crosstabulations between time of last dental check-up and enabling social constructs, geographical, and health care system factors. All three domains were significantly correlated to the outcome variable.

Enabling Social Structures

This domain included family income and household number. As the income level of the family increased, the likelihood to visit the dentist for a dental check-up increased as well. Families who had an income level of <$25,000 had a lower proportion with a visit to the dentist in the last year (74.6%) than those families who had an income level of >$75,000 (92.9%). Household number was significantly associated with having a dental check-up in the last 12 months (*p=0.009*).

Geographical

Metro/urban residents were more likely to have had a dental check-up last year (89%) than urban children near urban areas (85.8%) or mostly rural residents (83.6%).

Health Care System

Participants who lived in areas not designated as a dental health professional shortage area (D-HPSA) were more likely to have a dental visit last year (89%) than those who lived in areas designated as a D-HPSA (86%).

In summary, these bivariate analyses indicated that younger children (3-6 years) were least likely to have had a dental visit in the last year than any other group. Participants who had any dental need were more prone to visit the dentist

than those who did not have one. Having a regular source of medical or dental care was highly associated with visiting the dentist last year, as well as having any medical or dental insurance. Lower parent's level of education as well as lower family income were directly associated with a lower proportion of dental visits last year. Metro/urban residents reported a higher proportion with a dental visit in the last year than rural residents. All variables presented in this section were significantly associated ($p \leq 0.05$) with time of last dental visit except child sex.

Modeling

Variables showing significant association with the primary outcome –time of last dental check-up in the bivariate analysis ($p \leq 0.05$) were used to develop a final model using forward stepwise logistic regression analysis, and verified by backward elimination.

Multicollinearity analysis was conducted to examine significant correlations between some independent variables. The rating of child general health was significantly correlated with the rating of child dental health (Table 14). Child having a regular source of medical care was significantly correlated with child having a regular source of dental care (Table 15). Parent health insurance status was significantly correlated to child health insurance status (Table 16). After examining the importance of each of these variables regarding the outcome variable, three of them were retained in the model: the rating of child dental health, having a regular source of dental care, and child dental insurance status.

Table 17 displays the results from the logistic regression model exploring the association of fifteen variables with time of last dental check-up using forward stepwise logistic regression analyses. A parsimonious model was developed using the seven significant variables from the stepwise regression. Table 18 summarizes the final model.

The results indicated that those who were age 3-6 years only ($p \leq 0.001$), had no dental need ($p \leq 0.001$), rated child dental health as good/poor/fair ($p \leq 0.001$), had no regular source of dental care ($p \leq 0.001$), brushed their teeth once a day ($p = 0.002$), had no dental insurance ($p \leq 0.001$), and had a family income of less than $25,000 ($p = 0.009$) were significantly less likely to report having a dental check-up in the last 12 months.

Compared to children who were in age group 3-6 years, children between 7-12 years were 3.00 times as likely to report having a dental check-up last year, and children 13-17 years old were 2.14 times as likely. Compared to children who did not have any dental need last year, children who had an emergency need had 11.49 times the odds of having a dental visit, children with a restorative treatment need had 11.87 times the odds, and those who had a check-up/cleaning need had 7.33 times the odds of having a dental check-up last year. Compared to children whose oral health was rated as good/fair/poor, children who had an excellent rating in oral health were 3.45 times as likely to report having a dental visit, and children who reported having very good oral health were 1.92 times as likely to visit the dentist.

Children who had a regular source of dental care had 15.21 times the odds of having a dental check-up last year. Compare to children who brushed their teeth once a day, children who brushed twice a day were 1.53 times as likely to have a visit, and children who brushed three times or more were 2.06 times as likely to have a dental visit. Participants who had dental insurance were 2.11 times as likely to have a dental check-up last year as those who did not have it. Compared to children of families who have an income of less than $25,000, children from families with an income of more than $75,000 were 2.08 times as likely to have a visit, children with a family income between $50,000 to $75,000 were 1.67 times as likely, and the difference between the reference group and those with a family income between $25,000 to $50,000 was not significant (*p=0.135*).

Race/ethnicity Effect on Utilization of Dental Care

Special interest has been place in this study to understand the role of race/ethnicity in the utilization of dental services by Iowa children. Results from the final logistic regression model showed that race/ethnicity was not directly correlated to having a dental check-up in the last year after adjusting for variables in the model. However, as showed in the initial descriptive statistics by race/ethnicity, race was significantly associated with all variables included in the model. In this section we are presenting the procedures we followed to understand the role of race/ethnicity with the outcome variable of interest.

Initially, an unadjusted (crude) model was done to assess the association of race/ethnicity with time of last dental check-up (Table 19). Race/ethnicity was

significantly associated with time of last dental visit (*p≤0.001*). Latino Spanish children were 75% less likely to have had a dental visit last year than whites, AA children were 45% less likely to have a dental visit than whites, and LE children were 40% less likely to visit the dentist last year than whites.

Contingency tables were developed to evaluate the association of race with the seven significant variables from the final logistic model: regular source of dental care, dental insurance status, dental need, income, rating of dental health, age categories, brushing habits. Results showed that race was significantly correlated with all them. Simple logistic models were developed to assess the relationship of race/ethnicity as an explanatory variable for these seven outcome variables.

Race was found to have a strong association with four of the seven variables: having a regular source of dental care (*p≤0.001*), dental insurance status (*p≤0.001*), family income (*p≤0.001*), and having a dental need (*p≤0.001*). Table 20 shows results of the regression model between race and regular source of dental care. Compared to whites, LE children were 77% less likely to have a regular source of care, AA were 81% less likely, and LS children were 87% less likely to have a dental home. Table 21 is showing the relationship between race and dental insurance. AA children are more likely than whites to have dental insurance (OR 2.28); however, LS children were 58% less likely than whites to have dental insurance. The difference between LE children and whites was not significant (*p=0.771*). Table 22 summarizes data related to family income. AA and LS children were 82% less likely than whites to have a family income

between $25,000 and $50,000; African American children were 95% less likely to have had a family income between $50,000 and $75,000; and LS children were 100% less likely than whites to have had a family income of more than $75,000. Table 23 presents data for having a dental need in the last 12 months. Results show significant probabilities for the three categories: check-up/cleaning (*p≤0.001*), emergency (*p≤0.001*), and a need for treatment or fillings (*p≤0.001*).

Finally, the parsimonious model that was presented before including the seven significant variables from the initial stepwise logistic regression was run again, but this time race/ethnicity was included in the model. The procedure was done to test the effect of race in the main outcome variable as well as in the seven significant variables from the initial logistic model. Results from this regression are presented in Table 24. Race was not significantly associated with having a dental check-up (*p=0.229).* The effect of race was analyzed looking at changes in the odds ratios of the seven variables. Results showed that the variables that are mainly affected by race are: having a regular source of dental care, family income, dental insurance status, and having a dental need. The odds ratio from having a regular source of dental care changed from 15.20 to 16.61. This variable is the one that was more affected by the presence of race in the model. The probability value for family income was reduced from (*p=0.009*) to (*p=0.004*) and the odds ratio increased in its 3 categories. In the same way, dental insurance status changed from 2.11 to 2.04. The odds for children having a dental need changed in its 3 categories: check-up/cleaning (7.33 to 7.47), emergency (12.48 to 12.27), and treatment/fillings (11.87 to 12.04). The odds

ratios for the other three variables: child age, rating of dental health, and brushing habits, basically remained the same.

Results from the regression model suggest a direct association of race with having a regular source of dental care, family income, dental need, and dental insurance status; but an indirect effect over the main outcome variable (time of last dental check-up) through this other variables. Figure 3 summarizes this relationship.

Factors Related to Utilization of Dental Services for Each Racial/Ethnic Group

Knowing that the sample population for this study was mainly represented by white children, it was considered important to assess if the seven factors associated with the time of last dental check-up were the same for each racial/ethnic group. Bivariate analysis of the main outcome variable with all independent variables was done to determine variables that may be considered for inclusion in the model ($p \leq 0.1$) for each racial/ethnic group separately. Statistically significant variables from the bivariate analysis were entered in a simple logistic regression for each of the eight domains for each racial/ethnic group. Statistically significant variables for each domain ($p \leq 0.05$) were entered in a final simple logistic model for each racial/ethnic group.

Whites

Table 25 shows simple descriptive statistics of the initial outcome variable of interest for white children. The overall percentage of white children reporting having a dental check-up in the last 12 months was 88.7%, 5.3% reported having

a check-up 1-2 years ago, 1.2% 2 or more years ago and 4.8% have never had a dental check-up. Separate tables for each block of variables were created to assess the association between the dependent variable and each of the independent variables that may be considered for the final model. Chi-square tests were used to evaluate the association of each independent variable with time of last dental visit. Significant association was determined using a probability value of ≤*0.1*. In the tables, significant *p-values* are identified with bold text.

Individual Antecedent Factors

Table 26 summarizes data related to three domains included in this block: risk markers, need, and predisposing factors.

Risk Markers

Variables included in this domain were: child age categories (*p≤0.001*), child sex (*p=0.527*), and marital status of parents (*p≤0.006*). All variables were significantly associated to time of last dental check-up for whites except child sex.

Need

Having a dental need in the last 12 months was significantly associated *(p≤0.001)* to having a dental check-up during the last year.

Predisposing Factors

All variables included in this domain were significantly associated with the outcome variable. Parents rating of child general health (*p≤0.001*), parents rating of child dental health (*p≤0.001*), having a regular source of medical health

(*p=0.027*), having a regular source of dental care (*p≤0.001*), and brushing habits (*p≤0.001*).

Environmental Antecedent Factors

Social Construct

The relationship between the importance of dental health compared to other health issues and visiting the dentist for a dental check-up last year were not statistically significant (*p=0.246*) for white children (Table 27).

Individual Empowerment Factors

Enabling Factors

Table 28 presents crosstabulations between time of last dental check-up and four variables included in this domain: child health insurance, parent health insurance, child dental insurance, and parent level of education. All variables were significantly correlated to the outcome (*p≤0.001*).

Environmental Empowerment Factors

Table 29 presents crosstabulations for three domains: enabling social constructs, geographical and health care system factors. For the enabling social constructs domain, family income was associated to the outcome (*p≤0.001*) but not family household number (*p≤0.106*). The geographical domain was significantly correlated to time of last visit (*p≤0.001*) but not the D-HPSA variable (*p≤0.182*) from the health care system domain.

In summary, bivariate analyses showed significant association between time to last dental visit and eleven variables that were included in the initial modeling stage. Those were: having dental insurance, having a regular source of

dental care, brushing habits, having a dental need last year, having medical insurance, family income, the rating of child dental health, marital status of parents, parent's level of education, and geographical location.

Modeling

Eleven variables identified as statistically significant in the bivariate analysis were entered separately in a simple logistic regression by domains. Variables that showed significance probabilities of equal or less than 0.05 in each domain were entered in a final regression. The same seven variables that were associated with having a dental visit in the last year for the whole population were found significant for white children (Table 30).

Results from the logistic regression indicated that those who were in age 3-6 years only ($p \leq 0.001$), had no dental need ($p \leq 0.001$), rated child dental health as good/poor/fair ($p \leq 0.001$), had no regular source of dental care ($p \leq 0.001$), brushed their teeth once a day ($p = 0.002$), had no dental insurance ($p \leq 0.001$), and had a family income of less than $25,000 ($p = 0.052$) were significantly less likely to report having a dental check-up in the last 12 months.

Compared to children who were in age group 3-6 years, children between 7-12 years were 3.89 times as likely to report having a dental check-up last year, and children 13-17 years old were 2.69 times as likely. Compared to children who did not have any dental need last year, children who had a treatment need had 15.96 times the odds of having a dental visit, children with an emergency need had 14.92 times the odds, and those who had a check-up/cleaning need had 7.9 times the odds of having a dental check-up last year. Compared to

children whose oral health was rated as good/fair/poor, children who had an excellent rating in oral health were 3.38 times as likely to report having a dental visit, and children with a rating of very good oral health were 1.65 times as likely.

Children who had a regular source of dental care had 26.48 times the odds of having a dental check-up last year than those who did not have a regular source of dental care. Compared to children who brushed their teeth once a day, children who brushed twice a day were 1.47 times as likely to have a visit. The difference with children who brushed three times or more was not significant. Participants who had dental insurance were 1.77 times as likely to have a dental check-up last year as those who do not have dental insurance. Compared to children of families who had an income of less than $25,000, children from families with an income of more than $75,000 were 2.21 times as likely to have a dental visit. The difference with the other two income groups was not significant.

African-Americans

Table 31 shows simple descriptive statistics of the initial outcome variable for African-American children. The overall percentage of AA children reporting having a dental check-up in the last 12 months was 84%, 9.2% reported having a check-up 1-2 years ago, 3.7% 2 or more years ago and 3.1% have never had a dental check-up. Separate tables for each block of variables were created to assess the association between the dependent variable and each of the independent variables that may be considered for the final model. Chi-square tests were used to evaluate the association of each independent variable with

time of last dental visit. Significant association was determined using a probability value of ≤*0.1*. In the tables, significant *p-values* are identified with bold text.

Individual Antecedent Factors

Table 32 summarizes data related to the three domain included in this block.

Risk Markers

None of the variables included in this domain were associated with the outcome variable for AA children. Child age categories (*p≤0.703*), child sex (*p=0.631*), and marital status of parents (*p≤0.789*).

Need

Having a dental need in the last 12 months was significantly associated *(p=0.004)* to having a dental check-up during the last year for AA children.

Predisposing Factors

Having a regular source of medical (*p≤0.001*) and dental care (*p≤0.001*) were significantly associated with having a dental check-up for AA children. Parents rating of child general (*p≤0.351*) and dental health (*p≤0.183*), and brushing habits (*p≤0.319*) were not associated with having a dental visit.

Environmental Antecedent Factors

Social Construct

The relationship between the importance of dental health compared to other health issues and visiting the dentist for a dental check-up last year was not significant (*p=0.204*) for AA children (Table 33).

Individual Empowerment Factors

Enabling Factors

Table 34 presents crosstabulations for the four variables included in this domain. Child health and dental insurance status were correlated with the outcome variable (*p≤0.001*). Parent health insurance (*p=0.424*) and parent level of education (*p≤0.584*) were not.

Environmental Empowerment Factors

Table 35 presents crosstabulations for three domains: enabling social constructs, geographical and health care system factors. None of the domains showed significant associations with having a dental check-up for AA children.

In summary, bivariate analyses showed significant associations for five variables that were included in the initial modeling stage: Having dental insurance, having a regular source of dental care, having a dental need last year, having medical insurance, and the age of the children.

Modeling

Three variables that showed significance probabilities of equal or less than *0.05* in the individual domain regressions were entered in a final model (Table 36). Child dental need in the last 12 months, having a regular source of dental care, and dental insurance status were variables associated with utilization of dental care for AA children. Compared to children who didn't have a dental need, children needing a dental check-up were 5.18 times as likely to visit the dentist last year and children who had and emergency need were 5.92 times as likely to have a dental visit. Children with a regular source of dental care were 20.83

times as likely to have a dental check-up as those without regular source of care. AA children with dental insurance had 10.56 times the odds to visit the dentist last year compared to those without dental insurance.

Latinos English Interview

Table 37 shows descriptive statistics of the initial outcome variable of interest for LE children. The overall percentage of LE children that reported having a dental check-up in the last 12 months was 83.8%, 7.2% reported having a check-up 1-2 years ago, 4.5% 2 or more years ago and 4.5% had never had a dental check-up. Separate tables for each block of variables were created to assess the association between the dependent variable and each of the independent variables that may be considered for the final model.

Individual Antecedent Factors

Table 38 summarizes data related to risk markers, need, and predisposing factors.

Risk Markers

All variables included in this domain were not significantly related to dental utilization for LE children. Child age categories ($p=0.127$), child sex ($p=0.436$), and marital status of parents ($p\leq0.378$).

Need

Having a dental need in the last 12 months was significantly associated *($p=0.002$)* to having a dental check-up during the last year for LE children.

Predisposing Factors

All variables included in this domain were significantly associated with the outcome variable. Parents rating of child general health (*p≤0.017*), parents rating of child dental health (*p≤0.001*), having a regular source of medical care (*p≤0.001*) and dental care (*p≤0.001*), and brushing habits (*p≤0.025*).

Environmental Antecedent Factors

Social Construct

For LE children, the importance of dental health compared to other health issues was not significantly correlated to visiting the dentist for dental check-up (*p=0.246*) (Table 39).

Individual Empowerment Factors

Enabling Factors

Table 40 presents crosstabulations for four variables included in this domain: Child health insurance (*p=0.003*), parent health insurance (*p≤0.026*), child dental insurance (*p≤0.012*), and parent level of education (*p≤0.012).* All variables were significantly correlated to the outcome.

Environmental Empowerment Factors

Table 41 presents crosstabulations for three domains: enabling social constructs, geographical and health care system factors. None of them were significantly associated to having a dental visit.

In summary, bivariate analyses showed significant association for six variables that were included in the initial modeling stage. Those were: having dental insurance, having a regular source of dental care, having a dental need

last year, having medical insurance, the rating of child dental health, and parent's level of education.

Modeling

Six variables identified as significant in the bivariate analysis were entered separately in a simple logistic regression by domains. Variables that showed significance probabilities of equal or less than 0.05 in each domain were entered in a final regression. Table 42 shows the only variable that was significantly associated with visiting the dentist for LE children. LE children who had a regular source of dental care were 7.72 times as likely to visit the dentist as those who didn't have regular source of care.

Latinos Spanish Interview

Table 43 summarizes descriptive statistics of the initial outcome variable for LS children. The overall percentage of LE children that reported having a dental check-up in the last 12 months was 68.8%, 19.5% reported having a check-up 1-2 years ago, 6.5% 2 or more years ago, and 5.2% had never had a dental check-up. Separate tables for each block of variables were created to assess the association between the dependent variable and each of the independent variables that may be considered for the final model.

Individual Antecedents Factors

Table 44 summarizes data related to risk markers, need, and predisposing factors for LE children.

Risk Markers

From this domain the only variable that was significantly associated to dental visits was child age categories (*p=0.005*). Child sex and marital status of parents were not significant.

Need

Having a dental need in the last 12 months was significantly associated *(p≤0.001)* to having a dental check-up for LS children.

Predisposing Factors

Three of the five variables included in this domain were significantly related to having a dental visit: parents rating of child dental health (*p=0.002*), having a regular source of medical (*p≤0.001*) and dental care (*p≤0.001*). The rating of child general health and brushing habits were not significant.

Environmental Antecedent Factors

Social Construct

For LS children, the importance of dental health compared to other health issues was not significantly correlated to visiting the dentist for dental check-up (*p=0.145*) (Table 45).

Individual Empowerment Factors

Enabling Factors

Table 46 presents crosstabulations for four variables included in this domain. Child health insurance status (*p=0.004*) and child dental insurance status (*p≤0.012*) were significantly correlated to the outcome of interest.

Environmental Empowerment Factors

Table 47 presents crosstabulations for three domains: enabling social constructs, geographical and health care system factors. None of them were significantly associated to having a dental visit for LE children.

In summary, bivariate analyses showed significant associations (*p≤0.1)* for seven variables that were included in the initial modeling stage. Those were: having dental insurance, having a regular source of dental care, having a dental need last year, having medical insurance, the rating of child dental health, age categories, and parent's level of education.

Modeling

Seven variables identified as significant in the bivariate analysis were entered separately in a simple logistic regression by domains. Variables that showed significance probabilities of equal or less than 0.05 in each domain were entered in a final regression. Table 48 shows that only two variables were significantly associated with visiting the dentist last year for LS children. LS children who had a regular source of dental care were 13.70 times as likely to visit the dentist as those who did not have it. Compared to children 3-6 year of age, 7-12 years old were 95% less likely to visit the dentist for regular check-up last year, and 13-17 years old were 88% less likely.

Summary of findings

A summary of findings from the results chapter is presented in Figure 4. Seven factors were related to the time of the last dental visit for Iowa children: having a regular source of dental care, dental insurance status, having a dental

need in the past 12 months, brushing habits, the age of the children, and family income. The same seven factors were correlated to having a dental visit for white children. For African-American children, having a regular source of dental care, dental insurance status, and having a dental need in the last 12 months were the factors that were found associated to the time of the last dental check-up. For the Latino Spanish children, having a regular source of dental care and the age of the children were factors associated to dental utilization. Finally, for the Latino English children, the only factor associated with having a dental visit was having a regular source of dental care.

Table 3. Racial/ethnic distribution of study participants (n=3288)

Race	Number	Percent
African American	169	5.1
LE	113	3.4
LS	80	2.4
White	2926	89
Total	3288	100

Table 4. Descriptive statistics of time of last dental check-up by race/ethnicity

	Race/ethnicity				
Dependent Variable	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Time last dental check-up					**<0.001**
< 12 months	137(81.1)	93 (82.3)	53 (66.2)	2590 (88.5)	
> 12 months	32 (18.9)	20 (17.7)	27 (33.8)	336 (11.5)	

Table 5. Individual antecedent factors by race/ethnicity

	Race/ethnicity				
Risk Markers	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Child age categories					**0.002**
3-6 years	42 (24.9)	40 (35.4)	32 (40.0)	765 (26.2)	
7-12 years	48 (28.4)	38 (33.6)	29 (36.2)	1063 (36.3)	
13-17 years	79 (46.7)	35 (31.0)	19 (23.8)	1098 (37.5)	
Child sex					0
Male	82 (48.5)	57 (50.4)	37 (46.2)	1507 (51.5)	.705
Female	87 (51.5)	56 (49.6)	43 (53.8)	1419 (48.5)	
Marital status					**<0.001**
Married	73 (43.2)	90 (76.6)	52 (65.0)	2569 (87.8)	
No Married	96 (56.8)	23 (20.4)	28 (35.0)	357 (12.2)	
Need	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Child dental need in the last 12 months					**<0.001**
No need	69 (40.8)	34 (30.4)	26 (32.5)	706 (24.2)	
Check up/cleaning	71 (42.0)	58 (51.8)	40 (50.0)	1728 (59.1)	
Emergency	6 (3.6)	3 (2.7)	0 (0.0)	48 (1.6)	
Treatment/fillings	23 (13.6)	17 (15.1)	14 (17.5)	440 (15.1)	
Predisposing factors	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Rate child general health					**<0.001**
Excellent	82 (48.5)	65 (57.5)	29 (36.3)	1876 (64.1)	
Very good	46 (27.2)	27 (23.9)	12 (15.0)	791 (27.0)	
Good/fair/poor	41 (24.3)	21 (18.6)	39 (48.8)	259 (8.9)	
Rate child dental health					**<0.001**
Excellent	61 (36.1)	40 (35.4)	10 (12.4)	1239 (42.3)	
Very good	47 (27.8)	42 (37.2)	9 (11.3)	1067 (36.5)	
Good/fair/poor	61 (36.1)	31 (27.4)	61 (76.3)	620 (21.2)	
Regular source of medical care					**<0.001**
Yes	142(85.0)	95 (84.1)	45 (57.0)	2734 (93.7)	
No	25 (15.0)	18 (15.9)	34 (43.0)	185 (6.3)	
Regular source of dental care	141(83.4)	96 (85.7)	61 (76.3)	2810 (96.2)	**<0.001**
Yes	28(16.6)	16 (14.3)	19 (23.8)	110 (3.8)	
No					

Table 5. Continued

Predisposing Factors	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Brushing habits					**<0.001**
Once a day	45 (26.6)	32 (28.6)	14 (17.7)	901 (31.0)	
Twice	95 (56.2)	70 (62.5)	39 (49.4)	1852 (63.8)	
Three or more	29 (17.2)	10 (8.9)	26 (32.9)	150 (5.2)	

Table 6. Environment antecedent factors by race/ethnicity

	Race/ethnicity				
Social constructs	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Importance of dental health compared to other health issues					**<0.001**
More important	54 (32.1)	18 (16.0)	14 (17.9)	166 (5.7)	
Just as important	110(65.5)	90 (80.4)	60 (76.9)	2579 (88.3)	
Less important	4 (2.4)	4 (3.6)	4 (5.2)	174 (6.0)	

Table 7. Individual empowerment factors by race/ethnicity

	Race/ethnicity				
Enabling factors	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Child health insurance					**<0.001**
Uninsured	9 (5.4)	12 (10.8)	27 (34.6)	47 (1.6)	
Public insurance	79 (47.6)	18 (16.2)	25 (32.1)	245 (8.5)	
Private insurance	78 (47.0)	81 (73.0)	26 (33.3)	2607 (89.9)	
Parent health insurance					**<0.001**
Uninsured	28 (17.6)	18 (16.5)	48 (65.8)	162 (5.6)	
Public insurance	46 (28.9)	12 (11.0)	1 (1.3)	77 (2.7)	
Private insurance	85 (53.5)	79 (72.5)	24 (32.9)	2648 (91.7)	
Child dental insurance					**<0.001**
Yes	147(90.2)	87 (79.1)	49 (62.8)	2340 (80.2)	
No	16 (9.8)	23 (20.9)	29 (37.2)	577 (19.8)	
Parent level of education					**<0.001**
Less than HS	13 (7.7)	16 (14.2)	54 (67.5)	40 (1.4)	
HS or GED	56 (33.1)	30 (26.5)	21 (26.2)	615 (21.0)	
Some college/ 2 year degree	66 (39.1)	43 (38.1)	3 (3.8)	1046 (35.7)	
4 year degree or more	34 (20.1)	24 (21.2)	2 (2.5)	1225 (41.9)	

Table 8. Environment empowerment factors by race/ethnicity

	Race/ethnicity				
Enabling social structures	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Income categories					**<0.001**
Less than $25,000	71 (42.5)	23 (20.5)	40 (51.3)	146 (5.0)	
Between $25,0000 to $50,000	57 (34.1)	32 (28.6)	32 (41.0)	634 (21.7)	
Between $50,0000 to $75,000	25 (15.0)	33 (29.5)	5 (6.4)	897 (30.8)	
More than $75,000	14 (8.4)	24 (21.4)	1 (1.3)	1238 (42.5)	
Geographical	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Geographic area					**<0.001**
Metro/Urban	167(98.8)	56 (49.6)	41 (51.2)	1649 (56.3)	
Urban with adj.	2 (1.2)	46 (40.7)	27 (33.8)	757 (25.9)	
Mostly rural	0 (0.0)	11 (9.7)	12 (15.0)	520 (17.8)	
Health care system	**AA # (%)**	**LE # (%)**	**LS # (%)**	**Whites # (%)**	***p-value***
Dental HPSA					**<0.001**
Yes	166(98.2)	67 (59.3)	57 (71.2)	1489 (50.9)	
No	3 (1.8)	46 (40.7)	23 (28.8)	1437 (49.1)	

Table 9. Descriptive statistics of outcome variable time of last dental check-up

Last dental check-up	**Number**	**Percent**
<12 months	2873	87.9
1-2 years	192	5.9
2 or more years	51	1.5
Never	154	4.7
Total	3270	100

Table 10. Individual antecedent factors by last dental check-up

	Last dental check-up		
Risk Markers	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child race/ethnicity			**<0.001**
African- American	137 (81.1)	32 (18.9)	
Latino English	93 (82.3)	20 (17.7)	
Latino Spanish	53 (66.3)	27 (33.8)	
White	2590 (88.5)	336 (11.5)	
Child age categories			**<0.001**
3-6 years	683 (77.7)	196 (22.3)	
7-12 years	1085 (92.1)	93 (7.9)	
13-17 years	1105 (89.8)	126 (10.2)	
Child sex			0.631
Male	1466 (87.1)	217 (12.9)	
Female	1407 (87.7)	198 (12.3)	
Marital status			**0.001**
Married	2455 (88.2)	329 (11.8)	
No Married	418 (82.9)	86 (17.1)	
Need	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child dental need in the last 12 months			**<0.001**
No need	548 (65.6)	287 (34.4)	
Check up/cleaning	1796 (94.7)	101 (5.3)	
Emergency	54 (94.7)	3 (5.3)	
Treatment/fillings	472 (95.5)	22 (4.5)	
Predisposing factors	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Rate child general health			**<0.001**
Excellent	1830 (89.2)	222 (10.8)	
Very good	740 (84.5)	136 (15.5)	
Good/fair/poor	303 (84.2)	57 (15.8)	
Rate child dental health			**<0.001**
Excellent	1239 (91.8)	111 (8.2)	
Very good	1025 (88.0)	140 (12.0)	
Good/fair/poor	609 (78.8)	164 (21.2)	
Having medical home			**<0.001**
Yes	2671 (88.6)	345 (11.4)	
No	194 (74.0)	68 (26.0)	

Table 10. Continued

Predisposing factors	< 12 months # (%)	> 12 months # (%)	*p-value*
Having dental home			**<0.001**
Yes	2825 (90.9)	283 (9.1)	
No	45 (26.0)	128 (74.0)	
Brushing habits			**<0.001**
Once a day	821 (82.8)	171 (17.2)	
Twice	1845 (89.7)	211 (10.3)	
Three or more	187 (87.0)	28 (13.0)	

Table 11. Environmental antecedent factors by last dental check-up

	Last dental check-up		
Social constructs	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Importance of dental health compared to other health issues			0.053
More important	210 (83.3)	42 (16.7)	
Just as important	2495 (87.9)	344 (12.1)	
Less important	157 (84.4)	29 (15.6)	

Table 12. Individual empowerment factors by last dental check-up

	Last dental check-up		
Enabling factors	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child health insurance			**<0.001**
Yes	2819 (88.4)	369 (11.6)	
No	51 (53.7)	44 (46.3)	
Parent health insurance			**<0.001**
Yes	2682 (88.5)	350 (11.5)	
No	191 (74.6)	65 (24.4)	
Child dental insurance			**<0.001**
Yes	2370 (90.4)	253 (9.6)	
No	491 (76.1)	154 (23.9)	
Parent level of education			**<0.001**
Less than HS	84 (68.3)	39 (31.7)	
HS or GED	611 (84.6)	111 (15.4)	
Some college/ 2 year degree	1005 (86.8)	153 (13.2)	
4 year degree or more	1173 (91.3)	112 (8.7)	

Table 13. Environment empowerment factors by last dental check-up

	Last dental check-up		
Enabling social structures	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Income categories			**<0.001**
Less than $25,000	209 (74.6)	71 (25.4)	
Between $25,0000 to $50,000	618 (81.9)	137 (18.1)	
Between $50,0000 to $75,000	850 (88.5)	110 (11.5)	
More than $75,000	1186 (92.9)	91 (7.1)	
Geographical	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Geographic area			**0.001**
Metro/Urban	1705 (89.1)	208 (10.9)	
Urban with adj.	714 (85.8)	118 (14.2)	
Mostly rural	454 (83.6)	89 (16.4)	
Health care system	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Dental HPSA			0.**013**
Designated	1531 (86.1)	248 (13.9)	
No designated	1342 (88.9)	167 (11.1)	

*Household number was significantly correlated to time of last dental check-up (p=0.009)

Table 14. Crosstabulation of the rating of child general health by the rating of child dental health

	Rate Dental Health			
Rate Medical Health	**Excellent**	**Very Good**	**Good/fair/poor**	***p-value***
Excellent	1031(76.4)	656 (56.3)	365 (47.2)	**<0.001**
Very Good	230 (17.0)	409 (35.1)	237 (30.7)	
Good/fair/poor	89 (6.6)	100 (8.6)	171 (22.1)	

Table 15. Crosstabulation of child having a regular source of medical care by child having a regular source of dental care

	Dental Home		
Medical Home	**Yes**	**No**	***p-value***
Yes	2884 (93.0)	126 (73.7)	**<0.001**
No	216 (7.0)	45 (26.7)	

Table 16. Bivariate analysis of parent health insurance by child health insurance

	Child Medical Insurance		
Parent Health Insurance	**Yes**	**No**	***p-value***
Yes	3006 (94.3)	23 (24.2)	**<0.001**
No	182 (5.7)	72 (75.8)	

Table 17. Results from forward stepwise logistic regression model for time of last dental check-up

Variable	**<12 Months (%)**	**>12 Months (%)**	**Odds Ratio (95% CI)**	***p-value***
Child Age				**<0.001**
7-12 years	92.1	7.9	2.94 (2.10, 4.107)	<0.001
13-17 years	89.8	10.2	2.20 (1.61, 2.99)	<0.001
3-6 years	77.7	22.3	1.00	
Child Dental Need				**<0.001**
Check up/cleaning	94.7	5.3	7.41 (5.56, 9.86)	<0.001
Emergency	94.7	5.3	12.48 (3.33, 46.63)	<0.001
Treatment/fillings	95.5	4.5	11.74 (7.05, 19.56)	<0.001
No need	65.6	34.4	1.00	
Rate Child Dental				**<0.001**
Excellent	91.8	8.2	3.41 (2.40, 4.83)	<0.001
Very good	88.0	12.0	1.95 (1.40, 2.71)	<0.001
Good/Fair/Poor	78.8	21.2	1.00	
Having Dental Home				**<0.001**
Yes	88.6	11.4	14.74 (9.36, 23.19)	
No	74.0	26.0	1.00	
Brushing Habits				**0.010**
Twice	89.7	10.3	1.47 (1.11, 1.94)	0.006
Three or more	87.0	13.0	1.83 (1.01, 3.30)	0.44
Once	82.8	17.2	1.00	
Child Dental Insurance				**<0.001**
Yes	90.9	9.1	2.08 (1.56, 2.77)	
No	26.0	74.0	1.00	
Income Categories				**0.006**
Between $25,0000 to $50,000	81.9	18.1	1.44 (0.93, 2.22)	0.103
Between $50,0000 to $75,000	88.5	11.5	1.73 (1.11, 2.68)	0.015
More than $75,000	92.9	7.1	2.16 (1.38, 3.38)	0.001
Less than $25,000	74.6	25.4	1.00	

*Hosmer and Lemeshow Goodnees-of-Fit Test (*p=0.992*)

Table 18. Parsimonious model including seven significant variables from the forward stepwise logistic regression

Variable	**<12 Months**	**>12 Months**	**Odds Ratio (95% CI)**	***p-value***
Child Age				**<0.001**
7-12 years	92.1	7.9	3.00 (2.14, 4.19)	<0.001
13-17 years	89.8	10.2	2.14 (1.57, 2.91)	<0.001
3-6 years	77.7	22.3	1.00	
Child Dental Need				**<0.001**
Check up/cleaning	94.7	5.3	7.33 (5.51, 9.75)	<0.001
Emergency	94.7	5.3	12.48 (3.33, 46.75)	<0.001
Treatment/fillings	95.5	4.5	11.87 (7.12, 19.78)	<0.001
No need	65.6	34.4	1.00	
Rate Child Dental				**<0.001**
Excellent	91.8	8.2	3.44 (2.43, 4.88)	<0.001
Very good	88.0	12.0	1.92 (1.38, 2.66)	<0.001
Good/Fair/Poor	78.8	21.2	1.00	
Having Dental Home				**<0.001**
Yes	88.6	11.4	15.20 (9.68, 23.89)	
No	74.0	26.0	1.00	
Brushing Habits				**0.002**
Twice	89.7	10.3	1.53 (1.16, 2.01)	0.002
Three or more	87.0	13.0	2.06 (1.15, 3.70)	0.015
Once	82.8	17.2	1.00	
Child Dental Insurance				**<0.001**
Yes	90.9	9.1	2.11 (1.58, 2.80)	
No	26.0	74.0	1.00	
Income Categories				**0.009**
Between $25,0000 to $50,000	81.9	18.1	1.39 (0.92, 2.14)	0.135
Between $50,0000 to $75,000	88.5	11.5	1.67 (1.079, 2.59)	0.021
More than $75,000	92.9	7.1	2.07 (1.33, 3.24)	0.001
Less than $25,000	74.6	25.4	1.00	

*Hosmer and Lemeshow Goodnees-of-Fit Test (*p=0.947)*

Table 19. Unadjusted (crude) model for Last Dental Check-up by Race/Ethnicity

Parameter	Odds ratio	*p-value*
Last dental check-up		**<0.001**
African-Americans	0.55	0.004
Latino English Interview	0.60	0.046
Latino Spanish Interview	0.25	<0.001
White	1.00	

Table 20. Logistic regression for having a regular source of dental care by race/ethnicity

Parameter	Odds ratio	*p-value*
Dental Home		**<0.001**
African-Americans	0.19	<0.001
Latino English Interview	0.23	<0.001
Latino Spanish Interview	0.13	<0.001
White	1.00	

Table 21. Logistic regression for dental insurance by race/ethnicity

Parameter	Odds ratio	*p-value*
Dental Insurance		**<0.001**
African-Americans	2.26	0.002
Latino English Interview	0.93	0.771
Latino Spanish Interview	0.42	<0.001
White	1.00	

Table 22. Logistic regression for family income by race/ethnicity

Parameter	Odds ratio	*p-value*
Between $25,000 to $50,000		**<0.001**
African-Americans	0.18 (0.12, 0.27)	<0.001
Latino English Interview	0.32 (0.18. 0.56)	<0.001
Latino Spanish Interview	0.18 (0.11, 0.30)	<0.001
White	1.00	
Between $50,000 to $75,000		**<0.001**
African-Americans	0.05 (0.03, 0.09)	<0.001
Latino English Interview	0.23 (0.13, 0.40)	<0.001
Latino Spanish Interview	0.20 (0.008, 0.05)	<0.001
White	1.00	
More than $75,000		**<0.001**
African-Americans	0.02 (0.01, 0.04)	<0.001
Latino English Interview	0.12 (0.06, 0.22)	<0.001
Latino Spanish Interview	0.003 (0.00, 0.02)	<0.001
White	1.00	

*Reference category: Less than $25,000

Table 23. Logistic regression for dental need by race/ethnicity

Parameter	Odds ratio	p-value
Check-up or cleaning		**<0.001**
African-Americans	0.42 (0.29, 0.59)	
Latino English Interview	0.69 (0.45, 1.07)	
Latino Spanish Interview	0.62 (0.38, 1.03)	
White	1.00	
Emergency		**<0.001**
African-Americans	1.27 (0.52, 3.09)	
Latino English Interview	1.29 (0.38, 4.37)	
Latino Spanish Interview	NA	
White	1.00	
Other treatment as fillings		**<0.001**
African-Americans	0.53 (0.32, 0.87)	
Latino English Interview	0.80 (0.44, 1.45)	
Latino Spanish Interview	0.86 (0.44,1.67)	
White	1.00	

*Reference category: No dental need

Table 24. Parsimonious model including seven significant variables from the backwards stepwise logistic regression and race/ethnicity

Variable	**<12 Months**	**>12 Months**	**Odds Ratio (95% CI)**	***p-value***
Child Age				**<0.001**
7-12 years	92.1	7.9	3.01 (2.15, 4.21)	<0.001
13-17 years	89.8	10.2	2.10 (1.54, 2.87)	<0.001
3-6 years	77.7	22.3	1.00	
Child Dental Need				**<0.001**
Check up/cleaning	94.7	5.3	7.47 (5.56, 9.96)	<0.001
Emergency	94.7	5.3	12.27 (3.33, 45.19)	<0.001
Treatment/fillings	95.5	4.5	12.04 (7.22, 20.07)	<0.001
No need	65.6	34.4	1.00	
Rate Child Dental				**<0.001**
Excellent	91.8	8.2	3.46 (2.43, 4.94)	<0.001
Very good	88.0	12.0	1.92 (1.38, 2.68)	<0.001
Good/Fair/Poor	78.8	21.2	1.00	
Having Dental Home				**<0.001**
Yes	88.6	11.4	16.61 (10.42, 26.47)	
No	74.0	26.0	1.00	
Brushing Habits				**0.004**
Twice	89.7	10.3	1.53 (1.15, 2.01)	0.003
Three or more	87.0	13.0	2.01 (1.10, 3.67)	0.022
Once	82.8	17.2	1.00	
Child Dental Insurance				**<0.001**
Yes	90.9	9.1	2.04 (1.53, 2.72)	
No	26.0	74.0	1.00	
Income Categories				**0.004**
Between $25,0000 to $50,000	81.9	18.1	1.54 (0.97, 2.43)	0.063
Between $50,0000 to $75,000	88.5	11.5	1.90 (1.18, 3.07)	0.008
More than $75,000	92.9	7.1	2.39 (1.47, 3.88)	<0.001
Less than $25,000	74.6	25.4	1.00	
Race/ethnicity				0.229
African-Americans	81.1	18.9	1.6 (0.934, 2.99)	0.084
Latinos English	82.3	17.7	1.58 (0.77, 3.26)	0.211
Latinos Spanish	66.2	33.8	0.97 (0.45, 2.08)	0.973
Whites	88.5	11.5	1.00	

*Hosmer and Lemeshow Goodnees-of-Fit Test (*p=0.996*)

Figure 3. Indirect effect of race/ethnicity on time of last dental check-up

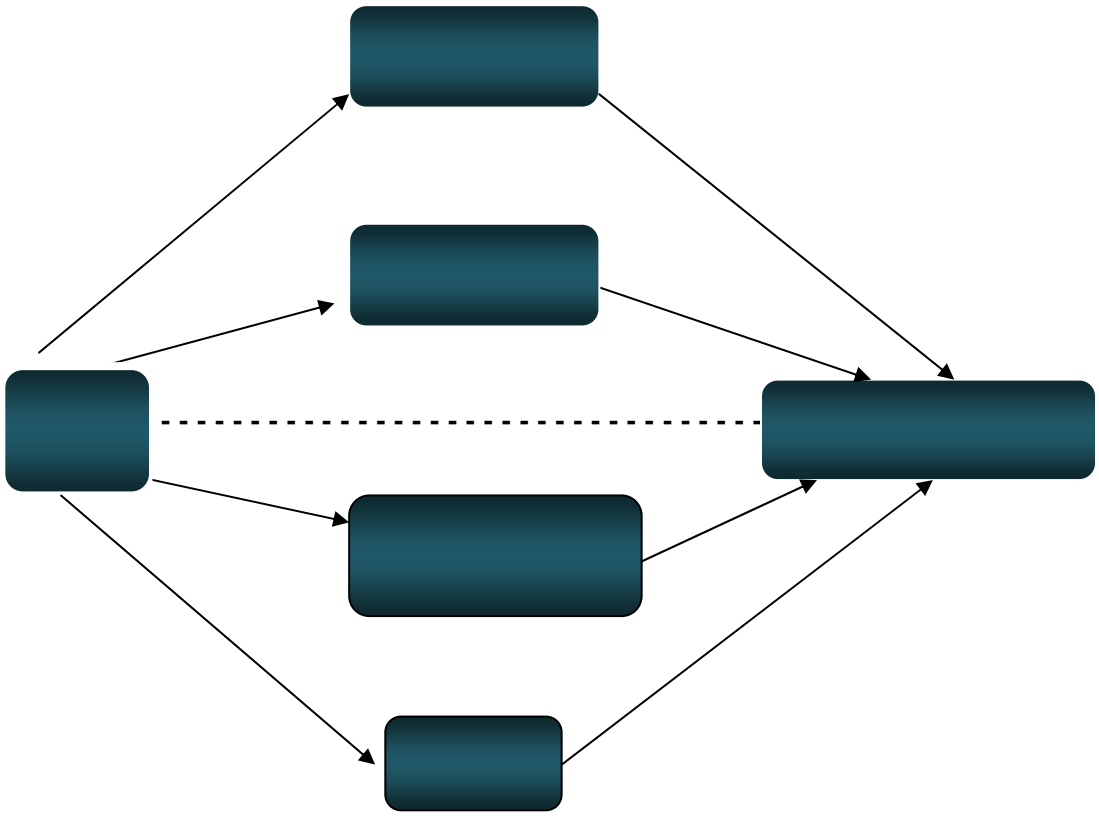


Table 25. Descriptive statistics for time of last dental check-up for whites

Last dental check-up	Number	Percent
<12 months	2590	88.7
1-2 years	154	5.3
2 or more years	35	1.2
Never	140	4.8
Total	2919	100

Table 26. Individual antecedent factors by time of last dental check-up for whites

	Last dental check-up		
Risk Markers	***< 12 months # (%)***	***> 12 months # (%)***	***p-value***
Child age categories 3-6 years 7-12 years 13-17 years	 588 (76.9) 993 (93.4) 1009 (91.9)	 177 (23.1) 70 (6.6) 89 (8.1)	**<0.001**
Child sex Male Female	 1328 (88.1) 1262 (88.9)	 179 (11.9) 157 (11.1)	0.527
Marital status Married No Married	 2290 (89.1) 300 (84.0)	 279 (10.9) 57 (16.0)	**0.006**
Need	***< 12 months # (%)***	***> 12 months # (%)***	***p-value***
Child dental need in the last 12 months No need Check up/cleaning Emergency Treatment/fillings	 469 (66.4) 1646 (95.3) 46 (95.8) 426 (96.8)	 237 (33.6) 82 (4.7) 2 (4.2) 14 (3.2)	**<0.001**
Predisposing factors	***< 12 months # (%)***	***> 12 months # (%)***	***p-value***
Rate child general health Excellent Very good Good/fair/poor	 1687 (89.9) 671 (84.8) 232 (89.6)	 189 (10.1) 120(15.2) 27 (10.4)	**0.001**
Rate child dental health Excellent Very good Good/fair/poor	 1143 (92.3) 939 (88.0) 508 (81.9)	 96 (7.7) 128 (12.0) 112 (18.1)	**<0.001**
Having medical home Yes No	 2430 (88.9) 154 (83.2)	 304 (11.1) 31 (16.8)	**0.027**

Table 26. Continued

Having dental home Yes No	 2566 (91.3) 21 (19.1)	 244 (8.7) 89 (80.9)	<0.001
Brushing habits Once a day Twice Three or more	 751 (83.4) 1681 (90.8) 139 (92.7)	 150 (16.6) 171 (9.2) 11 (7.3)	<0.001

Table 27. Environmental antecedent factors by time of last dental check-up for whites

	Last dental check-up		
Social constructs	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Importance of dental health compared to other health issues More important Just as important Less important	 144 (86.7) 2291 (88.8) 148 (85.1)	 22 (13.3) 288 (11.2) 26 (14.9)	0.246

Table 28. Individual empowerment factors by time of last dental check-up for whites

	Last dental check-up		
Enabling factors	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child health insurance			**<.001**
Uninsured	30 (63.8)	17 (36.2)	
Public	198 (80.8)	47 (19.2)	
Private	2339 (89.7)	268 (10.3)	
Parent health insurance			**<.001**
Uninsured	129 (79.6)	33 (20.4)	
Public insurance	56 (72.7)	21 (27.3)	
Private insurance	2377 (89.8)	271 (10.2)	
Child dental insurance			**<.001**
Yes	2129 (91.0)	211 (9.0)	
No	456 (79.0)	121 (21.0)	
Parent level of education			**<.001**
Less than HS	34 (85.0)	6 (15.0)	
HS or GED	522 (84.9)	93 (15.1)	
Some college/ 2 year degree	916 (87.6)	130 (12.4)	
4 year degree or more	1118 (91.3)	107 (8.7)	

Table 29. Environmental empowerment factors by last dental check-up for whites

	Last dental check-up		
Enabling social structures	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Income categories			**<.001**
Less than $25,000	111 (76.0)	35 (24.0)	
Between $25,0000 to $50,000	522 (82.3)	112 (17.7)	
Between $50,0000 to $75,000	796 (88.7)	101 (11.3)	
More than $75,000	1152 (93.1)	86 (6.9)	
Geographical	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Geographic area			**0.001**
Metro/Urban	1494 (90.6)	155 (9.4)	
Urban with adj.	657 (86.8)	100 (13.2)	
Mostly rural	439 (84.4)	81 (15.6)	
Health care system	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Dental HPSA			0.182
Designated	1306 (87.7)	183 (12.3)	
No designated	1284 (89.4)	153 (10.6)	

***** Household number (*p≤0.106*)

Table 30. Multiple logistic regression model for time of last dental check-up for whites

Variable	<12 Months (%)	>12 Months (%)	Odds Ratio (95% CI)	*p-value*
Child Age				**<0.001**
7-12 years	93.4	6.6	3.89 (2.67, 5.67)	<0.001
13-17 years	91.9	8.1	2.69 (1.90, 3.82)	<0.001
3-6 years	76.9	23.1	1.00	
Child Dental Need				**<0.001**
Check up/cleaning	95.3	4.7	7.9 (5.82, 10.96)	<0.001
Emergency	95.8	4.2	14.92 (3.31, 67.21)	<0.001
Treatment/fillings	96.8	3.2	15.96 (8.52, 29.89)	<0.001
No need	66.4	33.6	1.00	
Rate Child Dental				**<0.001**
Excellent	92.3	7.7	3.38 (2.26, 5.05)	<0.001
Very good	88.0	12.0	1.65 (1.13, 2.39)	0.008
Good/Fair/Poor	81.9	18.1	1.00	
Having Dental Home				**<0.001**
Yes	91.3	8.7	26.48 (14.04, 49.94)	
No	19.1	80.9	1.00	
Brushing Habits				**0.009**
Twice	90.8	9.2	1.47 (1.08, 1.99)	0.023
Three or more	92.7	7.3	2.60 (1.13, 5.96)	0.170
Once	83.4	16.6	1.00	
Child Dental Insurance				**<0.001**
Yes	91.0	9.0	1.77 (1.27, 2.49)	
No	79.0	21.0	1.00	
Income Categories				0.052
Between $25,0000 to $50,000	82.3	17.7	1.29 (0.67, 2.4)	0.444
Between $50,0000 to $75,000	88.7	11.3	1.79 (0.88, 3.65)	0.107
More than $75,000	93.1	6.9	2.21 (1.07, 4.55)	0.031
Less than $25,000	76.0	24.0	1.00	

*Hosmer and Lemeshow Goodnees-of-Fit Test (*p=0.351)*

Table 31. Descriptive statistics for time of last dental check-up for African-Americans

Last dental check-up	Number	Percent
<12 months	137	84.0
1-2 years	15	9.2
2 or more years	6	3.7
Never	5	3.1
Total	163	100

Table 32. Individual antecedent factors by time of last dental check-up for African-Americans

	Last dental check-up		
Risk Markers	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child age categories			0.703
3-6 years	32 (76.2)	10 (23.8)	
7-12 years	44 (91.7)	4 (8.3)	
13-17 years	61 (77.2)	18 (22.8)	
Child sex			0.631
Male	65 (79.3)	17 (20.7)	
Female	72 (82.8)	15 (17.2)	
Marital status			0.789
Married	58 (79.5)	15 (20.5)	
No Married	79 (82.3)	17 (17.7)	
Need	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child dental need in the last 12 months			**0.004**
No need	47 (68.1)	22 (31.9)	
Check up/cleaning	63 (88.7)	8 (11.3)	
Emergency	6 (100.0)	0.00	
Treatment/fillings	21 (91.3)	2 (8.7)	
Predisposing factors	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Rate child general health			0.351
Excellent	63 (76.8)	19 (23.2)	
Very good	40 (87.0)	6 (13.0)	
Good/fair/poor	34 (82.9)	7 (17.1)	
Rate child dental health			0.183
Excellent	49 (80.3)	12 (19.7)	
Very good	42 (89.4)	5 (10.6)	
Good/fair/poor	46 (75.4)	15 (24.6)	
Having medical home			**<0.001**
Yes	123 (86.6)	19 (13.4)	
No	13 (52.0)	12 (48.0)	
Having dental home			**<0.001**
Yes	127 (90.1)	14 (9.9)	
No	10 (35.7)	18 (64.3)	
Brushing habits			0.319
Once a day	34 (75.6)	11 (24.4)	
Twice	77 (81.1)	18 (18.9)	
Three or more	26(89.7)	3 (10.3)	

Table 33. Environmental antecedent factors by time of last dental check-up for African-Americans

	Last dental check-up		
Social constructs	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Importance of dental health compared to other health issues			0.204
More important	46 (85.2)	8 (14.8)	
Just as important	88 (80.0)	22 (20.0)	
Less important	2 (50.0)	2 (50.0)	

Table 34. Individual empowerment factors by last dental check-up for African-Americans

	Last dental check-up		
Enabling factors	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child health insurance			**<0.001**
Uninsured	3 (33.3)	6 (66.7)	
Public insurance	69 (87.3)	10 (12.7)	
Private insurance	64 (82.1)	14 (17.9)	
Parent health insurance			0.424
Uninsured	21 (75.0)	7 (25.0)	
Public insurance	40 (87.0)	6 (13.0)	
Private insurance	70 (82.4)	15 (17.6)	
Child dental insurance			**<0.001**
Yes	126 (85.7)	21 (14.3)	
No	6(37.5)	10 (62.5)	
Parent level of education			0.584
Less than HS	10 (76.9)	3 (23.1)	
HS or GED	46 (82.1)	10 (17.9)	
Some college/ 2 year degree	51 (77.3)	15 (22.7)	
4 year degree or more	30 (88.2)	4 (11.8)	

Table 35. Environmental empowerment factors by time of last dental check-up for African Americans

	Last dental check-up		
Enabling social structures	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Income categories			0.278
Less than $25,000	57 (80.3)	14 (19.7)	
Between $25,0000 to $50,000	44 (77.2)	13 (22.8)	
Between $50,0000 to $75,000	23 (92.0)	2 (8.0)	
More than $75,000	13 (92.9)	1 (7.1)	
Geographical	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Geographic area			0.344
Metro/Urban	136 (81.4)	31 (18.6)	
Urban with adj.	1 (50.0)	1 (50.0)	
Mostly rural	0.00	0.00	
Health care system	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
HPSA			0.530
Dental Designated	134 (80.7)	32 (19.3)	
No designated	3 (100.0)	0.00	

*Household number (*p≤0.416*)

Table 36. Multiple logistic regression model for time of last dental check-up for African-Americans

Variable	<12 Months	>12 Months	Odds Ratio (95% CI)	*p-value*
Child Dental Need	88.7	11.3		**<0.029**
Check up/cleaning	100.0	0.0	5.18 (1.55,17.27)	0.007
Emergency	91.3	8.7	2.633 E8	0.99
Treatment/fillings	68.1	31.9	5.92 (1.01, 34.68)	0.049
No need			1.00	
Having Dental Home	90.1	9.9		**<0.001**
Yes	35.7	64.3	20.83 (6.51, 66.67)	
No			1.00	
Child Dental Insurance	85.7	14.3	10.56 (2.55, 43.71)	**<0.001**
Yes	37.5	62.5	1.00	
No				

*Hosmer and Lemeshow Goodnees-of-Fit Test (*p=0.848*)

Table 37. Descriptive statistics for time of last dental check-up for Latinos English interview

Last dental check-up	Number	Percent
<12 months	93	83.8
1-2 years	8	7.2
2 or more years	5	4.5
Never	5	4.5
Total	111	100

Table 38. Individual antecedent factors by time of last dental check-up for Latinos English Interview

	Last dental check-up		
Risk Markers	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child age categories			0.127
3-6 years	35 (87.5)	5 (12.5)	
7-12 years	33 (86.8)	5 (13.2)	
13-17 years	25 (71.4)	10 (28.6)	
Child sex			0.436
Male	49 (86.0)	8 (14.0)	
Female	44 (78.6)	12 (21.4)	
Marital status			0.378
Married	73 (81.1)	17 (18.9)	
No Married	20 (87.0)	3 (13.0)	
Need	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child dental need in the last 12 months			**0 .002**
No need	22 (64.7)	12 (35.3)	
Check up/cleaning	55 (94.8)	3 (5.2)	
Emergency	2 (66.7)	1 (33.3)	
Treatment/fillings	14 (82.4)	3 (17.6)	
Predisposing factors	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Rate child general health			**0.017**
Excellent	58 (89.2)	7 (10.8)	
Very good	22 (81.5)	5 (18.5)	
Good/fair/poor	13 (61.9)	8 (38.1)	
Rate child dental health			**<0.001**
Excellent	37 (92.5)	3 (7.5)	
Very good	35 (83.3)	7 (16.7)	
Good/fair/poor	21 (67.7)	10 (32.3)	
Having medical home			**<0.001**
Yes			
No			

Table 38. Continued

Having dental home Yes No	 85 (88.5) 8 (50.0)	 11 (11.5) 8 (50.0)	**<0.001**
Brushing habits Once a day Twice Three or more	 27 (84.4) 59 (84.3) 6 (60.0)	 5 (15.6) 11 (15.7) 4 (40.0)	**0.025**

Table 39. Environmental antecedent factors by time of last dental check-up for Latinos English interview

	Last dental check-up		
Social constructs	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Importance of dental health compared to other health issues More important Just as important Less important	 14 (77.8) 74 (82.2) 4 (100.0)	 4 (22.2) 16 (17.8) 0.00	0.576

Table 40. Individual empowerment factors by time of last dental check-up for Latinos English interview

	Last dental check-up		
Enabling factors	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child health insurance			**0.003**
Uninsured	6 (50.0)	6 (50.0)	
Public insurance	14 (77.8)	4 (22.2)	
Private insurance	72 (88.9)	9 (11.1)	
Parent health insurance			**0.026**
Uninsured	12 (66.7)	6 (33.3)	
Public insurance	8 (66.7)	4 (33.3)	
Private insurance	70 (88.6)	9 (11.4)	
Child dental insurance			**0.012**
Yes	77 (88.5)	10 (11.5)	
No	15 (65.2)	8 (34.8)	
Parent level of education			0.012
Less than HS	9 (56.2)	7 (43.8)	
HS or GED	26 (86.7)	4 (13.3)	
Some college/ 2 year degree	35 (81.4)	8 (18.6)	
4 year degree or more	23 (95.8)	1 (4.2)	

Table 41. Environmental empowerment factors by last dental check-up for Latinos English Interview

	Last dental check-up		
Enabling social structures	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Income categories			0.835
Less than $25,000	18 (78.3)	5 (21.7)	
Between $25,0000 to $50,000	28 (87.5)	4 (12.5)	
Between $50,0000 to $75,000	27 (81.8)	6 (18.2)	
More than $75,000	20 (83.3)	4 (16.7)	
Geographical	< 12 months # (%)	> 12 months # (%)	*p-value*
Geographic area			0.325
Metro/Urban	49 (87.5)	7 (12.5)	
Urban with adj.	36 (78.3)	10 (21.7)	
Mostly rural	8 (72.7)	3 (27.3)	
Health care system	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Dental HPSA			0.567
Designated	54 (80.6)	13 (19.4)	
No designated	39 (84.8)	7 (15.2)	

Table 42. Multiple logistic regression model for time of last dental check-up for Latinos English Interview

Variable	**<12 Months**	**>12 Months**	**Odds Ratio (95% CI)**	***p-value***
Having Dental Home				**0.001**
Yes	88.5	11.5	7.72 (2.41, 24.74)	
No	50.0	50.0	1.00	

*Hosmer and Lemeshow Goodnees-of-Fit Test (*p=0.827*)

Table 43. Descriptive statistics for time of last dental check-up for Latinos Spanish Interview

Last dental check-up	Number	Percent
<12 months	53	68.8
1-2 years	15	19.5
2 or more years	5	6.5
Never	4	5.2
Total	77	100

Table 44. Individual antecedent factors by time of last dental check-up for Latinos Spanish Interview

	Last dental check-up		
Risk Markers	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child age categories			**0 .005**
3-6 years	28 (87.5)	4 (12.5)	
7-12 years	15 (51.7)	14 (48.3)	
13-17 years	10 (52.6)	9 (47.4)	
Child sex			0.995
Male	24 (64.9)	13 (35.1)	
Female	29 (67.4)	14 (32.6)	
Marital status			0.513
Married	34 (65.4)	18 (34.6)	
No Married	19 (67.9)	9 (32.1)	
Need	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child dental need in the last 12 months			**<0.001**
No need	10 (38.5)	16 (61.5)	
Check up/cleaning	32 (80.0)	8 (20.0)	
Emergency	11 (78.6)	3 (21.4)	
Treatment/fillings	53 (66.2)	27 (33.8)	
Predisposing factors	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Rate child general health			0 .383*
Excellent	22 (75.9)	7 (24.1)	
Very good	7 (58.3)	5 (41.7)	
Good/fair/poor	24 (61.5)	15 (38.5)	
Rate child dental health			**0.002***
Excellent	10 (100.0)	0.00	
Very good	9 (100.0)	0.00	
Good/fair/poor	34 (55.7)	27 (44.3)	
Having medical home			**<0.001**
Yes			
No			

Table 44. Continued

Having dental home			<0.001
Yes	47 (77.0)	14 (23.0)	
No	6 (31.6)	13 (68.4)	
Brushing habits			0.669
Once a day	9 (64.3)	5 (35.7)	
Twice	28 (71.8)	11 (28.2)	
Three or more	16 (61.5)	10 (38.5)	

Table 45. Environmental antecedent factors by time of last dental check-up for Latinos Spanish interview

	Last dental check-up		
Social constructs	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Importance of dental health compared to other health issues			0.145
More important	6 (42.9)	8 (57.1)	
Just as important	42 (70.0)	18 (30.0)	
Less important	3 (75.0)	1 (25.0)	

Table 46. Individual empowerment factors by time of last dental check-up for Latinos Spanish interview

	Last dental check-up		
Enabling factors	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Child health insurance			**0.004**
Uninsured	12 (44.4)	15 (55.6)	
Public insurance	22 (88.0)	3 (12.0)	
Private insurance	17 (65.4)	9 (34.6)	
Parent health insurance			**0**.113
Uninsured	29 (60.4)	19 (39.6)	
Public insurance	1 (100.0)	0.00	
Private insurance	20 (83.3)	4 (16.7)	
Child dental insurance			**0.012**
Yes	77 (88.5)	10 (11.5)	
No	15 (65.2)	8 (34.8)	
Parent level of education			0.091
Less than HS	31 (57.4)	23 (42.6)	
HS or GED	17 (81.0)	4 (19.0)	
Some college/ 2 year degree	3 (100.0)	0.00	
4 year degree or more	2 (100.0)	0.00	

Table 47. Environmental empowerment factors by time of last dental check-up for Latinos Spanish interview

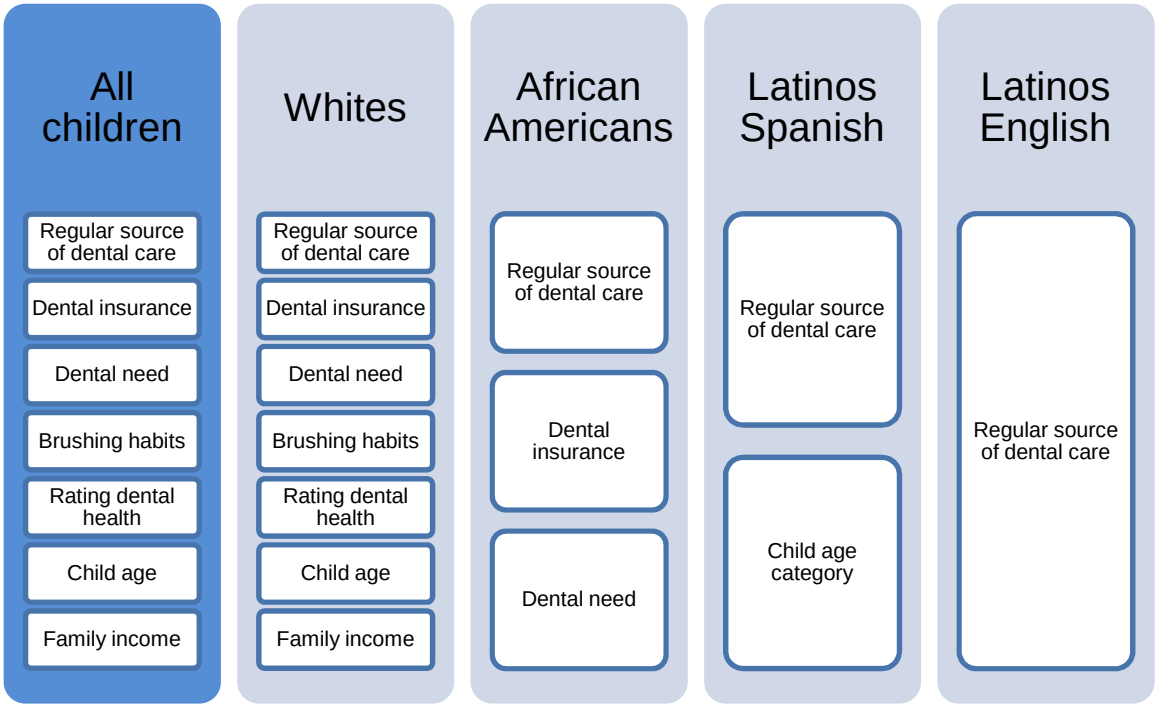
	Last dental check-up		
Enabling social structures	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Income categories			**0.**332
Less than $25,000	23 (57.5)	17(42.5)	
Between $25,0000 to $50,000	24 (75.0)	8 (25.0)	
Between $50,0000 to $75,000	4 (80.0)	1 (20.0)	
More than $75,000	1 (100.0)	0.00	
Geographical	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Geographic area			0.543
Metro/Urban	26 (63.4)	15 (36.6)	
Urban with adj.	20 (74.1)	7 (25.9)	
Mostly rural	7 (58.3)	5 (41.7)	
Health care system	**< 12 months # (%)**	**> 12 months # (%)**	***p-value***
Dental HPSA			0.892
Designated	37 (64.9)	20 (35.1)	
No designated	16 (69.6)	7 (30.4)	

Table 48. Multiple logistic regression model for time of last dental check-up for Latinos Spanish interview

Variable	**<12 Months**	**>12 Months**	**Odds Ratio (95% CI)**	***p-value***
Having Dental Home				**<0.004**
Yes	77.0	23.0	13.70 (2.31, 81.26)	
No	31.6	68.4	1.00	
Child Age				**0.007**
7-12 years	51.7	48.3	0.048 (0.007, 0.31)	
13-17 years	52.6	47.4	0.12 (0.02, 0.77)	
3-6 years	87.5	12.5	1.00	

*Hosmer and Lemeshow Goodnees-of-Fit Test (*p=0.549)*

Figure 4. Summary of the factors related to utilization of dental services for Iowa children by racial/ethnic group



CHAPTER V

DISCUSSION

Overview

This study was a statewide attempt to evaluate the factors that are related to access and utilization of dental services by children in Iowa. Emphasis was given to differences in utilization of dental services among racial/ethnic groups, especially Latinos. The study described and compares difficulties in utilization of care among Latino children whose parents answered the survey in English (LE) and those who answered it in Spanish (LS). In our study, language preference at the time to answer the interview was used as a measure of acculturation.

The objectives of the study were accomplish through a process were descriptive statistics by racial/ethnic groups were evaluated, bivariate analysis was done for selected variables, and binary logistic regression were developed to examine the combine effect of selected variables. Variables included in the model were chosen after reviewing factors that have been related to utilization of dental services in different studies. We used a conceptual framework for the receipt of oral health care among Latinos in the United States proposed by Mejia et al (57) as guidance for inclusion of important variables related to the use of dental services by Latino populations, and some of our findings were opposed to our expectation. Finally, the analysis gives some insight about the relationship between race/ethnicity and use of dental services, as well as the factors related to the utilization of dental services by each racial/ethnic group in Iowa.

Dependent variable

The demographic characteristics of study participants and their families indicated that our sample population was composed mainly of white children (89%) with married parents (84.8%) who had high levels of education (74% with 2 years of college or more) and whose family income was, for almost 70% of participants, $50,000 or more. It was not surprisingly then to see that the rates of utilization of dental services for these children were relatively high compared to national estimates. Utilization rates for children reported in different studies nationwide ranged from 44.4% to 73% (49), (58). In our study, the proportion of children with a dental check-up visit last year was 87.9%, almost 15% higher than the highest national figure. The socio-economic characteristics of most of the children in our study as well as the high proportion of children who had dental insurance (80.3%), could possibly explain these differences. Despite positive and high utilization rates, significant disparities between racial/ethnic groups regarding access and utilization of dental services were reported in this study.

Factors related to utilization of dental services for Iowa children

The main objective of this study was to identify the factors that were related to how recent a child had his/her last dental check up in Iowa. Results from the initial multiple logistic regression indicated that seven factors were significantly associated with the outcome variable: the age of the child, having a dental need in the last 12 months, the rating of the child dental health, having a regular source of dental care, dental insurance status, brushing habits, and family income.

Children who were age 3-6 years only, had no dental need last year, rated child dental health as good/poor/fair, had no regular source of dental care, brushed their teeth once a day, had no dental insurance, and had a family income of less than $25,000 were significantly less likely to report having a dental check-up in the last 12 months.

As it was explained in the initial framework by Mejia et al (57), the use of dental services is a very complex issue that it is usually affected by different individual and environmental factors. Antecedent factors interact to give individuals the intention to seek care, and this intention is empowered by enabling and system factors that will lead to the receipt of care.

In our study, antecedent individual factors were the most important factors related to the use of dental services by Iowa children. Five of the seven significantly associated variables were identified as factors leading to the intention to seek care: child age, having a dental need, the rating of oral health status, having a regular source of dental care, and brushing habits.

Two factors mediate the role between the intention to seek care (antecedent factors) and the actual receipt of care: dental insurance status and family income. Dental insurance status is identified by Mejia's framework as a variable that explain the level of control that a person perceives to receipt care and family income as an environmental factor affecting the receipt of care. These two factors facilitate or interrupt the path from the intention to seek care, moderated by five significant factors in our study, to the actual receipt of care.

Indirect association of race/ethnicity with utilization of dental services

An interesting feature of our study was the intention to explore the relationship between race/ethnicity and utilization of dental services after findings from the initial logistic regression were contrary to our expectation. Race was found not significantly associated with utilization of dental services, even though, significant disparities between racial/ethnic groups were establish in the descriptive and bivariate analysis. We developed a separate analysis trying to understand the relationship between race and the time of last dental check-up. Findings from this analysis revealed that race/ethnicity had a direct association with four variables: having a regular source of dental care, dental insurance status, having a dental need, and family income; and an indirect association with the outcome variable (time of last dental check-up) through these four variables.

Findings from this part of the analysis may benefit policy makers and health planners in our state to guide their actions toward the development of appropriate strategies addressing these four factors. The effort will ultimately lead to the decrease of oral health disparities in Iowa children.

In the past, some studies have reported a direct association of race/ethnicity with the use of dental services (43), and others have reported not association at all (47). To our knowledge, none of the studies in the past have considered the possibility of an indirect association of race with utilization of dental services. Ignoring this approach may not fully considered important

relationships between some of the variables of interest that may help to understand contributing factors increasing disparities in oral health.

Disparities for LE children

The emphasis of this study was on identifying factors affecting the use of dental services by Latino children living in Iowa, as well as describing and comparing differences between Latino children whose parents answer the survey in English (LE) and those whose parents answered the survey in Spanish (LS). Results from descriptive analysis by race/ethnicity revealed major differences between LS and LE children regarding access and utilization of medical and dental services, as well as their medical and oral health status.

Several disparities were found for LE children compared to whites; however, in most of these measures, LE children were showing better outcomes than AA and LS children. LE children were less likely than whites to have a dental visit last year but more likely to have a visit than AA and LS children. Compared to whites, LE children were less likely to have an excellent/very good rating of general and dental health, less likely to have a regular source of medical and dental care, and more likely to be medically uninsured, as well as to have parents who were medically uninsured. The family income level of LE children was lower than whites, but higher than AA and LS children. No disparities were found regarding dental insurance status between LE children (79%) and whites (80%). However, it is important to note that the highest proportion of children with dental insurance was among AA (90%) and not whites (80%). Similar findings were reported by Flores et al (28) where 84% of AA reported having dental

insurance compared to 78% of whites and 68% of Latinos. A possible explanation of this could be the eligibility of AA children to public health programs like Medicaid, and CHIP (Hawk-I in Iowa) due to their lower socio-economic status.

In general, characteristics of LE children in this study match those of Latinos who may be second generation of immigrants with higher family income, higher level of education, higher rates of private health insurance as well as dental insurance. In contrast, characteristics of LS children are more related to recent immigrants who moved to the state due to job opportunities created during the 80's and 90's in food processing plants. Homogenization of LE and LS children as just one Latino group can give a mistaken picture of the real health status of this ethnic group in Iowa.

Disparities for LS Children

Findings from the study revealed that LS children in the state of Iowa experience multiple disparities related to medical and dental health, access and utilization of dental services. Consistent with other studies nationwide (28), (53), LS children were less likely to report a dental check-up visit in the last 12 months than any other racial/ethnic group, more likely to report suboptimal medical and dental health status, less likely to have a regular source of medical and dental care, more likely to report being medically and dentally uninsured, and more likely to have parents who are medically uninsured as well. Regarding demographic characteristics, LS children were more likely to have parents who

have less than high school education and more likely to have a family income of less than $25,000 than any other racial/ethnic group.

On the other hand, it was interesting to find that LS children were more likely than any other group to brush their teeth three or more times a day. According to a recent report from the University of Iowa Public Policy Center (59) that assessed disparities in the health and well-being of Iowa children, LS children were more likely to report healthier habits, like more physical activity and less screen time, than AA and white children. Additionally, LS children were less likely to report having any behavioral problem than any other racial/ethnic group in the state. These findings may suggests that the poor oral and general health status of LS children in Iowa, and possibly in other parts of the country, may be more related to the lack of access to medical and dental services than to the poor health behaviors of Latino populations.

Results from the logistic regression for LS children only, showed that two factors were significantly related to having a dental visit in the last 12 months: the age of the child *(p=0.007)* and having a regular source of dental care *(p≤0.004)*. Regarding the age of the child, findings from the initial logistic regression including all children in the study indicated than whites, AA, and LE children who were 3-6 years-old were less likely to have a dental check-up in the last year than older children. Inversely, findings from the LS children group alone revealed that 3-6 years-old had better odds to have a dental check-up last year than older LS children. Compared to 3-6 years-old, 7-12 years LS children were 50% less likely to have a dental check-up and 13-17 years were 88% less likely. Similar

findings were reported by the National Center for Health Statistics (17) where even though younger children in general (2-5 years-old), had lower proportion of dental visits compared to older children (6-17 years-old), in the youngest group, Latino children had higher proportion of dental visits than African-Americans but less proportion of visits than whites. However, if we look to the older group (6-17 years-old), Latinos had the lowest proportion of visits compared to AA and whites.

It is interesting to speculate the possible reason for this unexpected finding. A possible explanation is that younger Latino children are possibly U.S. citizens who may be eligible for public health programs, like Medicaid or the Hawk-I program, and this eligibility may give them better opportunity to use dental services. The characteristics of LS parents in our sample seem to be related to recent immigrants. Mixed Latino families composed by undocumented and U.S. citizens may be able to access health services for their younger U.S. citizen children but not for older children who may be undocumented. Future research should evaluate factors related to access of dental services among Latino children from different age groups that will include additional measures related to acculturation including, if possible, immigration status.

The second factor that was reported as related to the utilization of dental services for LS children as well as for LE children was having a regular source of dental care. In our study, this was the strongest factor related to the use of care for all racial/ethnic groups. LS children who had a regular source of care were almost 13 times more likely to have a dental visit last year than those who did not

have a dental home. In the same way, LE children who had a regular source of care were almost 7 times more likely to receipt care.

Compared to other racial/ethnic groups Macek et al (47) in his study of schoolchildren in Maryland reported that Latinos were less likely to have a regular source of dental care than AA, and white children; and Grembowski (48) reported that Latino children of mothers who had a regular source of dental care were more likely to receipt dental services than those from mothers who didn't have a regular source of care. However in these studies, no differences among Latino subgroups were studied.

Federal initiatives aimed to reduce disparities regarding oral health have emphasized about the importance of what is called a "dental home". Dental Home was defined by the American Dental Association (ADA) in 2005 as the "ongoing relationship between the dentist who is the primary dental care provider and the patient, which includes comprehensive oral health care, beginning no later than age one". To complement this definition The American Association of Pediatric Dentist (AAPD) emphasizes that a "dental home" should have 5 specific characteristics, it should be: accessible, continuous, comprehensive, coordinated, and family centered.

In our study less acculturated Latino children faced the most significant barriers to have a "dental home". The implementation of strategies that will address their difficulties to access care faced not only political but policy barriers. The anti-immigrant sentiment in the U.S. expressed by many states like Arizona (1019 law) is the most significant political barrier. In the policy side, the

ineligibility of undocumented families for many public programs, the inadequate public and private workforce, and the high cost of dental services, limited the ability of these families to access any care. The health care reform law will help to address in part difficulties experience by disadvantage families with the expansion of Medicaid coverage; however, undocumented families are not included.

Some of the policy recommendations to address disparities in health care for minority groups include (60),(61): culturally and linguistically sensitive providers, increased the number of health professionals from minority groups, affordable health care professionals schools, increased support for community-based interventions and programs that will response to the need of minority communities, and the preservation and expansion of the safety net.

Innovative initiatives at the state level are necessary to address the oral health needs of disadvantaged Latino children. Dental hygienist with expanded-functions, who may have the ability to reach children at schools and delivered invaluable preventive measures that otherwise, will not be accessible or case management initiatives that will help Latino children to access free or reduced dental care.

Contrary to findings from other researchers involving Latino populations (49), (53), in our study, parental education was not significantly related to the use of dental services. Possible explanations for that is the limited number of Latinos in our study. Further exploration of this association, especially related to LS parents, who had the lowest level of education, should be considered.

Study Limitations

This study was one of the first attempts in the state to collect data related to minority populations. This cross-sectional study gave a snapshot of the oral health status, access and utilization of dental services of whites and minority children living in the state. Because of its cross-sectional nature (one point in time), factors identified in the study as associated to use of dental services by different racial/ethnic groups should not be inferred as causal.

The IHHS 2005 was not a pure random sample therefore generalization of findings may be given with caution. Our study relies on self-reported data from parents with no validation against dental records or dental claims that will allow us to triangulate findings. Because of this, responses from participants may be subject to recall bias. Additionally, data used for this research included information regarding children 3-17 years of age; therefore findings from the study, may not be applicable to younger populations in the state.

The oversample of African-American and Latino children may be considered a limitation regarding the generalizability of findings. However, given the characteristics of Iowa as a white rural state, it was necessary to take this approach in order to assure adequate representation of small segments of the population that otherwise will be difficult to reach.

An assumption that choosing to answer the interview in Spanish indicates less acculturation is an interpretative limitation of the results. Researchers have suggested that a combination of measures assessing Limited English Proficiency

(LEP), language preferences, and ethnic identification, will give a superior and more accurate measure of acculturation for immigrant groups (56), (53).

The translation of the initial English survey into Spanish may be considered another limitation. The possibility of interpretative differences of questions compared to the English survey, as well as the possibility of misunderstandings due to the variety of terms used from Spanish speaking people from different countries should be acknowledge.

Finally, the limited number of Latinos in some of the groups may limited the power to detect factor associated to the use of dental services for this group as well as the ability to contrast this finding to the other racial groups.

Strengths of the Study

While we acknowledge our limitations, the study has significant strengths. The Iowa Child and Family Household Health Survey is the largest household sample statewide. Additionally, the high response rate of participants in the survey (77%), as well as the posterior comparability of our sample with the characteristics of Iowa children from census data, gives us more confidence that our sample closely represents the children population in Iowa.

To our knowledge, this is one of the first attempts in the state to identify factors related to the use of dental services by Latino children. The oversample of minority children to reach an appropriate number of African-American and Latino children in a predominantly white state was a plus. Additionally, Latino participants had the option of answering the survey in the language of their choice (English or Spanish) allowing us to have a measure of acculturation.

Finally, few studies have been done nationwide, to identify factors related to access and utilization of dental services among Latino children using a measure of acculturation.

Implication of findings

Findings from this study gave a snapshot of the factors that are affecting the oral health status, access and utilization of dental services of Latino children living in Iowa. At the same time, the study provided a better understanding of the basis of oral health disparities in the state. Policy makers and health planners are called to recognize disparities and implement short and long term strategies that will address individual, community, and system factors affecting racial/ethnic minority groups in the state.

Innovative efforts should be made to assure a regular source of dental care for Latino children that will enhance their ability to access dental services. Ignoring the needs of the fastest growing segment of children in the state, that has the poorest oral health status and the least access to care, will translate in the future increase of oral health diseases in the state. State initiatives ensuring all children to have a place where they can receive comprehensive, continuous, and coordinated dental care, would greatly benefit the oral health not only of Latino children living in Iowa but the health of all children.

CHAPTER VI

CONCLUSION

Information from this research gives policy makers, public health workers, and clinicians an overview of oral health disparities affecting children in the state. For those agencies in Iowa interested in the improvement of access and utilization of dental services for minority children, this project gives important inside about the factors related to the use of services for each racial/ethnic group.

Emphasis was given in the project to evaluate oral health disparities affecting Latino children. The language chose to do the interview was used as a measure of acculturation. Stark differences were found between LE and LS children suggesting that generalizations of them as just one Latino group should not be established. Interventions to improve access and utilization of services for Latino children in Iowa should focus on overcoming important structural barriers like the lack of a regular source of dental care.

APPENDIX

The following are the original questions from the IHHS 2005 that were included in the study.

HEALTH CARE

1. In general, how would you rate [child]'s overall health now? Would you say…
    a. Excellent
    b. Very good
    c. Good
    d. Fair
    e. Poor
2. Do you know one person you think of as [child]'s personal doctor or nurse?
    a. Yes
    b. No
3. Do you have any kind of health care coverage for [child], including health insurance, plans such as HMO's, or government plans such as Medicaid or Title 19?
    a. Yes
    b. No
4. What type of health care coverage do you use to pay for most of [child]'s medical care? Is it coverage through …
    a. Your employer

b. Someone else's employer

c. A plan that you or someone else buys on your own

d. The HAWK-I program (State Child Health Insurance Plan)

e. Medicaid or Title 19

f. The Military, Champus, or the VA

g. The Indian Health Service

h. Some other source [specify]

5. Do you have any kind of health care coverage for yourself, including health insurance, prepaid plans such as HMO's, or government plans such as Medicaid or Title 19?

    a. Yes

    b. No

6. What type of health care coverage do you use to pay for most of you medical care? Is it coverage through …

    i. Your employer

    j. Someone else's employer

    k. A plan that you or someone else buys on your own

    l. The HAWK-I program (State Child Health Insurance Plan)

    m. Medicaid or Title 19

    n. The Military, Champus, or the VA

    o. The Indian Health Service

    p. Some other source [specify]

DENTAL CARE

7. Does [child] currently have insurance that covers dental care?
    a. Yes
    b. No
8. During the past 12 months, was there any time when you or a health professional thought [child] needed dental care? [Prompt: This includes routine dental check-up or care for dental needs]
    a. Yes
    b. No
9. What kind of dental care did you or a health professional think [child] needed? Was it a…
    a. Check-up or cleaning
    b. Emergency dental care
    c. Other treatment such as fillings
10. In the last 12 months, was there any time when [child] needed dental care but could not get it for any reason?
    a. Yes
    b. No
11. What was the main reason [child] could not get dental care.

    Do not read, select main reason
    a. Could not afford the care or have no insurance
    b. Insurance/HMO coverage was inadequate
    c. Trouble getting an appointment

d. Distance or transportation problems
e. Not comfortable with providers available at the time
f. Available providers did not have expertise child needed
g. Inconvenient hours, not open when care needed
h. Did not know where to go at night or on weekend
i. Could not get off work
j. Language or communication problems
k. Bad past experience or heard about bad experiences
l. Child was too afraid to go
m. Not comfortable due to cultural, ethnic or religious reasons
n. Family not comfortable seeking care for specific problem
o. Doctor/Nurse sent me to the ER
p. Doctor wouldn't prescribe the medicine child needed
q. Other [open]

12. Is there one main place where you usually go for your child's dental care?
    a. Yes
    b. No
13. When was [child]'s last dental check-up?
    a. Less than 12 months ago
    b. Between 1 and 2 years ago
    c. More than 2 years ago
    d. Child has never been to the dentist

14. How would you rate [child]'s overall dental health? Would you say it is …
    a. Excellent
    b. Very good
    c. Good
    d. Fair
    e. Or poor
15. Would you describe [child] as someone who …
    a. Visits the dentist regularly (at least once per year)
    b. Occasionally
    c. Rarely
    d. Or only when [he/she] has a problem
    e. Child has never been to the dentist
16. On average day, how many times does [child] brush [his/her] teeth? [Prompt: With or without parent help]
    a. Once
    b. Twice
    c. Three or more times
    d. Teeth are not brushed
17. There are many health issues that are important for children such as asthma or ADHD. Compared to other health issues affecting children, how important do you think good dental health is? Would you say good dental heath is …
    a. More important

b. Just as important

c. Less important

DEMOGRAPHICS

18. What is your current marital status?

    a. Married

    b. Divorced

    c. Widowed

    d. Separated

    e. Never married

19. What is the age and gender of the child in your home?

20. Is [child] of Spanish or Hispanic origin?

    a. Yes

    b. No

21. What is [child]'s race?

    a. African-American

    b. White

    c. American-Indian/Native American/Aleutian or Eskimo

    d. Asian/Pacific Islander

    e. Other [specify]

22. Are you of Spanish or Hispanic origin?

    c. Yes

    d. No

23. What is your race?

f. African-American

g. White

h. American-Indian/Native American/Aleutian or Eskimo

i. Asian/Pacific Islander

j. Other [specify]

24. And you are …

a. Male

b. Female

25. What is your age? [_ _ _]

26. What is the highest grade or level of school that you have completed?

a. 8th grade or less

b. Some high school, but did not graduate

c. High school graduate or GED

d. Some college or 2-year degree

e. 4-year college graduate

f. More than 4-year college degree

27. Including you, how many adults, that is people age 18 and over, lives in your household? [_ _ _] adults

28. Now, for analysis purposes only, what was the total income of all persons in your household over the past year, including salaries or other earnings, interest, retirement, and so on, for all household members combined?

a. $0 to $5,000

b. $5,001 to $10,000

c. $10,001 to $15,000

d. $15,001 to $20,000

e. $20,001 to $25,000

f. $25,001 to $30,000

g. $30,001 to $35,000

h. $35,001 to $40,000

i. $40,001 to $45,000

j. $45,001 to $50,000

k. $50,001 to $55,000

l. $55,001 to $60,000

m. $60,001 to $65,000

n. $65,001 to $70,000

o. $70,001 to $75,000

p. $75,001 to $80,000

q. $80,000 or more

29. What is your zip code? [_ _ _ _]

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