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Impact of insurance coverage on dental care utilization of Iowa children

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IMPACT OF INSURANCE COVERAGE ON DENTAL CARE UTILIZATION OF IOWA CHILDREN

by
Simi Mani

A thesis submitted in partial fulfillment
of the requirements for the Master of
Science degree in Dental Public Health
in the Graduate College of
The University of Iowa

May 2015

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CERTIFICATE OF APPROVAL

MASTER'S THESIS

This is to certify that the Master's thesis of

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has been approved by the Examining Committee
for the thesis requirement for the Master of Science
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To my wonderful husband and my loving parents, who have always supported my dreams and encouraged me to achieve all the things I aspire.

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ABSTRACT

Objective: To understand the association between dental insurance coverage and dental care utilization in Iowa children.

Methods: The 2010 Iowa Child and Family Household Health Survey (IHHS) data was used to assess the association between dental insurance coverage and dental care utilization in Iowa children. Andersen's model of health services utilization was used as a framework for determining the predictors of dental care utilization. Chi-square test was used for determining bivariate associations and Logistic regression analysis was used to determine factors associated with dental care utilization.

Results: The results from the multivariable logistic regression model indicate that children with private dental insurance ($p < 0.001$) and 4-9 years of age ($p = 0.005$) were more likely to have a dental visit. Additionally, respondents who were always able to get dental appointments for their child ($p < 0.001$), had a regular source of dental care for the child ($p < 0.001$) and perceived dental need for their child ($p < 0.001$), were more likely to report having a dental check-up for their child in the past 12 months.

Conclusion: Dental insurance was significantly associated with having a dental visit in the past year in Iowa children 4-17 years of age. Some of the other predictors of dental care utilization were: having a regular source of dental care for the child, ease of getting dental appointment for the child, younger child's age and having perceived dental need for the child.

PUBLIC ABSTRACT

The aim of this study was to understand the association between dental insurance coverage and dental care use in Iowa children 4-17 years of age using the 2010 Iowa Child and Family Household Health Survey data. The factors that were associated with dental care utilization were selected using the Andersen's model of health services utilization. This study found that having dental insurance for the child, having a regular source of dental care for the child, ease of getting dental appointment for the child, younger child's age and having perceived dental need for the child were significantly associated with child having a dental visit in the past year.

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CHAPTER 1- INTRODUCTION

Despite the scientific advancements and improvements in the prevention and treatment of oral health diseases and conditions, national surveys show that the dental disease prevalence in the United States is still high among racial/ethnic minority groups and the underserved population. The General Accounting Office (GAO) report in 2000 emphasized that poor oral health was a chronic problem among low-income people. The GAO report stated that one in three children (age 2-5 years) who were poor (family income <\$10,000) had untreated dental caries compared to one in ten children who were not poor (family income >\$35,000).

In the United States, most people are covered by some form of private or public health insurance based on their income level. The Medicaid program is a government-funded program that provides health care coverage for children, pregnant women, disabled individuals and adults. Most of the low-income children and adults who are below the Federal Poverty Level (FPL) are eligible for Medicaid. Nearly 60 million people in the United States receive healthcare coverage through Medicaid and the Children's Health Insurance Program (CHIP) programs (Medicaid.gov).

Children from families that do not qualify for the Medicaid program and do not have the means to buy private insurance may be eligible for the Children's Health Insurance Program. The CHIP program was started in 1997 and currently it is estimated that 8 million children receive health care coverage through this program (Medicaid.gov).

Medicaid provides both medical and dental benefits for children and in some states, adults. While the specific eligibility criteria and benefits differ from state to state and for adults and children, all states provide dental benefits to Medicaid enrolled children through the Early and Periodic Screening Diagnostic and Treatment (EPSDT) program. Until recently, private health insurance plans often did not include dental benefits for children. However, the Affordable Care Act (ACA) mandates that the insurance plans offered through the exchanges must provide dental benefits for children. At this time it is unclear if the ACA has had an impact on dental insurance coverage.

The recent GAO report (2013) described the differences in dental insurance coverage, payments and fee variations for dental services. According to the report, in the year 2010, 50% of the population had private dental insurance coverage, 13% had Medicaid/CHIP, 25% had no dental insurance and the dental insurance coverage was unknown for 10-12% of the population.

National health expenditures for Medicaid and CHIP programs for 2011 were approximately \$407 and \$12 billion respectively (CMS.gov). In spite of spending so much for health care, research shows that Medicaid-enrolled patients have difficulty in receiving care and utilization of dental services by Medicaid-insured patients is low compared to patients with private insurance. Data from the Medical Expenditure Panel Survey (2007) shows that 57.3% of people over age two with family income greater than or equal to 400% of the FPL had a dental visit in the past 12 months compared to 27.1% among those with family income below the FPL (HealthyPeople.gov).

Healthy People (HP) 2010 and 2020 are 10-year national objectives that are established to improve the health of people in the United States. The objectives are set based on available national data. The HP 2020 has four overarching goals and one of the goals is to “Achieve health equity, eliminate disparities, and improve the health of all groups” in the United States (HealthyPeople.gov). The HP 2020 oral health section includes specific objectives to reduce these oral health disparities. Specifically, oral health objectives seven and eight in Healthy People 2020 are to increase the proportion of individuals using the oral health care system and to increase the proportion of low-income children and adolescents (2-18 years) receiving preventive dental services (HealthyPeople.gov).

To be able to achieve the HP 2020 oral health objectives of increasing the proportion of individuals using the oral health care system it is essential to understand what factors influence utilization of dental care. There are some studies in the literature that have assessed the level of medical care utilization but there has not been as many studies assessing the effect of dental insurance coverage on dental care utilization and oral health status in children and no such studies of Iowa children. Therefore, the goal of this study is to determine the impact of dental insurance coverage on dental care utilization and perceived oral health status of Iowa children using the 2010 Iowa Household Health Survey data.

CHAPTER 2 – LITERATURE REVIEW

Even though there have been tremendous improvements in the diagnosis and treatment of oral diseases and conditions in the past decades, studies indicate that dental disease prevalence in the United States is still high among people who are socially or economically disadvantaged. The following section will review some studies that describe disparities in oral health.

Disparities In Oral Health

Dye et al (2012) used data from 2005-2008 National Health and Nutrition Examination Surveys (NHANES) to describe disparities in selected oral health indicators in children and the adult population. Trained interviewers and dentists collected data for NHANES. A stratified, multistage sampling design was used to obtain a nationally representative sample. Untreated dental caries was defined as “dental cavities that have not received proper treatment”. Poverty level was defined based on the definition by the Social Security Administration that took into account family income, family size and composition. The poverty level was classified as, poor (< 100% of the federal poverty level), near poor (100%–199% of the federal poverty level) and non-poor (≥ 200% of the federal poverty level). (Dye et al., 2012)

Mexican-American and non-Hispanic black children and adolescents (23%) had significantly higher untreated dental caries in comparison to non-Hispanic white children and adolescents (13%). Also, untreated dental caries was higher for children

and adolescents living in poverty (25%) in comparison to those living at 200% of the poverty level or higher (12%). Among the adult (20-64 years) population, untreated dental caries was significantly higher for Mexican-Americans (35%) and non-Hispanic blacks (40%) in comparison to non-Hispanic white adults (19%). Untreated dental caries was also higher in adults living in poverty (42%) in comparison to adults living at 200% of the poverty level or higher (17%). (Dye et al., 2012)

The General Accounting Office (GAO) report in 2000 highlighted that the burden of oral health was higher among people with low-income and members of minority groups. The report stated that one in two adults (age 19-64 years) from poor households (family income <\$10,000) had untreated dental caries compared to one in six adults from non-poor households (family income >\$35,000). The report stressed that poor oral health was an issue for both children and adults who lived below the poverty level.

Edelstein et al (2002) also used data from the National Health and Nutrition Examination Survey (NHANES) in addition to the National Health Interview Survey (NHIS) and the Medical Expenditure Panel Survey (MEPS) to describe disparities in oral health and access to care issues for children in the United States. Oral health status was assessed by dental caries experience and utilization was assessed by dental visits. Dental caries experience was defined using the DMF index and included untreated caries, filled teeth and teeth missing due to disease. Utilization was defined as having had a dental visit in the past 12 months. (Edelstein et al., 2002)

The study sample included participants in the NHANES (1988-94), NHIS (1993) and MEPS (1996) national surveys. Sociodemographic variables such as age, sex, race, geographic location, education level of parents and parent's income level were used to assess disparities in oral health status of children. The authors defined children living in household with annual income <\$16,500 (for family of 4) as children in poverty and children living in household with annual income between \$16,500-\$33,000 (for family of 4) as children near poverty. (Edelstein et al., 2002)

White children (15% for 2-4 year-olds) generally had less caries experience than black (25% for 2-4 year-olds) and Hispanic (28% for 2-4 year-olds) children. Native American children (75% for 2-4 year-olds) had higher dental caries experience compared to all other groups. Children with parents who had more than high school education (11% for 2-4 year-olds) had less caries experience compared to children with parents who had less than high school education (28% for 2-4 year-olds). Poor children (30% for 2-4 year-olds) had higher caries experience compared to children who were not poor (8% for 2-4 year-olds).

National reports show that dental care utilization rate is increasing among children and is at the highest level since the year 1996 (Nasseh et al., 2014, Waldman et al., 2014). Even though, the dental utilization rate is increasing in children, it has been reported that this increase in utilization of dental services by children is not uniform among all groups of the population. Waldman et al (2014)

Waldman et al (2014) conducted a study to look at trends in utilization of dental services for children 2-17 years of age. This study looked at dental utilization pattern

from 2000-2011 using the results of surveys from the Data Resource Center for Child and Adolescent Health. This study reported that for the year 2011, the proportion of children (5-17 years of age) who visited a dentist in the previous year was higher for children above the poverty level (91.3%) in comparison to children living in poverty (81.7%). Additionally, the proportion of children (5-17 years of age) who visited a dentist in the previous year was higher for children private insurance (91%) in comparison to children with public insurance (87%) and children with no insurance (60%). Moreover, Asian (81.9%) and Hispanic children (84.3%) had the lowest proportion with dental visit in the previous year in comparison to non-Hispanic Whites (89.1%) and non-Hispanic Black children (87.1%).

In summary, Mexican-American and non-Hispanic black children and adults had significantly higher untreated dental caries in comparison to non-Hispanic white children and adults. Untreated dental caries was significantly higher for children and adults living in poverty in comparison to those living at 200% of the poverty level or higher. White children had less caries experience compared to other racial or ethnic groups. Native American children had the highest caries experience compared to all other races. In addition, children who were poor had higher caries experience than children who were not poor and children whose parents were highly educated had less caries experience compared to children whose parents had less than high school education.

Moreover, dental utilization was higher among children with private insurance and children living above the poverty level in comparison to children with public

insurance and children living in poverty. Also, proportion of dental utilization was lowest among Asian and Hispanic children in comparison to non-Hispanic White children. The next section will address the barriers to receiving care and health service utilization models to better understand the underlying factors that lead to disparities in oral health.

Models Of Health Service Utilization

The Institute of Medicine defines access as “the timely use of personal health services to achieve the best possible outcome” (Ricketts et al., 2005). Researchers have identified that an individual’s decision to seek care is not based on a single factor but is influenced by several factors and therefore they have developed multifactor models to explain the barriers/factors that affect access to health care services. This section will discuss briefly some of the important models from the literature, namely the Health Belief Model (Ricketts and Goldsmith., 2005), the Hispanics oral health care utilization model (Meija et al., 2008) and Andersen’s health behavior model (Andersen., 1995).

According to the Health Belief Model, an individual’s intention to prevent illness and use health services is influenced by the individual’s perceived susceptibility to disease, perception of illness severity, perception of benefits versus costs, perceived barriers and self-efficacy. In 2007, Meija et al developed a conceptual framework to explain the use of oral health care among Hispanics living in the United States. This model categorizes factors affecting utilization into individual and environmental constructs and each construct has antecedent and empowerment factors. Antecedent

factors are those that play a role in the individual's intention to seek care, and empowerment factors are those that act as mediators between the individual's intention to seek care and receipt of care.

The most popular model of health service utilization was developed in the late 1960s by Ronald Andersen and has subsequently been revised several times. The current Andersen's model has evolved from the first proposed model to include many new constructs derived from new knowledge of factors affecting utilization. The initial model suggested that use of health services was influenced by certain predisposing factors, enabling factors and need. The predisposing factors, enabling factors and need factors together were considered as population characteristics/factors. The current model includes environmental factors, health behaviors and health outcome measures in addition to the original population characteristics.

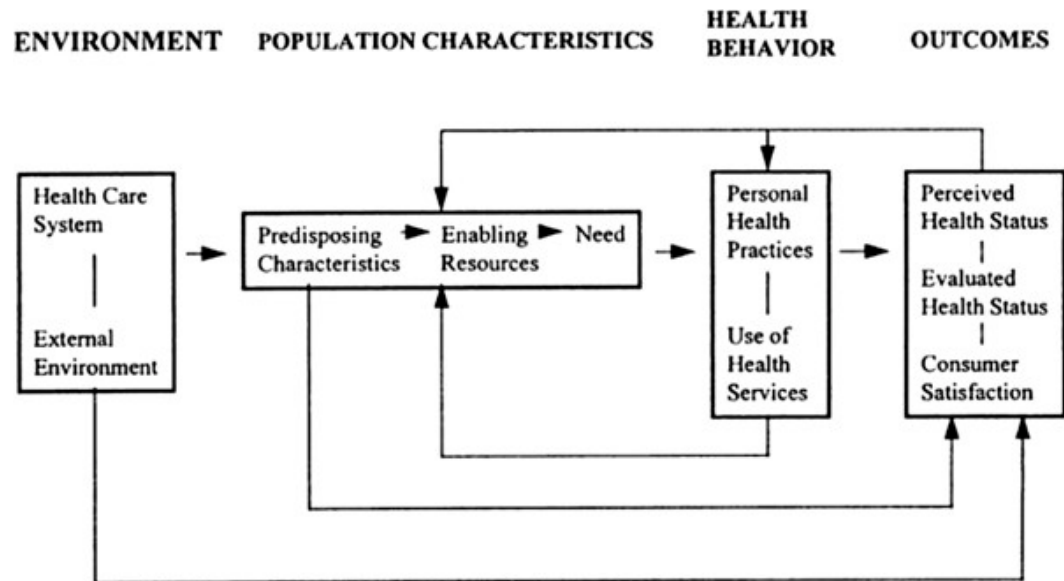
In summary, there are several established models that can be used to study the use of health services. The appropriate model of choice for a study would depend on the type of data that has been collected and the population of the study. The next section will discuss, in detail, the factors influencing utilization of health services from the current Andersen's model since it will be used as a framework for determining the predictors of dental care utilization in this study. The model is merely used as guidance for selecting the appropriate factors affecting healthcare utilization and it's not within the scope of this study to validate the model. The following section provides an overview of all the factors described in the model. The specific factors used for this study will be described in detail later in the methods section.

Factors Affecting Utilization Of Dental Care

Healthy People (HP) 2010 and 2020 are 10-year national objectives that are established to improve the health of people in the United States. The objectives are set based on available national data. The HP 2020 has four overarching goals and one of the goals is to “Achieve health equity, eliminate disparities, and improve the health of all groups” in the United States (HealthyPeople.gov). Based on data from national reports and surveys, the HP 2020 oral health section includes specific objectives to reduce these oral health disparities. Oral health objectives seven and eight in Healthy People 2020 are to increase the proportion of individuals using the oral health care system and to increase the proportion of low-income children and adolescents (2-18 years) receiving preventive dental services (HealthyPeople.gov).

To be able to achieve the HP 2020 oral health objectives of increasing the proportion of individuals using the oral health care system it is essential to study the factors that influence utilization of dental care. Therefore, factors influencing utilization of dental care from the Andersen’s model will be discussed under the following six groups - predisposing factors, enabling factors, need, environmental factors, health behaviors and health outcome factors.

Figure 1: Andersen's Behavioral Model Of Health Services Use (Andersen 1995)



Population Characteristics

The population characteristics include predisposing factors, enabling factors and need. A brief description of each of these factors is provided below.

Predisposing Factors

Factors that reflect an inclination towards use of health care services are called predisposing factors. This component includes demographic factors, social structure and health beliefs of the individual. The current model also includes genetic and psychological factors under this category in addition to the other factors (Andersen., 1995). Demographic factors include individual's age and gender. Social structure includes level of education, race/ethnicity, occupation, culture and social capital. Health

beliefs include the individual's attitudes and knowledge about health and healthcare services.

Enabling Factors

Individual/family and community resources that are needed for use of health services are called enabling factors. Income, health/dental insurance, availability of care, travel time and waiting time for care are considered as enabling factors.

Need

The need component of the model refers to the individual's need for health services. The need for health services can be an individual's perceived need or clinically evaluated need.

Environmental Factors

Environmental factors include the factors of the health care system that influences use of healthcare services. National/state health policies, resources available in the community and their changes over time and how that affects individual's use of healthcare services is addressed in this component of the model.

Health Behavior

Individual's personal health practices and behaviors also play a role in seeking care; therefore, this component includes personal habits/practices such as diet and exercise. Use of healthcare services is also included in this component.

Health Outcome

The final addition to the current model was the health outcome component. This includes individuals perceived health status, evaluated health status and satisfaction with the received services.

To summarize, Andersen's model includes a comprehensive list of factors that can affect the level of healthcare utilization. It takes into account that an individual's decision to seek care is complex and is influenced by multiple factors acting at both the individual and community levels. The model also emphasizes the effect of health care services utilization and its influence on health status. In addition, the model includes feedback loops to help understand how health outcomes in turn, affect other factors in the model and future utilization of healthcare services.

Even though there are a number of factors that influence utilization, many studies have suggested insurance coverage as one of the most important factors in improving access and utilization of healthcare services (Weinick et al., 1996, Zuvekas and Weinick., 1993). Therefore, the following sections will briefly discuss the types of

health insurance coverage in the United States, and their impact on utilization of medical and dental services, since it is the main predictor variable in the present study.

Types Of Health Insurance Coverage In The United States

In the United States, most people are covered by some form of private or public health insurance based on their income level. The Medicaid program is a government-funded program that provides health care coverage for children, pregnant women, disabled individuals and adults. Most of the low-income children and adults who are below the Federal Poverty Level (FPL) are eligible for Medicaid. Nearly 60 million people in the United States receive healthcare coverage through Medicaid and the Children's Health Insurance Program (CHIP) programs (Medicaid.gov).

Children from families that do not qualify for the Medicaid program and do not have the means to buy private insurance may be eligible for the Children's Health Insurance Program. The CHIP program was established in 1997 and it is estimated that currently 8 million children receive health care coverage through this program (Medicaid.gov).

Medicaid provides both medical and dental benefits for children and adults. While the specific eligibility criteria and benefits differ from state to state and for adults and children, all states provide dental benefits to Medicaid enrolled children through the Early and Periodic Screening Diagnostic and Treatment (EPSDT) program. Until recently, private health insurance plans often did not include dental benefits for

children. The Affordable Care Act (ACA) mandates that the insurance plans offered through the exchanges must provide dental benefits for children.

National health expenditures for all Medicaid and CHIP programs for 2011 were approximately \$407 and \$12 billion respectively (CMS.gov). In spite of spending so much for health care, research shows that Medicaid-enrolled patients have difficulty in receiving care and utilization of dental services by Medicaid-insured patients is low compared to patients with private insurance. Data from the Medical Expenditure Panel Survey (2007) shows that 57.3% of people over age two with family incomes greater than or equal to 400% of the FPL had a dental visit in the past 12 months compared to 27.1% among those with family income below the FPL (HealthyPeople.gov).

Most people in the United States are covered by private health insurance. In 2011, 61.2% of the U.S populations under age 65 years were covered by private health insurance plans (Cohen and Martinez., 2012). Private insurance can be employer-based or purchased from private consumer cooperatives or purchased directly from insurance providers. Employer-based private insurance is the most common form of private insurance coverage in the United States. The benefits available with different types of private insurance plans vary widely.

For the year 2011, it was estimated that 61.2% of population under age 65 were covered by private health insurance plans, 23% were covered by public insurance plans and 17.3% had no insurance coverage (Cohen and Martinez., 2012). Additionally, the 2013 GAO report described the differences in dental insurance coverage, payments and fee variations for dental services. According to the report, in the year 2010, 50% of the

population had private dental insurance coverage, 13% had Medicaid/CHIP, 25% had no dental insurance and the dental insurance coverage was unknown for 10-12% of the population.

The next section of the literature review will focus on studies describing association between insurance coverage and utilization of healthcare services among children in the United States. The review includes only studies on utilization among children since the present study aims to understand the association between insurance coverage and utilization of dental services among children. Also, the utilization and insurance coverage patterns vary widely for adults and children and thus this review focuses only on utilization in children and adolescents.

Insurance Coverage And Utilization Of Healthcare Services In Children

The lack of health insurance and its effect on access to healthcare has been an important topic in many state and national settings for many years. This section will review studies from the literature that describe this association in children. Studies including either utilization of outpatient care or utilization of inpatient care by insurance status are included in this review.

A study by Short and Lefkowitz (1992) used data from the National Medical Expenditure Survey (NMES) to determine healthcare utilization among pre-school children. They used data from the 1987 NMES for this study. NMES is a national household survey that provides information on demographics, insurance coverage, use

of healthcare services, healthcare expenditure and sources of payment. “The household survey involved 4 rounds of personal and telephone interviews at approximately 4-month intervals with a final short interview (conducted over the telephone, if possible) as a supplementary fifth round” (Short and Lefkowitz., 1992).

Adult respondents were asked to complete a self- administered health questionnaire for themselves and their children. The study sample included 2,695 children who were 4 years of age or younger. The authors reported that a full year of Medicaid coverage was associated with a “significant increase in well-child care for low-income children who would otherwise be uninsured” and “the logit coefficients imply that a full-year of Medicaid increases the probability of any well-child visits by 17 percentage points for low-income children”(Short and Lefkowitz., 1992).

Stoddard et al (1994) also used NMES data to determine utilization of ambulatory care among children with different insurance coverage. The authors used the 1987 NMES to test the hypothesis that “children without health insurance are less likely than insured children to receive medically indicated ambulatory care when they have specific illness or symptoms” (Stoddard et al., 1994).

The study sample included 7578 children and adolescents aged 1-17 years that participated in the 1987 NMES. The authors examined the association between health insurance coverage and “whether they received medical attention from a physician for pharyngitis, acute earache, recurrent ear infections, or asthma” (Stoddard et al, 1994). Children’s insurance status was categorized as public /private insurance and uninsured. The study reported that children without insurance were more likely than insured

children to receive no medical care for pharyngitis (Adjusted OR=1.72, $p<0.05$), acute earache (Adjusted OR=1.85, $p<0.05$), recurrent ear infections (Adjusted OR=2.12, $p<0.01$) and asthma (Adjusted OR=1.72, $p<0.05$). (Stoddard et al., 1994)

A study by Currie and Grubber (1996) used Medicaid eligibility instead of actual insurance coverage to estimate utilization in children. They used the National Health Interview Survey (NHIS) data from 1984-1992 to “estimate the effect of Medicaid eligibility on the probability of having at least one physician visit during a 1-year period” (Currie and Grubber, 1996). The NHIS collects information on insurance coverage, demographic characteristics, family income, health status and medical care utilization. The study sample included over 225,000 children less than or equal to 15 years of age from 1984-1992 NHIS. (Currie and Grubber., 1996)

Utilization was defined as having had at least one doctor’s visit in the past 12 months. The Medicaid eligibility variable included individuals who were eligible but did not actually have Medicaid coverage as one group, and another group consisting of the uninsured and private coverage as the comparison group. The authors reported that Medicaid eligibility significantly decreased the probability of going without a visit in the previous year by 2.5 percentage points. (Currie and Grubber., 1996)

Banthin and Selden (2003) used data from the 1987 National Medical Expenditure Survey (NMES) and the 1996 Medical Expenditure Panel Survey (MEPS) to determine “changes in children’s access to care, financial burdens and health insurance coverage” (Banthin and Selden., 2003) between the two time points. Both surveys included stratified and clustered random sampling of households. The study sample

included 10,030 observations from NMES and 6,595 observations from MEPS of children less than 19 years of age. The surveys collected information on insurance coverage; demographic characteristics, family income, health status and medical care utilization. (Banthin and Selden., 2003)

Each child in both time periods was assigned to one of the four mutually exclusive eligibility groups. The four groups were,

1. Eligible for Medicaid through aid to families with dependent children, as of 1987
2. Eligible for Medicaid through the poverty related expansions, as of 1996
3. Eligible for SCHIP, as of 2000
4. Ineligible for either program

The first group included poorest group of children who were Medicaid-eligible. The second group included children who became Medicaid eligible with Medicaid expansions in 1984 and 1990. The third group was the comparison group and the fourth group included children from middle and high-income families who did not qualify for Medicaid or SCHIP. Access to care was measured by using four different measures; “a) reporting a usual source of care, and b) having at least one visit to a doctor's office, c) having at least one visit to a dentist's office, and d) having at least one visit to an emergency room”(Banthin and Selden., 2003).

The study reported that among the expansion-eligible children, the percentage of children having at least one visit in the past year increased from 56.8% (1987) to 64.4%(1996). Also, the difference-in-differences (D-in-D) estimate comparing group 2 and group 3 was 8.4 percentage points (Banthin and Selden., 2003).

Lave et al (1998) conducted a study to “determine the impact of children’s health insurance programs on access to health care and on other aspects of the lives of the children and their families” (Lave et al., 1998). The study used a before and after study design and participants were interviewed by telephone at baseline, 6 months and 12 months after enrollment into the Pennsylvania children’s health insurance programs namely BlueCHIP and caring programs. The study sample included 659 randomly selected families and their 1,031 newly enrolled children between August and December 1995. The comparison group included 330 randomly selected families with 460 newly enrolled children who enrolled between August and December 1996. (Lave et al., 1998)

Demographic information, use of health care services, insurance coverage and information on access to care for each child in the family was obtained by telephone survey. Access was measured using questions like “whether the child had a usual source of medical care, dental care, or both, the number of visits the child made to different types of health care providers, and whether the child experienced unmet need, delayed care, or both for 6 types of services (i.e., physician services, emergency services, care recommended by the primary physicians, prescriptions, dental and vision care) in the past 6 months” (Lave et al., 1998). The effect of insurance coverage on the well being of the children and family was measured by the question “What has having health insurance for your kids meant to you and your family?” (Lave et al., 1998).

The study reported that there was a significant increase in the proportion of all continuously enrolled children who had any preventive dental visits, physician visits and

dental visits at 6 months and 12 months after CHIP enrollment in contrast to the comparison group. The proportion of all continuously enrolled children who reported having a physician visit in the past 6 months significantly increased at both 6 months (69.3%, $p < 0.05$) and 12 months (63.9%, $p < 0.05$) after enrollment into CHIP in contrast to the comparison group (55.4%). (Lave et al., 1998)

For the question on the effect of insurance coverage on family, 61 % of parents reported that having insurance “led to peace of mind, reduced worry, and lowered stress”. Additionally, 38% of parents reported that their “children could now get the care they needed, care that they otherwise would not have received” and 12% reported “having health insurance eased the financial burden on their families” (Lave et al., 1998).

Selden and Hudson (2006) used data from Medical Expenditure Panel Survey (MEPS) to determine the relationship between insurance coverage and access to and utilization of medical services in children. The study sample included children 18 years and younger. The authors pooled data from 1996-2002 MEPS for a sample size of 49,003 observations. The MEPS is a nationally representative survey with stratified random sampling of households. The survey collected information on socio-demographic characteristics insurance coverage, medical expenditures and other health related information. In addition, the authors linked the MEPS to the National Health Interview Survey (NHIS) for information on home ownership, nativity, and residence in the United States. (Selden and Hudson., 2006)

Health insurance coverage was defined as uninsured if they lacked coverage for the entire year, publicly insured and privately insured. Access was measured by whether the child had a Usual Source of Care (USC) “i.e., whether there was an office, clinic, health center, or person that the child would usually go to if he/she needed care” (Selden and Hudson., 2006). Utilization was measured by using indicators like dental visits, emergency room visits, ambulatory visits or inpatient hospital stays made over the calendar year.

The study reported that children with insurance were less likely to lack a USC than those without insurance. The percentage of children lacking a USC for privately insured was 6.9%; it was 12.1% for publicly insured and 28.2% for uninsured children. Moreover, the percentage of children with at least one ambulatory visit during the year was 74.5% for privately insured, 69.4% for publicly insured and 49.9% for uninsured children. Also, there was no difference in utilization observed for other type of visits such as dental visits and well-child visits by insurance coverage in multivariate analysis when controlling for other covariates. (Selden and Hudson., 2006)

Holl et al (2000) conducted a study to assess the effect of New York State’s Child Health Plus program on access, utilization, quality of care and health status of children. The New York State’s Child Health Plus (CHPlus) program provided health insurance to kids (0-13 years) who lived in families with income below 222% of the FPL and were not eligible for Medicaid and also did not have any health insurance coverage. Some of the services covered by CHPlus included ambulatory, emergency, specialty care services and prescriptions. Inpatient services were not covered by CHPlus. (Holl at al., 2000)

The study population included children from six western New York State counties who were less than 7 years old when they enrolled in CHPlus program between November 1, 1991 and August 1, 1993; and were enrolled in CHPlus program for at least 9 consecutive months. The authors used a before and after study design. They compared access to care and utilization outcomes in children before and after CHPlus program enrollment. The study sample included 1,730 children, 0-6 years of age. Parents/guardians of the study participants were interviewed after 12 months of enrollment. Chart reviews and parent interviews were used to collect information on child's access and use of medical services. (Holl et al., 2000)

Information on previous insurance status was obtained and was categorized by the extent of services covered. The categories were 1) uninsured, 2) underinsured, 3) fully insured and 4) Medicaid. Additionally, access to health care services was measured by "asking about usual sources of preventive and sick care; 24-hour/day access to a regular medical provider; and whether immunizations were received at a primary care site or at a public health clinic" (Holl et al., 2000).

Utilization was measured by using preventive, sick, and follow-up visits information from the child's primary care charts. "Visits were classified as preventive if there was an indication of well-child care or evidence of preventive services (screening tests or routine immunizations). Sick visits were defined as visits that included a diagnosis of an acute illness in the medical chart. Follow-up visits were defined as visits that occurred within 48 hours of a ED visit, contained a notation of follow-up, or were focused on a single chronic illness" (Holl et al., 2000).

The study reported that the percentage of children reporting usual source of preventive care increased during CHPlus (100%) in comparison to before CHPlus enrollment (98%); the percentage of children reporting usual source of sick care also increased during CHPlus (99%) in comparison to before CHPlus enrollment (96%). The percent increase for usual source of preventive care (1.9%, $p < 0.001$) and sick care (2.7%, $p < 0.001$) was statistically significant. Also, children aged 1-5 years had a significantly higher mean number of primary care visits during CHPlus (0.97/year) in comparison to before CHPlus enrollment (0.75/year, $p < 0.001$). (Holl et al., 2000)

In summary, children without insurance were less likely to have well-child visits when compared to children with insurance. Low-Income children with Medicaid were more likely to have a well-child visit in comparison to low-income children without insurance. Furthermore, Insurance coverage was associated with increased utilization of ambulatory medical services for common medical illnesses in children and sick child visits. Children with no insurance were less likely to receive ambulatory care services in comparison to children with insurance coverage.

Some of the limitations of the studies reviewed in this section include data that were self-reported. Most of the surveys were cross-sectional surveys and included data on only one point of time. Non-Response bias was also a major concern with surveys. Additionally, some studies included Medicaid eligibility and did not use actual insurance coverage for the insurance variable (Currie and Gruber., 1996, Bantlin and Selden., 2003). Moreover, data on utilization were derived using only the measure of having had a visit, while there are other measures that could be used to determine utilization more

accurately. The following section will discuss studies on associations between dental insurance coverage and utilization of dental care among children in the United States.

Dental Insurance Coverage And Utilization Of Dental Care In Children

Over the years, many studies have demonstrated the importance of insurance in improving access and utilization of medical services in children. The literature on dental care utilization and insurance for children is very limited in comparison to the medical care utilization literature. This section provides a review of the existing literature on dental care utilization among children and adolescents in the United States.

Monheit and Cunningham (1992) used national survey data to determine changes in the insurance status and utilization of health care services among children in the United States. They used data from the 1977 National Medical Care Expenditure Survey (NMCES) and the 1987 National Medical Expenditure Survey (NMES) to determine the changes between the two time periods. The NMCES and NMES collect information on healthcare use, demographic characteristics, health insurance coverage, and healthcare expenditures. (Monheit and Cunningham., 1992)

The 1987 NMES included data on 63,749 children aged 0-17 years. Insurance status was classified as insured all year or uninsured. The insured category included private and public insurance, which were defined as follows. Private insurance included people covered only by private insurance (all year), public insurance included people

covered by public insurance all year or by a combination of both public and private insurance. (Monheit and Cunningham., 1992)

The study reported that in 1987 children covered by private insurance (57.6%) were 2 times more likely to receive dental care in comparison to children who were uninsured (23.6%). In addition, the percentage of privately insured children using dental care increased from 51.7% to 57.6% between 1977 and 1987. The percentage of uninsured children using dental care declined from 30.1% to 20% between 1977 and 1987. (Monheit and Cunningham., 1992)

Manski et al (2001) used data from 1996 Medical Panel Expenditure Survey (MEPS) to understand the impact of dental insurance coverage on dental care access and expenditure. The MEPS is a national survey sponsored by the Agency for Healthcare Research and Quality and that collected information on socio-demographic characteristics, health care expenditure, payment source and health insurance data. The 1996 MEPS sample consisted of 10,500 households. Each household was interviewed 3 times over an 18-month period to collect data for 1996 MEPS. The response rate for the 1996 MEPS was 70%. (Manski et al., 2001)

The study sample included 6,595 participants between 0-18 years of age. The variable for dental coverage included private dental insurance, Medicaid and no insurance as three categories. The outcome variable was “having at least one dental visit” in the year. The authors reported that 42% of children with private insurance coverage had at least one dental visit in comparison to 18% of uninsured children.

Moreover, 28% of children with Medicaid had at-least one dental visit in comparison to 18% of uninsured children. (Manski et al., 2001)

Valencia et al (2012) conducted a study to understand the racial and ethnic disparities in dental care utilization among Iowa children. The authors used the 2005 Iowa child and family household health survey data (IHHS) for this study. The IHHS was developed by the joint efforts of the University of Iowa Public Policy Centre and the Iowa Department of Public Health (IDPH) to understand and monitor the health and healthcare needs of children in Iowa. The IHHS was a population based telephone survey that included a sample of 3,669 families with children in the state of Iowa. The study sample included 3,288 children aged 3-17 years. (Valencia et al., 2012)

The dependent variable, utilization of dental care was defined by child having had a dental check up in the previous year. Child's dental insurance status was categorized as uninsured and insured. The study reported that children who had no dental insurance were less likely to report having a dental visit in the past year in comparison to children with dental insurance (OR=2.11, $p < 0.001$). The limitations of this study were that the study sample was not random sample and the study design was cross-sectional study design. (Valencia et al., 2012)

A study by Wall et al (2012) examined the trends in oral health services utilization from 1997-2010 for adults and children using the National Health Interview Survey (NHIS). The NHIS survey collects information on demographics and insurance coverage on every sample household. "One adult and one child per household are randomly selected for the sample adult core and sample child core components " of the

NHIS. The response rate for the 2010 NHIS sample adult component and sample child component was 60.8% and 70.7% respectively. (Wall et al., 2012)

Dental care utilization was assessed using the survey question “About how long has it been since {sample person} last saw a dentist?” (Wall et al., 2012). The respondents who indicated “six months or less” or “more than six months, but not more than one year ago” were considered to have had a dental visit during the past year” (Wall et al., 2012). Insurance coverage was categorized as private health insurance, Medicaid (included both Medicaid and CHIP) and no insurance based on the coverage at the time of the interview. People without insurance were identified using the NOTCOV variable available in the dataset. (Wall et al., 2012)

The study reported that the utilization rate for children aged 2-20 years increased from 1997 (71.6%) to 2010(77%). Additionally, the percentage of children covered by private insurance decreased from 1997 (66.2%) to 2010 (54.2%), the percentage of children covered by Medicaid/CHIP increased from 1997 (16.1%) to 2010 (32.2%) and the percentage of children without any insurance decreased from 1997 (14.4%) to 2010 (10.2%). Some of the limitations of this study were that the utilization data were self-reported. Private health insurance and public health insurance were used as proxy measures for private dental insurance and public dental insurance. (Wall et al., 2012)

Isong et al (2012) also used NHIS data to determine racial disparity trends in utilization of dental services by children from 1964-2010. The study included data on children 2-17 years of age from the 1964,1976,1989,1999 and 2010 NHIS. In this study,

the authors assessed differences in dental utilization outcomes (from 1989-2010) among children by insurance and FPL status. The dependent variables in the study were “(1) child’s receipt of a dental visit in the previous 12 months and (2) child’s history of never having had a dental visit” (Isong et al., 2012). Health insurance status was categorized as public and private. The sample size for the study varied from 42,973 in 1964 to 8,647 in 2010. (Isong et al., 2012)

The study reported that the prevalence of children lacking dental visits decreased from 1989 to 2010 for both publicly insured and privately insured categories. Additionally, the decrease in not having a dental visit was greater among publicly insured children in comparison to the privately insured children. The percentage of lack of dental visits by insurance category is presented below for the three time periods. (Isong et al., 2012)

Table 1: Utilization Of Dental Services (Isong et al 2012)

	1989	1999	2010
Last dental visit >12 months			
Public Insurance	44.6%	36.3%	22.7%
Private Insurance	29.4%	21.7%	17.1%
Never had a dental visit			
Public Insurance	21.8%	19.3%	11.7%
Private Insurance	15.1%	12.1%	9.4%

Some of the limitations of this study were that the utilization data were self-reported and data on uninsured children were not included in the analysis.

The Selden and Hudson (2006) study used data from Medical Expenditure Panel Survey (MEPS) and the National Health Interview Survey (NHIS) to determine the relationship between insurance coverage and utilization of dental services in children. The study sample included children aged 18 and younger. The authors pooled data from 1996-2002 MEPS for a sample size of 49,003 observations. The survey collected information on socio-demographic characteristics, insurance coverage, medical expenditures and other health related information. Health insurance coverage was defined as uninsured, publicly insured and privately insured. Dental utilization was measured by using indicators like “whether children had any dental visits (measured over the calendar year)” (Selden and Hudson., 2006).

The study reported that the percentage of children with at least one dental visit during the year for privately insured was 47.6%, for publicly insured was 29% and for uninsured children was 21.6%. Also, they observed that there was no difference in utilization of dental visits by insurance type in multivariate analysis when controlling for other covariates such as age, gender, race/ethnicity, parent’s education, self-reported oral health status etc. (Selden and Hudson., 2006)

The study by Lave et al (1998) used a before-after study design to “determine the impact of children’s health insurance program on access to health care and other aspects of the lives of the children and their families” (Lave et al., 1998). Participants in this study were interviewed by telephone at baseline, 6 months and 12 months after

enrollment into the Pennsylvania BlueCHIP and caring programs. The study sample included 659 randomly selected families and their 1,031 newly enrolled children between August and December 1995. The comparison group included 330 randomly selected families with 460 newly enrolled children between August and December 1996. (Lave et al., 1998)

Demographic information, use of health care services, insurance coverage and information on access to care for each child in the family was obtained by telephone survey. Access was measured using questions like “whether the child had a usual source of medical care, dental care, or both” (Lave et al., 1998) and questions on the number of visits to different health care providers and whether the child experienced unmet need, delayed care, or both for services such as physician services, emergency services, care recommended by the primary physicians, prescriptions, dental and vision. (Lave et al., 1998)

The study reported that there was a significant increase in the proportion of all continuously enrolled children who had any preventive dental visits, physician visits and dental visits at 6 months and 12 months after CHIP enrollment in contrast to the comparison group. The proportion of all continuously enrolled children who reported having a dental visits in the past 6 months significantly increased at both 6 months (59.7%, $p<0.05$) and 12 months (64.7%, $p<0.005$) after enrollment into CHIPs in contrast to the comparison group (55.4%, $p<0.05$). (Lave et al., 1998)

In summary, children with dental insurance had higher utilization of dental services in comparison to children without dental insurance. Among those with

insurance, children with private insurance were more likely to have a dental visit in comparison to children with public insurance. Additionally, the number of children with private insurance and no insurance has decreased over time and children with public insurance have increased over time. This literature review began with a discussion on existing oral health disparities, models of healthcare use and predictors of health care utilization, and focused on literature about association between insurance coverage and utilization of healthcare and dental services among children in the United States.

Summary And Need For This Study

Healthy People (HP) 2010 and 2020 are 10-year national objectives that were established to improve the health of people in the United States. The objectives are set based on available national data. The HP 2020 has four overarching goals and one of the goals is to “Achieve health equity, eliminate disparities, and improve the health of all groups” in the United States (HealthyPeople.gov). Based on data from national reports and surveys, HP 2020 oral health section includes specific objectives to reduce these oral health disparities. Oral health objectives seven and eight in Healthy People 2020 are to increase the proportion of individuals using the oral health care system and to increase the proportion of low-income children and adolescents (2-18 years) receiving preventive dental services (HealthyPeople.gov).

To be able to achieve the HP 2020 oral health objectives of increasing the proportion of individuals using the oral health care system, it is essential to understand what factors influence utilization of dental care. As reviewed in the previous section,

there are many studies in the literature that assessed the association between insurance coverage and level of medical services utilization among children but only a few studies have assessed the association between dental insurance coverage and the level of dental care utilization in children. Most of the studies on dental care utilization are based on national surveys and do not provide state-based estimates for utilization. Therefore, the goal of this study is to determine the impact of dental insurance coverage on dental care utilization and oral health status of Iowa children using the 2010 Iowa Household Health Survey data.

CHAPTER 3- METHODS

Introduction

As reviewed in chapter two, national data show that dental disease prevalence in the United States is still high among racial/ethnic minority groups and the underserved population. National health expenditures for Medicaid and CHIP programs for 2011 were approximately \$407 and \$12 billion respectively (CMS.gov). In spite of spending so much for health care, research shows that Medicaid-enrolled patients have difficulty in receiving care and utilization of dental services by Medicaid-insured patients is low compared to patients with private insurance.

Data from the Medical Expenditure Panel Survey (2007) shows that 57.3% of people over age two with family incomes greater than or equal to 400% of the Federal Poverty Level (FPL) had a dental visit in the past 12 months compared to 27.1% among those with family income below 100% of the FPL (HealthyPeople.gov). Therefore, the purpose of this study is to determine the impact of dental insurance coverage on dental care utilization and oral health status of Iowa children aged 4-17 years.

This study primarily focuses on the association between dental insurance coverage and dental care utilization in Iowa children. In addition, as dental utilization along with the other predisposing and enabling factors has been theorized to impact oral health status in the Andersen's model of health care utilization, this study also examines the association between type of dental insurance coverage and parent perceived oral health status.

So, the primary research question is: What is the association between type of dental insurance coverage and dental care utilization in Iowa children aged 4-17 years? The secondary research question is: What is the association between type of dental insurance coverage and parent perceived oral health status in Iowa children aged 4-17 years?

This chapter discusses the methodology involved in conducting this study. The data source, selection of the study sample, hypotheses that were tested, variables and statistical analysis used for this study will be described in detail.

Data Source & Study Sample

The present study addresses the research questions by performing secondary analysis of the 2010 Iowa Child and Family Household Health Survey (IHHS) data. The Iowa Child and Family Household Health Survey were developed by the joint efforts of the University of Iowa public health research team and the Iowa Department of Public Health (IDPH). The IHHS was developed to understand and monitor the health and healthcare needs of children in Iowa. Additionally, the purpose of the survey was to provide information for researchers, public health professionals and policy makers on the health status and healthcare needs of Iowa children. The survey was administered in the years 2000, 2005 and 2010. The 2010 Iowa Child and Family Household Health Survey (IHHS) data was used for this study.

Investigators at the University of Northern Iowa Center for Social and Behavior research collected the 2010 IHHS data. Five groups funded the 2010 survey, 1. IDPH,

- 2.U.S Department of Health and Human Services Maternal and Child Health Bureau,
- 3.Blank Children’s Hospital, 4.American Academy of Pediatrics (Iowa chapter) and
- 5.Iowa Child Health Specialty Clinics.

In the 2010 IHHS, Iowa households were randomly selected using an address-based sampling approach that differed from the previous surveys. Minority groups such as African American and Latinos were oversampled in the IHHS to better understand the health needs of these populations and also to be able to detect statistically significant differences between the different racial and ethnic groups.

In the address based sampling approach, letters with information about the study and instructions on completing the survey online were sent to a random sample of addresses in Iowa that were selected from the United States Postal Service delivery sequence file. Along with this letter participants were also notified that if they did not complete the online survey within a week of receiving the letter then they would be contacted by telephone to participate in the interview. Information on one randomly selected child under the age of 18 years was obtained from the adult that was most knowledgeable about the child in each household. The same selection criteria were used for both the telephone and the online surveys.

The IHHS survey included over 165 questions under various domains related to children’s health. Some of the topic areas included access to care, behavioral and emotional health, early childhood issues, oral health, social determinants of health, parent health status and demographic characteristics of the child and family etc. The

present study included data from oral health, access to care and demographic characteristics of the child and family topics areas.

Therefore the study sample included participants of the 2010 IHHS who were older than 3 years of age and had response available on the utilization of oral health survey question in the oral health section.

Dependent & Independent Variables

There were two dependent variables in this study. The first dependent variable was utilization of dental care. This was assessed using the survey question “When was the child’s last check-up by a dentist?” and the responses available were “Less than 12 months ago, between 1 and 2 years ago, more than 2 years ago and child has never been to the dentist”. Because of the small number of respondents in each of the categories, “between 1 and 2 years ago, more than 2 years ago and child has never been to the dentist” categories were collapsed into one group “Equal to or greater than 12 months”. Therefore, the responses were dichotomized as two categories, “1. Less than 12 months ago” and “2. Equal to or greater than 12 months” for the analysis.

The second dependent variable was parents perceived oral health status of their child. This was assessed using the survey question “How would you rate the child’s overall dental health?” and the responses available were “excellent, very good, good, fair and poor”. Excellent, very good categories were collapsed into one group while good, fair and poor categories were collapsed into another group because of the small number of respondents in each of those three categories. Therefore, the responses for

parent perceived oral health were dichotomized as two categories, “1. Excellent, very good,” and “2. Good, fair, poor” for the analysis.

The dependent and independent variables used in this study are presented in Table 2 along with the survey questions used to assess these variables and their corresponding categories.

Table 2: Dependent And Independent Variables With IHHS Survey Questions And Categories

Variable Name	Survey question(s) assessing variable	Original Categories	Final Categories
Dependent Variables			
1.Utilization of oral health care	When was the child’s last check-up by a dentist?	Less than 12 months ago Between 1 and 2 years ago More than 2 years ago Child has never been to the dentist	Binary: 1. Less than 12 months ago 2. Equal to or greater than 12 months
2.Parent perceived child’s oral health status	How would you rate the child’s overall dental health?	Excellent Very Good Good Fair Poor	Binary: 1. Excellent, very good 2. Good, fair, poor

(Table -2 Continued)

Independent Variables			
Dental Insurance	Does child currently have insurance that covers dental care? Kind of dental insurance?	Yes No Your employer Someone else's employer A plan that you or someone else buys on your own The HAWK-I program Medicaid or Title 19 The Military, Champus or the VA The Indian Health Service Some other source	Categorical: 1. Public insurance 2. Private insurance 3. No insurance
Race/ethnicity of child	Is the child of Spanish or Hispanic origin? What is the child's race?	Yes No African-American White American-Indian/Native American/Aleutian or Eskimo Asian/Pacific Islander Some other race	Binary: 1. Whites 2. All other races
Age of child	Child's birth month and year OR reported age?	Open-ended	Categorical: 1. 4-9 years 2. 10-14 years 3. 15-17 years
Gender	What is the gender of the child in your home?	Open-ended	Binary: 1. Boy 2. Girl
Regular source of care for child	Is there one main place where you usually go for your child's dental care?	Yes No	Binary: 1. Yes 2. No

(Table 2 – Continued)

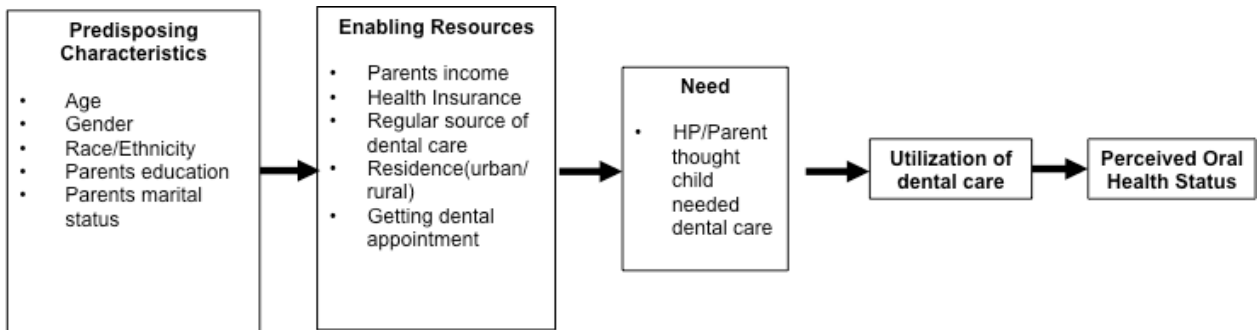
Need for dental care	During the last 12 months, was there any time when you or a health professional thought [CHILD] needed dental care?	Yes No	Binary: 1. Yes 2. No
Parent education	What is the highest grade or level of school that you have completed?	8th grade or less Some high school but did not graduate High school graduate Or GED Some college or 2-year degree 4-year college graduate More than 4-year college graduate	Categorical: 1. High school or less 2. Some college 3. 4-year college graduate +
Household income	What was the total combined income in 2009 for all persons in your household?	\$5,000 increments from \$0-\$80,000 More than \$80,000	Categorical: 1. \$0-\$40,000 2. \$40,001-\$80,000 3. More than \$80,000
Medical insurance	Do you have any kind of health care coverage for yourself, including health insurance, prepaid plans such as HMOs, or government plans such as Medicaid or Title 19?	Yes No	Binary: 1. Yes 2. No
Parents marital status	Marital status	Married Divorced Widowed Separated Never married	Binary: 1. Married 2. Not- married
Residence	What is your zip code?	Open-ended	Binary: 1. Rural and mostly rural 2. Urban and mostly urban

(Table 2 – Continued)

Ease of getting dental care	How often were you able to get dental care for your child as soon as you wanted?	Never Sometimes Usually Always	Categorical: 1. Never, Sometimes 2. Usually 3. Always
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The Andersen's model of health services utilization was used as a framework for determining the predictors of dental care utilization in this study population. The model was merely used as guidance for selecting the appropriate factors affecting healthcare utilization and it's not the scope of this study to validate the model. Figure 2 provides an overview of the factors used for this study and how it relates with the utilization of dental care and perceived oral health status.

Figure 2: Model With Variables Using The Andersen's Behavior Model Framework



Hypotheses

The specific null hypotheses for the dependent variable “dental care utilization” are listed below.

- i. There is no association between dental care utilization and child’s insurance status.
- ii. There is no association between dental care utilization and child’s age.
- iii. There is no association between dental care utilization and child’s gender.
- iv. There is no association between dental care utilization and child’s race/ethnicity.
- v. There is no association between dental care utilization and parent’s education level.
- vi. There is no association between dental care utilization and parent’s marital status.
- vii. There is no association between dental care utilization and parent’s income level.
- viii. There is no association between dental care utilization and regular source of dental care.
- ix. There is no association between dental care utilization and child’s residence.
- x. There is no association between dental care utilization and perceived dental need.
- xi. There is no association between dental care utilization and ease of getting dental appointment for the child.

The specific null hypotheses for the dependent variable “perceived oral health status” are listed below.

- i. There is no association between the parents perceived oral health status of their child and child’s insurance status.
- ii. There is no association between the parents perceived oral health status of their child and child’s dental care utilization.
- iii. There is no association between the parents perceived oral health status of their child and child’s age.
- iv. There is no association between the parents perceived oral health status of their child and child’s gender.
- v. There is no association between the parents perceived oral health status of their child and child’s race/ethnicity.
- vi. There is no association between the parents perceived oral health status of their child and parent’s education level.
- vii. There is no association between the parents perceived oral health status of their child and parent’s marital status.
- viii. There is no association between the parents perceived oral health status of their child and parent’s income.
- ix. There is no association between the parents perceived oral health status of their child and regular source of dental care.

- x. There is no association between the parents perceived oral health status of their child and child's residence.
- xi. There is no association between the parents perceived oral health status of their child and perceived dental need.
- xii. There is no association between the parents perceived oral health status of their child and ease of getting dental appointment for the child.

Study Approval

University of Iowa's Institutional Review Board determined that the data used for this study was de-identified; so human subject's approval for this study was not needed. Also, permission was obtained from the Iowa Department of Public Health for using the 2010 IHHS survey data for this study.

Statistical Analysis

Data were analyzed using SPSS (IBM-SPSS Statistics v21 for Mac) statistical software. Descriptive statistics were applied for all variables of interest in the study. Bivariate analysis was conducted to explore the significant factors associated with utilization of dental care and parents perceived child's oral health status using the chi-square test. Variables that showed statistical significance ($p < 0.05$) in the bivariate analysis were admitted into the final logistic regression model.

Forward stepwise logistic regression analysis was used to identify significant predictor variables for each of the dependent variables, verified by using backward

elimination. Therefore, two final logistic regression models were obtained, that is one model for utilization of dental care and another model for parent's perceived oral health status of their child. The Homer and Lemeshow Goodness-of-Fit test was used to evaluate the goodness of the model fit. A p-value of less than 0.05 was used as a criterion for statistical significance.

CHAPTER 4- RESULTS

Descriptive Results

Findings from the descriptive, bivariate and multiple logistic regression analyses are described in this section. A total of 2,386 participants had completed the 2010 Iowa Child and Family Household Health Survey. Of those, only participants who were older than three years of age and younger than 18 years and had answered the survey question on utilization of oral health care were included in this study. Therefore, the final sample size for this study was 1,927. Detailed descriptive statistics about the characteristics of the study participants are presented in Table 3.

A majority of the respondents reported that their child had a dental visit in the past year (92.9%) and only a small percentage of parent's rated their child's oral health status as poor, fair and good (21.8%). Around 63.8% of the respondents reported that their child had private dental insurance, 18.1% reported having public dental insurance and 17.3% reported that their child had no dental insurance. Most of the respondents were married (81.3%), lived in mostly urban area (64.5%), had medical insurance (89.9%), reported a perceived dental need for their child (87.6%) and had a regular source of dental care (97.1%) for the child.

Additionally, most of the children in the study were White (86.6%), 51.3% of the children were boys, 36.2 % were between four to nine years of age, 35.2% were between 10-14 years of age and 28.5% were between fifteen to seventeen years of age. About 19.3% of the respondents reported having high school level education or less,

37.3% reported having some college level education, 43.4% reported having a 4-year college degree and more. Moreover, 17.9% of the respondents reported an income level less than \$40,000/year, 34.8% reported an income level between \$40,001-\$80,000/year and 35.3% reported an income level greater than \$80,000/year.

Table 3: Descriptive statistics for all variables of interest in the study (N=1,927)

Variables	Frequency	Percent
Gender		
Boy	988	51
Girl	939	49
Child needed dental care		
Yes	1688	88
No	234	12
Regular source of dental care		
Yes	1872	97
No	51	3
Child race/ethnicity		
All other races	136	8
Whites	1669	92
Ease of getting dental care		
Sometimes/Never	159	8
Usually	459	24
Always	1309	68
Parents' education		
High school or less	372	19
Some college	719	37
4-yr college, graduate+	836	44
Income categories		
\$0-\$40,000	344	20
\$40,001-\$80,000	671	40
Greater than \$80,000	680	40
Parent's health insurance		
Yes	1733	90
No	192	10

(Table 3 – Continued)

Parent's marital status		
Married	1567	81
Not-Married	356	19
Age		
4 to 9 years	698	36
10 to 14 years	679	35
15 to 17 years	550	29
Urban rural areas		
Urban/Mostly urban	1242	65
Rural/Mostly rural	662	35
Child's dental insurance		
No insurance	333	18
Private insurance	1229	64
Public insurance	349	18
Dental care utilization		
Equal to or greater than 12 months	137	7
Less than 12 months	1790	93
Parent perceived child's oral health status		
Good, Fair, Poor	420	22
Excellent, Very good	1506	78

Note: Due to missing data, not all variables add up to the total sample size population of 1,927

Bivariate Results

Bivariate analysis was performed to explore the association between the dependent variable utilization of dental care and each of the independent variables, and the results are presented in Table 4. There were statistically significant association between the dependent variable dental care utilization and the following independent variables: age of the child ($p=0.023$), child's dental insurance ($p<0.001$), perceived dental need ($p<0.001$), having a regular source of dental care ($p<0.001$), getting dental care for child ($p<0.001$), parent's education ($p<0.001$), parent's income level ($p<0.001$), parent's health insurance ($p<0.001$), parent's marital status ($p<0.001$) and child's residence

($p=0.018$). There was no statistically significant association between the dependent variable utilization of dental care and child's gender or race.

Moreover, children with private dental insurance (96%) were more likely to have a dental visit in the past year in comparison to children with public dental insurance (89.7%) and no dental insurance (85.6%). Children of respondents who reported perceived dental need (96.3%) were more likely to have a dental visit in the past year in comparison to respondents who did not report perceive dental need for their child (68.8%). Children who reported having a regular source of dental care (94.3%) were more likely to have a dental visit in the past year in comparison to children who did not have a regular source of dental care (41.2%). Children of respondents who reported being married (94%) were more likely to have a dental visit in the past year in comparison to children of respondents who were not married (87.9%). Children whose parents reported having health insurance (93.9%) were more likely to have a dental visit in the past year in comparison to children whose parents reported having no health insurance (83.3%).

Furthermore, bivariate analysis was also conducted to explore the association between the dependent variable parent's perceived oral health status and each of the independent variables, and the results are presented in Table 5. There were statistically significant associations between the dependent variable parent perceived oral health status and the following independent variables: age of the child ($p=0.011$), child's gender ($p=0.013$), child's dental insurance ($p<0.001$), having a regular source of dental care ($p<0.001$), child's race ($p=0.001$), getting dental care for child ($p<0.001$), parent's

education ($p < 0.001$), parent's income level ($p < 0.001$), parent's health insurance ($p < 0.001$), parent's marital status ($p < 0.001$) and utilization of dental care ($p < 0.001$). There was no statistically significant association between the dependent variable parent's perceived oral health status and perceived dental need for child or child's residence.

Parents were more likely to report excellent/very good oral health status for the child if the child had a dental visit in the past year (79.7%) in comparison to children who did not have a dental visit in the past year (58.4%). Respondents who reported being married (80%) were more likely to report excellent/very good oral health status for the child in comparison to respondents who were not married (69.9%). Participants who reported having a regular source of dental care for their child (79.1%) were more likely to report excellent/very good oral health status for the child in comparison to participants who did not have a regular source of dental care for their child (47.1%).

Additionally, respondents with children who had private dental insurance (81.7%) were more likely to report excellent/very good oral health status for the child in comparison to children with public dental insurance (67%) and no dental insurance (77.8%). Children whose parents reported having health insurance (79.8%) were more likely to report excellent/very good oral health status for the child in comparison to children whose parents reported having no health insurance (63.5%). Children of respondents who reported having more than four years of college education (86.7%) were more likely to report excellent/very good oral health status for the child in

comparison to children of respondents who reported some college education (73.4%) and high school or less education (68.2%).

Table 4: Results of Bivariate Analysis of Dental Care Utilization with Independent Variables

Independent Variables	Less than 12 months N=1790	Equal to or greater than 12 months N=137	p Value
Dental insurance			<0.001*
No insurance	285(86%)	48(14%)	
Private insurance	1180(96%)	49(4%)	
Public insurance	313(90%)	36(10%)	
Gender			0.399
Boy	913(92%)	75(8%)	
Girl	877(93%)	62(7%)	
Urban rural areas			0.018*
Urban/Mostly urban	1166(94%)	76(6%)	
Rural/Mostly rural	602(91%)	60(9%)	
Parent's education			<0.001*
High school or less	326(88%)	46(12%)	
Some college	664(92%)	55(8%)	
4-yr college graduate+	800(96%)	36(4%)	
Child's race			0.13
All other races	122(90%)	14(10%)	
Whites	1555(93%)	114(7%)	
Parent's marital status			<0.001*
Married	1473(94%)	94(6%)	
Not-Married	313(88%)	43(12%)	
Ease of getting dental care			<0.001*
Sometimes/Never	115(72%)	44(28%)	
Usually	421(92%)	38(8%)	
Always	1254(96%)	55(4%)	

(Table 4 – Continued)

Regular source of dental care			<0.001*
Yes	1766(94%)	106(6%)	
No	21(41%)	30(59%)	
Income categories			<0.001*
\$0-\$40,000	303(88%)	41(12%)	
\$40,001-\$80,000	619(92%)	52(8%)	
Greater than \$80,000	658(97%)	22(3%)	
Age			0.023*
4 to 9 years	660(95%)	38(5%)	
10 to 14 years	632(93%)	47(7%)	
15 to 17 years	498(90%)	52(10%)	
Child needed dental care			<0.001*
Yes	1625(96%)	63(4%)	
No	161(69%)	73(31%)	
Parent's health insurance			<0.001*
Yes	1628(94%)	105(6%)	
No	160(83%)	32(17%)	

*Statistically significant ($p < 0.05$) using chi-square test

Note: Statistical analysis were conducted based on all non-missing values

Table 5: Results of Bivariate Analysis of Perceived Oral Health with Independent Variables

Independent Variables	Excellent, Very good N=1506	Good, Fair, Poor N=420	p Value
Dental care utilization			<0.001*
Less than 12 months	1426 (80%)	363(20%)	
Equal to or greater than 12 months	80(58%)	57(42%)	
Parent's marital status			<0.001*
Married	1253(80%)	313(20%)	
Not-Married	249(70%)	107(30%)	
Ease of getting dental care			<0.001*
Sometimes/Never	84(53%)	75(47%)	
Usually	331(72%)	128(28%)	
Always	1091(83%)	217(17%)	

(Table – 5 Continued)

Regular source of dental care			<0.001*
Yes	1480(79%)	391(21%)	
No	24(47%)	27(53%)	
Income categories			<0.001*
\$0-\$40,000	231(67%)	113(33%)	
\$40,001-\$80,000	509(76%)	161(24%)	
Greater than \$80,000	595(88%)	85(12%)	
Child's dental insurance			<0.001*
No insurance	259(78%)	74(22%)	
Private insurance	1003(82%)	225(18%)	
Public insurance	234(67%)	115(33%)	
Child's race			0.001*
All other races	90(66%)	46(34%)	
Whites	1311(79%)	357(21%)	
Parents' education			<0.001*
High school or less	253(68%)	118(32%)	
Some college	528(73%)	191(27%)	
4-yr college graduate+	725(87%)	111(13%)	
Age			0.011*
4 to 9 years	538(77%)	159(23%)	
10 to 14 years	514(76%)	165(24%)	
15 to 17 years	454(83%)	96(17%)	
Urban rural areas			0.081
Urban/Mostly urban	986(80%)	255(20%)	
Rural/Mostly rural	503(76%)	159(24%)	
Child needed dental care			0.737
Yes	1322(78%)	366(22%)	
No	181(77%)	53(23%)	
Parent's health insurance			<0.001*
Yes	1383(80%)	349(20%)	
No	122(64%)	70(36%)	
Gender			0.013*
Boy	750(76%)	238(24%)	
Girl	756(81%)	182(19%)	

*Statistically significant ($p < 0.05$) using chi-square test

Note: Statistical analysis were conducted based on all non-missing values

Multivariable Results

Variables that were statistically significantly associated with utilization of dental care in the bivariate analysis were used to develop the final logistic regression model for the first dependent variable utilization of dental care. Similarly, variables that were statistically significantly associated with parent perceived oral health status of their child in the bivariate analysis were used to develop the final logistic regression model for the second dependent variable parent perceived oral health status. Two-way interactions between certain two variables were examined, including the interaction between age and gender in the parent perceived oral health status model. However, no significant interaction was found. Results from the utilization of dental care logistic regression model are presented in Table 6 and results from the parent perceived oral health status logistic regression model are presented in Table 7.

Results from the utilization of dental care model indicate that the significant predictor variables are: child's dental insurance ($p < 0.001$), ease of getting dental appointment for the child ($p < 0.001$), having regular source of dental care for the child ($p < 0.001$), age of the child ($p = 0.005$) and having perceived dental need for the child ($p < 0.001$).

Compared to children with no insurance, children with private dental insurance were 2.63 times as likely to report having a dental visit in the past year and children with public insurance were 1.69 times as likely to report having a dental visit. The odds of reporting a dental visit in the past year in children who had a regular source of care was

9.14 times the odds of reporting a dental visit in children who did not have a regular source of care. The odds of reporting a dental visit for the child in the past year in respondents who reported as married was 1.59 times the odds of reporting a dental visit for the child in respondents who reported as not-married. The odds of reporting a dental visit in the past year in children with perceived dental need was 8.98 times the odds of reporting a dental visit in children with no perceived dental need.

Also, compared to children who were able to get dental appointment sometimes/never, children who were able to get dental appointment always were 4.66 times as likely to report having a dental visit in the past year and children who were able to get dental appointment usually were 2.80 times as likely to report having a dental visit. Children who were 4-9 years of age were 2.13 times as likely to report having a dental visit in the past year and children who were 10-14 years of age were 1.26 times as likely to report having a dental visit in comparison to children 15-17 years of age.

Results from the parent perceived oral health status model indicate that the significant predictor variables are: respondents' level of education ($p < 0.001$), ease of getting dental appointment for the child ($p < 0.001$), having a dental visit in the past year ($p = 0.005$), child's dental insurance ($p = 0.040$), age of the child ($p = 0.002$) and gender of the child ($p = 0.008$).

The odds of reporting excellent/very good oral health for subjects in age group of 4-9 years and 10-14 years was 40% less than that for subjects in the age group of 15-17 years. The odds of reporting excellent/very good oral health for subjects who were boys was 28% less than that of subjects who were girls. The odds of reporting

excellent/very good oral health for children with private dental insurance and public dental insurance were 5% and 35% less than that for children with no dental insurance.

Moreover, the odds of reporting excellent/very good oral health status for the child among respondents who reported as married was 1.33 times the odds of reporting excellent/very good oral health status for the child among respondents who were not-married. The odds of reporting excellent/very good oral health in children who had a dental visit in the past year was 1.83 times the odds of reporting excellent/very good oral health in children who did not have a dental visit in the past year.

Compared to children who were able to get dental appointment sometimes, respondents of children who were able to get dental appointment always were 3.75 times as likely to report excellent/very good oral health for the child and respondents of children who were able to get dental appointment usually were 2.02 times as likely to report excellent/very good oral health for the child. Respondents with more than four years of college level education were 2.40 times as likely to report excellent/very good oral health status for the child and respondents with some college education were 1.11 times as likely to report excellent/very good oral health status for the child in comparison to respondents with high school level education or less.

In summary, in the bivariate analysis for the dental care utilization variable, there were statistically significant association between dental care utilization and age of the child, child's dental insurance, perceived dental need, having a regular source of dental care, ease of getting dental care for child, parent's education, parent's income level, parent's health insurance, parent's marital status and child's residence.

Additionally, in the bivariate analysis for the dependent variable parent perceived oral health status, there were statistically significant association between oral health status and age of the child, child's gender, child's dental insurance, having a regular source of dental care, child's race, ease of getting dental care for child, parent's education, parent's health insurance, parent's marital status, parent's income level and utilization of dental care.

Lastly, this study on Iowa children 4-17 years of age found that dental insurance was significantly associated with having a dental visit in the past year. Along with dental insurance some of the other predictors of dental care utilization were: having a regular source of dental care for the child, ease of getting dental appointment for the child, child's age and having perceived dental need for the child. Moreover, this study also found that dental insurance was significantly associated with parent perceived oral health status of their child. Some of the other significant predictors of parent perceived oral health status were: respondent's education level, ease of getting dental appointment for the child, child's age, gender of the child and having a dental visit in the past year.

Table 6: Results of Multiple Logistic Regression Analysis of Factors Associated with Dental Care Utilization (N=1927)

Variable	Odds Ratio (95% CI)	p-value
Child's dental insurance		
No insurance	Ref	
Private insurance	2.63(1.61,4.29)	<0.001*
Public insurance	1.69(0.95,3.03)	0.076
Ease of getting dental care		
Sometimes /Never	Ref	
Usually	2.80(1.52,5.15)	0.001*
Always	4.66(2.65,8.20)	<0.001*
Regular source of dental care		
No	Ref	
Yes	9.14(4.21,19.82)	<0.001*
Age		
15 to 17 years	Ref	
4 to 9 years	2.13(1.25,3.60)	0.005*
10 to 14 years	1.26(0.77,2.06)	0.356
Child needed dental care		
No	Ref	
Yes	8.98(5.85,13.78)	<0.001*

*Statistically significant (p<0.05) using chi-square test

Table 7: Results of Multiple Logistic Regression Analysis for Factors Associated with Perceived Oral Health (N =1927)

Variable	Odds Ratio (95% CI)	p-value
Parent's education		
High School or less	Ref	
Some college	1.11(0.81,1.50)	0.497
4 Year college graduate+	2.40(1.71,3.36)	<0.001*
Ease of getting dental care		
Sometimes/ Never	Ref	
Usually	2.02 (1.32,3.09)	0.001*
Always	3.75(2.52,5.57)	<0.001*
Child's dental insurance		
No insurance	Ref	
Private insurance	0.95(0.68,1.32)	0.781
Public Insurance	0.65(0.44,0.96)	0.031*
Age		
15 to 17 years	Ref	
4 to 9 years	0.60(0.44,0.82)	0.002*
10 to 14 years	0.60(0.44,0.82)	0.001*
Dental care utilization		
Equal to or greater than 12 months/Never	Ref	
Less than 12 months	1.83(1.20,2.78)	0.005*
Gender		
Girl	Ref	
Boy	0.72(0.56,0.91)	0.008*

*Statistically significant (p<0.05) using chi-square test

CHAPTER 5- DISCUSSION

Overview

The purpose of this study was to determine the impact of dental insurance coverage on dental care utilization and perceived oral health status of Iowa children. This study focused on two specific research questions. First, what was the association between type of dental insurance coverage and oral health utilization in Iowa children aged 4-17 years? Second, what was the association between type of dental insurance coverage and parent perceived oral health status in Iowa children aged 4-17 years? In addition, this study also identified other predictors for dental care utilization and parent perceived oral health status in the study population. Andersen's model of health services utilization was used as a framework for determining the predictors for dental care utilization and parent perceived oral health status.

The majority of the children in this study were White and had private dental insurance. Most of the study population (92.9%) reported having a dental visit in the past year. Additionally, many respondents reported their child's oral health status as Excellent/Very good (78.2%). The level of dental care utilization reported in this study was higher in comparison to dental care utilization studies reviewed in chapter two. This high level of utilization could be due to the higher socio-economic characteristics of the respondents. Most of the respondents were married, had more than four years of college education, had health insurance, had income greater than \$40,000, had a

regular source of dental care for their child and reported living in mostly-urban and urban areas.

Results from the logistic regression model for utilization of dental care showed that five factors were statistically significant. The five significant factors from the final logistic regression model were: child's dental insurance, having a regular source of dental care for the child, ease of getting dental appointment for the child, age of the child and having a perceived dental need for the child.

Results from the logistic regression model for the parent perceived oral health status showed that six factors were statistically significant. The six significant factors from the final logistic regression model were: child's dental insurance, respondents education level, ease of getting dental appointment for the child, age of the child, having a dental visit in the past year and child's gender.

The present study found that dental insurance played a significant role in children having a dental visit in the past year. Both private and public insurance increased the odds of children having a dental visit in comparison to children with no insurance. This positive association between dental insurance coverage and utilization of dental care are consistent with the findings of Manski et al (2001) study, Valencia et al (2012) and Isong et al (2012).

Even though the odds of having a dental visit was higher among children with public insurance in comparison to children with no insurance, it was still lower in comparison to children with private dental insurance. This might be due to many reasons. One reason could be that the dental coverage for dental procedures and visits

may be different among private and public dental insurance. Another reason could also be that there are fewer dentists' who accept and provide dental care for children with public insurance.

Another important finding in this study is the positive association between dental care utilization and having a regular source of dental care for the child. Having a regular source of dental care significantly increased the odds of having a dental visit in the past year for the study population. Studies by Valencia et al (2012) and Finlayson et al (2014) also found that having a regular source of care was associated with children having a dental visit in the past year.

Finlayson et al (2014) study reported that having a regular source of care was an important determinant in getting dental care for Latino children. Macek et al (2005) and Grembowski et al (2008) also reported similar association between regular source of care and utilization of dental care among Latino children. Additionally, some studies have reported that children with dental insurance are more likely to have a regular source of care in comparison to children without dental insurance (Selden and Hudson 2006, Holl et al 2000).

Moreover, another important finding in this study is the association between parental perceived dental need and utilization of dental care. Perceived dental need was positively associated with having a dental visit in the study population. Similar association between dental need and having a dental visit in the past year was found in the Valencia et al (2012) study. But, a study by Finlayson et al (2014) found that children

were less likely to have a dental visit if the caregiver thought child had cavities and needed care.

Next, the present study found that children of respondents who were able to get dental appointment usually or always were more likely to have a dental visit in the past year in comparison to children of respondents who were not able to get dental appointment. While there are no studies that look at the association between getting dental appointment and having a dental visit directly, there are studies that report provider availability as an important predictor of dental care utilization among Latino children [Tellen et al (2012), Kim et al (2004)].

Finally, another important finding in this study is the association between dental insurance and parent perceived oral health status of their child. The present study found that subjects who had no insurance were more likely to report having excellent oral health compared with subjects who had public insurance, but there was no difference between subjects who had no insurance and those who had private insurance. The study by Kenney et al (2008) found the opposite association in their study. The study reported that people without insurance were less likely to report having excellent oral health in comparison to people with dental insurance but this study did not define the dental insurance variable based on the type of dental insurance coverage like the present study. Dental insurance status was categorized as with dental insurance and without dental insurance in the Kenney et al (2008) study.

Strengths & Limitations

Some of the strengths of this study are the study's sample size. The 2010 Iowa Child and Family Household Health Survey (IHHS) includes data on 2386 Iowa children up to 18 years of age. It is the largest statewide data available on the health and well being of Iowa Children. Also, the IHHS survey instrument incorporates questions on a wide array of health and health care topics related to children, which was very useful in identifying and selecting the independent variables/predictors for this study. Finally, this is the first study to identify the association between type of dental insurance coverage and utilization of dental care among Iowa children.

Even though the present study has strengths there are several limitations. First, this study is a secondary analysis of the IHHS data. Therefore, many factors that were in the Andersen's model of health services utilization were not available and not included in the study. Next, this study was a cross-sectional study therefore no inferences about causality can be made using the study findings. Also, the study sample included respondents of higher socio-economic characteristics, so the study findings may not be generalizable to all populations.

Additionally all data were self-reported by the respondents and were not validated against actual dental records and claims data. Moreover, since all the responses were self-reported, the response to utilization of dental care outcome variable may be subjected to recall bias. Finally, this study included only children who

were 4-17 years of age; therefore the results from this study may not be applicable to children younger than four years of age.

Policy Implications

Disparities in access to dental services and children's oral health have been reported by many studies in the literature. Eliminating these disparities in children's oral health needs a multifaceted approach. It is imperative to address some of the important barriers to care in an effort to increase children's access to dental care. Addressing these barriers and decreasing the disparities in access to dental care for children could lead not only to improved oral health but could also provide better overall health status for the rest of their lives.

First, more strategic efforts should be made to decrease the number of children without dental insurance. Having any kind of dental insurance is related to improved dental care utilization in this study and also in many other studies (Manski et al., 2001, Valencia et al., 2012, Isong et al., 2012). A recent report by the Health Policy Institute stated that dental utilization among low-income children in the United States has increased over the last decade. Additionally, the authors reported that dental utilization among children is at its highest level since 1996 and the main reason for this is the growth of the public dental insurance programs for poor and near-poor children in the United States. (Nasseh & Vujicic., 2014)

Also, it has been estimated that by the year 2018, about 9 million more children could gain dental benefits due to the Affordable Care Act (Nasseh & Vujicic., 2014). This

could lead to an increased demand for dental care, but since only some dentists accept Medicaid or publicly insured patients, this could lead to longer wait times and fewer appointments available for children with public insurance. All of this could result in decreased dental utilization among children from low-income families and lead to reversal of the progress made in dental utilization among children with public dental insurance.

Next, having more dentists' that accept public insurance is a key component to reduce the disparities in access to dental care. Usually the large amount of paper work and low reimbursement level associated with public insurance are reported as some of the important barriers for provider participation in Medicaid and other public insurance programs (Nasseh & Vujicic., 2014). Studies have found that increasing Medicaid reimbursement levels and decreasing the administrative burden associated with public insurance programs can lead to increased dentists participation in the Medicaid and Children's Health Insurance Program (Beazoglou et al., 2015, Nasseh & Vujicic., 2014). Therefore, efforts should be made to change or improve the current policies and regulations so that it can attract more dental providers to care for children with public insurance.

Another important factor to consider is also availability of dental appointment. Since only some dentists accept Medicaid or publicly insured patients, this leads to longer wait times and fewer appointments available. All of this could lead to decrease in obtaining dental care and pent-up dental need. So, strategies to increase dentist participation in Medicaid and other public programs should be developed.

Finally, having a regular source of care was highly associated with having a dental visit in this study and has also shown similar association in other studies (Valencia et al., 2012, Finlayson et al., 2014). Therefore, more efforts should be made towards the establishment of dental home for each child. The American Academy Of Pediatric Dentistry (AAPD) and many other professional organizations support the concept of dental home for all children. The AAPD recommends the establishment of a dental home for each child by 12 months of age.

CHAPTER 6- CONCLUSION

This study on Iowa children 4-17 years of age found that dental insurance was significantly associated with having a dental visit in the past year. Along with dental insurance coverage some of the other predictors of dental care utilization were: having a regular source of dental care for the child, ease of getting dental appointment for the child, age of the child and having perceived dental need for the child. Additionally, this study also found that dental insurance was significantly associated with parent perceived oral health status of their child. The other predictors of parent perceived oral health status were: ease of getting dental appointment for the child, respondent's education level, child's age, having a dental visit in the past year and child's gender.

This study provides insight about the various factors that are related to dental care utilization and could therefore be used to develop strategic and targeted programs to improve access to dental care for children in Iowa. Researchers, policy makers and public health professionals can also use the findings from this study to improve or modify existing programs that promote dental care utilization among children.

REFERENCES

- Andersen RM. Revisiting the behavioral model and access to medical care: Does it matter. *Journal of health and social behavior* 1995; 36(1): 1-10.
- Banthin JS, Selden TM. The ABCs of children's health care: how the Medicaid expansions affected access, burdens, and coverage between 1987 and 1996. *Inquiry*. 2003; 40:133–145.
- Beazoglou T, Douglass J, Myne-Joslin V, Baker P, Bailit H. Impact of fee increases on dental utilization rates for children living in Connecticut and enrolled in Medicaid. *J Am Dent Assoc*. 2015 ;146(1):52-60.
- Cohen RA, Martinez ME. Health Insurance Coverage: Early Release of Estimates From the National Health Interview Survey, 2011. National Center for Health Statistics (2012). Available from: <http://www.cdc.gov/nchs/nhis/releases.htm>
- CMS Fast Facts. Centers for Medicare and Medicaid services.gov, accessed December 2, 2013, <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMS-Fast-Facts/index.html> .
- Currie J, Gruber J. Health Insurance Eligibility, Utilization of Medical Care, and Child Health. *Quarterly Journal of Economics* 1996; 111:431-466.
- Dye BA, Li X, Beltran-Aguilar ED. Selected Oral Health Indicators in the United States, 2005-2008. National Center for Health Statistics Data Brief 2012; 96: 1-8.
- Edelstein BL. Disparities in Oral health and access to care: Findings of National Surveys. *Ambulatory Pediatrics* 2002; 2(2): 141-147.
- Finlayson TL, Gansky SA, Shain SG, Weintraub JA. Dental Utilization By Children In Hispanic Agricultural Worker Families In California. *J Dent Oral Craniofac Epidemiol* 2014; 2(1-2): 15-24.
- General Accounting Office (US) Washington: GAO; 2000. Apr. Report to congressional requesters. Oral health: dental disease is a chronic problem among low-income populations. GAO/HEHS-00-72. Also available from: URL: <http://www.gao.gov/archive/2000/he00072.pdf>.
- Grembowski D, Spiekerman C, Milgrom P. Linking mother and child access to dental care. *Pediatrics*. 2008; 122(4): 805-814
- Holl J, Szilagy P, Rodewald L, Shone L, Zwanziger J, Mukamel D, Trafton S, Dick A, Barth R, Raubertas R. Evaluation of New York State's Child Health Plus: Access, utilization, quality of health care, and health status. *Pediatrics* 2000; 105 (3): 711-718.
- Isong IA, Soobader MJ, Fisher-Owens SA, Weintraub JA, Gansky SA, Platt LJ, Newacheck PW. Racial disparity trends in children's dental visits: US National Health Interview Survey, 1964-2010. *Pediatrics*, 2012; 130(2): 306-314.
- Kim YOR, Telleen S. Predictors of the utilization of oral health services by children of low-income families in the United States: beliefs, cost, or provider? *Taehan Kanho Hakhoe Chi*, 2004;34:1460–7.
- Kenney MK, Kogan MD, Crall JJ. Parental perceptions of dental/oral health among children with and without special health care needs. *Ambul Pediatr*. 2008 Sep-Oct;8(5):312–320.

- Lave J, Keane C, Lin C, Ricci E, Amersbach G, LaVallee C. Impact of a children's health insurance program on newly enrolled children. *JAMA* 1998; 279:1820-25.
- Macek MD, Wagner ML, Goodman HS, Manz MC, Marrazzo ID. Dental visits and access to dental care among Maryland schoolchildren. *J Am Dent Assoc.* 2005; 136(4):524–533.
- Manski R, Edelstein B, Moeller JF. The impact of insurance coverage on children's dental visits and expenditures, 1996. *JADA* 2001; 132:1137–1145.
- Medicaid by Population. [Medicaid.gov](http://www.medicaid.gov) accessed December 2, 2013, <http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Population/By-Population.html> .
- Mejia GC, Kaufman JS, Corbie-Smith G, Rozier RG, Caplan DJ, Suchidran CM. A conceptual Framework for Hispanic Oral Health care. *Journal of Public Health Dentistry* 2008; 68(1): 1-6.
- Monheit AC, Cunningham PJ. Children without health insurance. *Future Child* 1992; 2(2): 154–70.
- Nasseh K, Vujicic M. Dental care utilization rate highest ever among children, continues to decline among working-age adults. Health Policy Institute Research Brief. American Dental Association. October 2014.
- Nasseh K, Vujicic M. The impact of Medicaid reform on children's dental care utilization in Connecticut, Maryland and Texas. *Health Serv Res* December 2014;1-14.
- Oral health objectives. [HealthyPeople.gov](http://www.healthypeople.gov), accessed December 2, 2013, <http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicid=32> .
- Ricketts TC, Goldsmith LJ. Access in health services research: The battle of the frameworks. *Nursing Outlook* 2005; 53(6): 274-280.
- Selden T, Hudson J. Access to care and utilization among children: estimating the effects of public and private coverage. *Med Care* 2006; 44(5): 119–26.
- Short PF, Lefkowitz DC. Encouraging preventive services for low-income children. *Med Care* 1992; 30:766-780.
- Stoddard JJ, St. Peter RF, Newacheck PW. Health insurance status and ambulatory care for children. *N Engl J Med* 1994; 330: 1421-1425.
- Telleen S, Kim YOR, Chavez N, Barrett RE, Hall W, Gajendra S. Access to oral health services for urban low-income Latino children: social ecological influences. *J Public Health Dent*, 2012;72(1):8–18.
- Valencia A, Damiano P, Qian F, Warren JJ, Weber-Gasparoni K, Jones M. Racial and ethnic disparities in utilization of dental services among children in Iowa: the Latino experience. *Am J Public Health* 2012; 102(12): 2352-2359.
- Waldman HB, Ackerman MB, Perlman SP. Increasing Use of Dental Services by Children, but Many Are Unable to Secure Needed Care. *Journal of Clinical Pediatric Dentistry* 2014; 39(1):9-11.
- Wall TP, Vujicic M, Nasseh K. Recent trends in the utilization of dental care in the United States. *J Dent Edu.* 2012; 76(8): 1020-1027.
- Weinick RM, Zuvekas SH, Drilea SK. Access to health care sources and barriers, 1996. Rockville, Md.: U.S. Department of Health and Human Services, Public Health

Service, Agency for Health Care Policy and Research; 1997. Agency for Health Care Policy and Research publication 98-0001.

- Zuvekas SH, Weinick RM. Changes in access to care, 1977–1996: the role of health insurance. *Health Serv Res* 1999; 34:271–279.