# AN UNFORESEEN CONSEQUENCE: THE EFFECT OF A PARENT'S HEALTH INSURANCE COVERAGE

By

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**A. Abstract:**

Background: Many children eligible for public insurance remain uninsured, despite efforts to increase the prevalence of children with health insurance. Outcomes for lack of health insurance for children include an increased likelihood of having an unmet medical need, no usual source of care or doctors visits, and delayed urgent care. Previous studies demonstrate that parent and child health insurance are related, and this association is integral to why eligible children remain uninsured.

Objective: This study explores the association between the length of insurance coverage for adult Oregon Health Plan (OHP) members and whether children in the same household have health insurance. To better understand the circumstances of OHP adults with children living in the same household, socioeconomic, health and health care characteristics were compared for participants with varying lengths of health insurance.

Methods: This is a secondary analysis of the Oregon Health Care Survey data, which includes three waves of surveys conducted at 6-, 18- and 30-months after OHP implemented increased cost-sharing and more stringent administrative rules. This survey oversampled for race and ethnicity, and also used iterative post-stratification raking to account for nonresponse at each wave. Participants were included in this study if they responded to all three surveys, and reported insurance information at 30 months for children in their household. Descriptive analyses compared the socioeconomic, health and health care characteristics for adults that had varying lengths of health insurance coverage. Multivariate logistic regression estimated the odds of having at least one

uninsured child in the household at 30 months for different lengths of adult health insurance coverage, while adjusting for confounding variables.

Results: This study included 559 study participants. The majority of participants were white (85.70%), female (80.32%) and English-speaking (94.00%). Adults with longer lengths of health insurance coverage were more likely to have a chronic illness including depression, had more health care utilization, and were more likely to be enrolled in OHP Plus (an OHP coverage group) at the beginning of the study. Adults with longer lenghts of coverage were also less likely to report medical debt or financial strain at 30 months. Adult insurance length ($p<0.01$), race and ethnicity ($p<0.01$), highest education level ($p<0.01$), primary language ($p<0.01$), age at study start ($p=0.22$), OHP group type at study start ($p=0.18$), insurance type at 30 months ($p<0.01$) and medical debt at 30 months ($p=0.21$) were all found to be associated with having at least one uninsured child in the household at 30 months. Adults with longer lengths of health insurance coverage had significantly decreased odds of having at least one uninsured child in the household at 30 months. Primary language, race and ethnicity, age at study start and OHP group member type at study start were included in the adjusted logistic regression model for the association between having an uninsured child in the household at 30 months and length of adult insurance coverage. (Adjusted Wald test $p<0.001$). The association between length of adult insurance coverage and having at least one uninsured child at 30 months is modified by highest education level, as the association is stronger with high school or less education.

Discussion: This study demonstrates that the longer an adult is insured, the less likely they are to have uninsured children. Therefore, increasing the prevalence of insured children in the United States, should involve shortening any gaps of health insurance coverage that caretakers in the same household have.

## Introduction

*HEALTH INSURANCE FOR CHILDREN AND ADULTS*

Providing children health insurance is a prominent issue in the United States. In 2004, the amount of uninsured children in the United States was 9-10 million and accounted for a prevalence of 12-13% of all children. (Selden, Hudson, & Banthin, 2004) In 2006, the amount of uninsured children was estimated at 7.3 million, representing 10.3% of all children. (Hoilette, Clark, Gebremariam, & Davis, 2009) Examining children's insurance patterns over an extended period of time reveals an even higher prevalence of uninsured children. For example, over a two-year period, the Medical Expenditure Panel Survey (MEPS), a longitudinal study that examines patterns of insurance coverage, found that nationally 12.8 million children experienced one gap in health insurance coverage, 1.5 million experienced multiple gaps, and 3.8 million were uninsured during the entire study. Collectively, the prevalence of children experiencing periods without insurance in the United States was 28%. (Cassedy, Fairbrother, & Newacheck, 2008) Locally in Oregon, 10.1% of children were uninsured in 2002 and 12.3% in 2004. (Selden et al., 2004)

Lack of health insurance for a child can have considerable outcomes. For example, in a 2005 study analyzing families enrolled in the Oregon Food Stamp Program (which has similar eligibility to the Oregon Health Plan (OHP),) a child with a gap in health insurance was more likely to have an unmet medical, prescription or dental need, no usual source of care, no doctors' visits within the last year, and delayed urgent care. The likelihood of these outcomes increased with longer gaps in a child's coverage. (DeVoe, Petering, & Krois, 2008) These findings are observed nationally as in 2006, 23.3% of uninsured children compared to 17.8% of insured children in the United States reported no usual source of care. (Hoilette et al., 2009) Uninsured children in the United States were also found to have 5 to 6 fold higher odds of having an unmet medical need

compared to children with private insurance. (Hoilette et al., 2009) Multiple studies have also shown that both short and long term gaps in health insurance had consequences in health care access. For example, if children endured short periods of being uninsured they were less likely to have a usual source of care and more likely to have delays in needed care. Longer health insurance gaps were associated with a dearth of preventive health visits and delays in receiving medical care and prescriptions. (Cummings, Lavarreda, Rice, & Brown, 2009) (Olson, Tang, & Newacheck, 2005) Analysis of the MEPS also found that children experiencing single or multiple gaps in health insurance coverage were more likely to lack a usual source of care and well-child visits, and to also have unmet medical or prescription drug needs. (Cassedy et al., 2008) Conversely, research has also shown that having health insurance leads to better access to and utilization of health care resources for children, and also improves health outcomes. (Szilagyi, Cheng, Simpson, Berkelhamer, & Sectish, 2008) (Chung, Mathews, McCollum, Elo, & Culhane, 2008) These outcomes are important over a lifetime, as childhood health influences health outcomes over a person's entire life. (Forrest & Riley, 2004) (Dube, Felitti, Dong, Giles, & Anda, 2003)

Efforts to provide health insurance for more children in the United States have been extensive and have occurred for decades. Examples of these efforts include expanding Medicaid's eligibility for children and the implementation of the State Children's Health Insurance Program. (Dubay & Kenney, 2004)

Despite efforts to provide health insurance to more children, many children who qualify for insurance remain uninsured. For example, the 2005 Oregon Food Stamp Program study estimated that almost 11% of children in Oregon presumed eligible for public health insurance were uninsured. (DeVoe, Krois, Edlund, Smith, & Carlson, 2008) Reasons that an eligible child remained uninsured may include problems with initial enrollment and problems with retaining insurance. A 2006 study in Massachusetts,

Pennsylvania and California demonstrated that poor retention contributes substantially to whether children have insurance, as one third of uninsured children had lost Medicaid or the State Children Health Insurance Program (SCHIP) the previous year. Of these children eligible for public coverage, two-fifths had Medicaid or SCHIP the previous year. (B. D. Sommers, 2007)

The ability of a child to obtain or maintain health insurance coverage may be influenced by the relationship between parent and children's health insurance. For example, previous research indicates that maternal health insurance coverage is associated with a decreased likelihood of children losing coverage. (B. Sommers, 2006) Expanding Medicaid to cover parents in Massachusetts also led to a 14-percentage point increase in the prevalence of children covered by Medicaid, which included a substantial amount of uninsured but eligible children. (Dubay & Kenney, 2003) Locally, the 2005 Oregon Food Stamp Program study also found that children of uninsured parents were more likely to be uninsured than children with insured parents (adjusted OR 14.21, 95% CI 9.23-20.34.) (DeVoe, Krois et al., 2008)

Possible reasons for this relationship may relate to a caretaker's ability to navigate and receive care under the insurance system. For example, associations between mother and children's utilization of health services have been noted previously. (Minkovitz, O'Campo, Chen, & Grason, 2002) Both insured and uninsured children of uninsured parents also have difficulty with accessing regular primary health care and addressing health needs, and insuring both parents and children was associated with children having continuous coverage and having regular physician visits. (Davidoff, Dubay, Kenney, & Yemane, 2003) (Guendelman & Pearl, 2004) (DeVoe, Tillotson, & Wallace, 2009)

Certain socioeconomic, health and health care characteristics of the family and adults in the household appear to be associated with whether a child is insured.

Age: For example, the eligibility of both private and public insurance varies based on age. A person qualifies for Medicare at age 65 years, and younger people can remain dependents on their parent or guardian's insurance plans through their early twenties. Therefore, because the age of an adult influences their health insurance eligibility, a parent or caretaker may be more familiar with certain types of health insurance, which may thus influence the health insurance a child has.

Race and ethnicity: In multiple studies, race and ethnicity have been associated with whether a child has health insurance. For example, certain racial and ethnic minority groups are also more likely to have an uninsured family member. (Institute of Medicine, 2002) Analysis of the MEPS from 2004 to 2005 showed that the highest prevalence of uninsured children were Hispanic, as 8.8% of white children were uninsured over an entire year, while 11.6% of black children and 21.3% of Hispanic children were uninsured. (Pylypchuk & Selden, 2008) In 2006, the highest prevalence of uninsured children for a race or ethnicity group was Hispanic children who represented 42.5% of uninsured children in the United States. (Hoilette et al., 2009) The MEPS data from 2002 to 2005 also found that 24.7% of uninsured children and adolescents were Hispanic compared to only 14.2% of insured children. (DeVoe, Tillotson, & Wallace, 2008) Locally, the Oregon Children's Access to Health Care Survey also found associations between race and ethnicity groups and health care needs. For example, Hispanic children had a significantly higher likelihood of delayed urgent care and no doctor's visits in the past year compared to white non-Hispanic children. Non-white non-Hispanic children in Oregon were also found to have significantly more unmet medical needs and dental care compared to white non-Hispanic children. (DeVoe, Graham, Angier, Baez, & Krois, 2008)

Primary language: The primary language of adults in the household may affect the ability of these caretakers to navigate the health care system for their children,

including accessing health insurance for them. (Federico, Tjoeng, & Berman, 2007) Analysis of MEPS from 2004 to 2005 found that Hispanic survey participants who responded to non-English surveys were more likely to have uninsured children. (Pylypchuk & Selden, 2008)

Gender: Studies that have examined the relationship between children and parent health care utilization often use maternal characteristics. (Chung et al., 2008) Gender of the survey respondent may also be an indication of family structure, assuming the participant is a caretaker of the household children, and may indicate the insurance options available for the children.

Marital status: Marriage often provides more opportunities for family members to obtain health insurance under an employee health insurance plan. Children who live in households with married adults are more likely to have health insurance compared to children living in single-parent households. (Cassedy et al., 2008) Conversely, families with unmarried or separated adults are more likely to have children without health insurance. (Wie, Ziegenfuss, Blewett, & Davern, 2008) In MEPS data from 2002 to 2005, there was a higher prevalence of uninsured children in single parent families compared to insured children. (DeVoe et al., 2008)

Health: Parents in poor health may have difficulty attending to their children's health care needs, and parents' mental health strongly influences parenting practices. (Institute of Medicine, 2002) These parenting practices may include the ability to acquire health insurance for their children.

Health care utilization: Parents who regularly utilize health care services may be more likely to attain health insurance for their children as well. For example, mothers who use various health care services are more likely to have children that also utilize similar health care services, such as emergency department visits, health care practitioner visits and mental health visits. (Minkovitz et al., 2002)

Employment: While employment can be the source of health insurance for an adult and dependants, it can also raise the household income-level and therefore disqualify family members from public insurance. For example, children living in households with insured parents may have difficulty attaining health insurance if their household income is too high to qualify for public insurance but too low to afford private insurance. (DeVoe et al., 2008) In addition, while United States wages only increased by 21% and inflation by 25%, the cost of health benefits doubled between 2000 and 2007. (Shields, McGinn-Shapiro, & Fronstin, 2008) The relative lack of wage increase compared to health insurance cost increase may result in a family's inability to afford health insurance. Furthermore, disruptions in employment or unemployment may disorient a family navigating the health care system, which may result in family members losing health insurance coverage.

Highest education level: Studies examining characteristics of children without insurance have found that children are more likely to be uninsured if the highest household educational attainment is high school or less. (Wie et al., 2008) (Cassedy et al., 2008) (DeVoe et al., 2008) (Stevens, Seid, & Halfon, 2006)

OHP group type at study start: In 2003, OHP Standard members were subject to cost-sharing and administrative changes in their insurance plan, while OHP Plus members did not experience these changes. The effect of these changes was profound. For example, after the changes to OHP occurred, OHP Standard members were more likely to lose their insurance coverage, have reduced health care access, and have increased financial strain. (Carlson, Wright, & Mongoue-Tchokote, 2007) In addition, OHP Plus and Standard members have inherent differences (such as income and health status) based on the eligibility of these two types of insurance coverage. (Oberlander, 2006) (Selden et al., 2004) For example, OHP Plus includes those individuals eligible for Medicaid under federal law including Temporary Aid to Needy Families, Old Age

Assistance, disabled individuals and Medicaid and SCHIP eligible children, and OHP Standard includes adults without children and adults with families. (Carlson, Wright, & Mongoue-Tchokote, 2007) The different characteristics and health insurance enrollment patterns between OHP Plus and Standard may also affect whether children in the same household have insurance.

Income level: Income level determines whether both adults and children qualify for public insurance. In addition, households with at least one uninsured member tend to have lower incomes. (Institute of Medicine, 2002) A study examining insurance characteristics between different race and ethnicity groups also found that families with an income less than 200% of the Federal Poverty Level were also more likely to have children without insurance. (Wie et al., 2008) Adolescents also had a higher risk of being uninsured if they came from low income households. (Committee on Adolescence and Committee on Child Health Financing, 2009) A larger prevalence of uninsured children came from low-income families compared to insured children according to the MEPS data from 2002 to 2005. (DeVoe et al., 2008)

Insurance type: The type of insurance a parent has may impact whether their children have health insurance. For example, according to MEPS data from 2002 to 2005, children with parents who had any private insurance were more likely to be uninsured at a point in time, to have any length of coverage gap, and to have an insurance coverage gap longer than 6 months of a year, compared to children with parents who had public insurance. (DeVoe et al., 2008)

Financial strain and Medical debt: According to the Institute of Medicine's *Health Insurance is a Family Matter*, "families with uninsured members are more likely to have higher health expenditures as a proportion of a family income than are insured families." (Institute of Medicine, 2002) Low-income families with uninsured members may be more likely to suffer from financial strain because of difficulty paying medical bills. For

example, according to analysis of the Current Population Survey and National Survey of America's Families, more than half of uninsured parents living below poverty reported they had trouble paying for bills and housing, and also worried about food shortages. (Dubay & Kenney, 2004) Financial strain may also be a manifestation of household income, which previous studies have shown is significantly associated with whether children have insurance. (Institute of Medicine, 2002) (Wie et al., 2008) (Committee on Adolescence and Committee on Child Health Financing, 2009) (DeVoe et al., 2008)

*THE OREGON HEALTH PLAN EXPERIENCE*

Administrative and increased cost-sharing changes were implemented for some adult Oregon Health Plan members in February 2003. (Carlson et al., 2007) By implementing these changes, Oregon state officials intended to expand OHP to 46,000 additional enrollees. To cover the cost of expanding coverage, OHP was divided into OHP Plus (including individuals eligible for Medicaid under federal law) and OHP Standard (single adults, couples, single parents.) For OHP Standard, premiums were increased, co-pays were required, 6-month lockouts were implemented for failing to pay premiums, and several benefits were cut including mental health, substance abuse, durable medical equipment, and dental coverage. Despite goals to increase enrollment, OHP enrollment dropped from 104,000 in January 2003 to 49,000 in December 2003, and dropped another 50% in the next 18 months, with no new enrollments. (Oberlander, 2006)

After implementation of cost-containment strategies, the Oregon Health Care Survey was sent to OHP clients at 6-, 18- and 30-months. This prospective cohort study sought to assess the impact of the OHP policy changes on a person's insurance coverage, access to healthcare, financial status, and overall physical and mental health, by comparing OHP Standard members who experienced these changes, and OHP Plus members who did not. From this 30-month study, OHP Standard members were less

likely to remain enrolled in OHP compared to OHP Plus members (33% for Standard versus 69% for Plus), and were more likely to be uninsured at the end of the study period (32% for Standard versus 8% for Plus). OHP Standard also reported significantly greater unmet health care needs (OR = 1.795, 95% CI 1.447-2.227) and increased medical debt (OR = 1.53, 95% CI 1.21-3.19.) (Wright & Carlson, 2005) (Carlson et al., 2007)

*CURRENT STUDY*

This current study assesses the association between adult OHP members' insurance coverage duration with whether children in the same household have health insurance at 30 months. To better understand potential barriers to maintaining insurance coverage for adults with children living in the same household, socioeconomic, health and health care characteristics were compared for varying lengths of adult health insurance coverage.

Adult health insurance coverage is strongly linked to a child's health and health care access. Therefore, this study seeks to further examine barriers to maintaining health insurance, and also the relationship between the length of adult health insurance coverage and whether children in the same household have health insurance. Information gained by exploring these associations may thus provide valuable insight on how to improve health insurance coverage for children.

*PRELIMINARY STUDIES*

After the OHP changes in 2003, a research team from the Office for Oregon Health Policy and Research (OHPR), Portland State University, the Providence Health System's Center for Outcomes Research and Education (CORE) and the Office of Medical Assistance Programs, developed a three-year cohort study. They followed a cohort of individuals enrolled in OHP prior to program changes to assess enrollment

changes, access to care, service utilization, and financial and health outcomes. (Wright & Carlson, 2005)

Previous studies with the Oregon Health Care Survey data have included research by Dr. Matthew Carlson from Portland State University, who has mentored this project. His research has indicated that in the context of increased premiums, benefit reductions and loss of insurance, OHP Standard members were more likely to experience loss of insurance coverage, reduced access to care, reduced primary care and emergency department use, and increased financial strain. In addition, OHP Standard members with the lowest incomes were more likely to lose coverage and report unmet medical care needs. This may indicate that the most economically vulnerable were most impacted by increasing program costs. Despite these changes, neither OHP Standard or Plus groups reported diminished health status during the study period. (Carlson et al., 2007)

## RESEARCH QUESTION AND SPECIFIC AIMS

*RESEARCH QUESTION*

What is the association of adult OHP members' length of insurance coverage after implementing OHP cost containment strategies in 2003 with whether children in the same household have health insurance?

*SPECIFIC AIMS*

Using the 30-month Oregon Health Care Survey data, our specific aims are to:

1) Compare characteristics of OHP adults with household children who have varying lengths of health insurance coverage.

i. *Adult OHP Health insurance length categories include*: (1) 28 to 30 months (near continuous coverage, referent category), (2) 19 to 27 months (left OHP and had a relatively short gap), (3) 10 to 18 months (left OHP and had a medium gap), (4) 0 to 6 months (left OHP and had a relatively long gap of health insurance coverage). Characteristics that will be compared include:

ii. *Socioeconomic characteristics*: age at study start, gender, race and ethnicity, primary language, marital status, highest education level, employment stability, and income.

iii. *Health and health care characteristics*: chronic disease, depression, OHP coverage type before cost-containment strategies, OHP members' type of health insurance coverage at 30 months, primary care, total number of health care visits, amount of medical debt at 30 months, and financial strain.

**Hypothesis**: Adults with children living in the same household, and who lost OHP coverage, will have differences in socioeconomic, health and health care characteristics, compared to those adults with children who did not lose coverage.

2) Evaluate whether the length of adult health insurance coverage is associated with whether children in the same household had health insurance at 30 months.

i. *Main dichotomous outcome variable*: all compared to some or none of the household children have health insurance at 30 months

ii. *Main polychotomous independent variable*: OHP adult health insurance coverage patterns divided into: (1) 28 to 30 months (near continuous coverage, reference category), (2) 19 to 27 months (left OHP and had a relatively short gap), (3) 10 to 18 months (left OHP and had a medium gap), (4) 0 to 6 months (left OHP and had a relatively long gap of health insurance coverage).

**Hypothesis:** As the length of adult insurance coverage increases, the odds of having at least one uninsured child in the household will decrease.

## METHODS

*ORIGINAL PROSPECTIVE COHORT STUDY*

1. Survey Overview

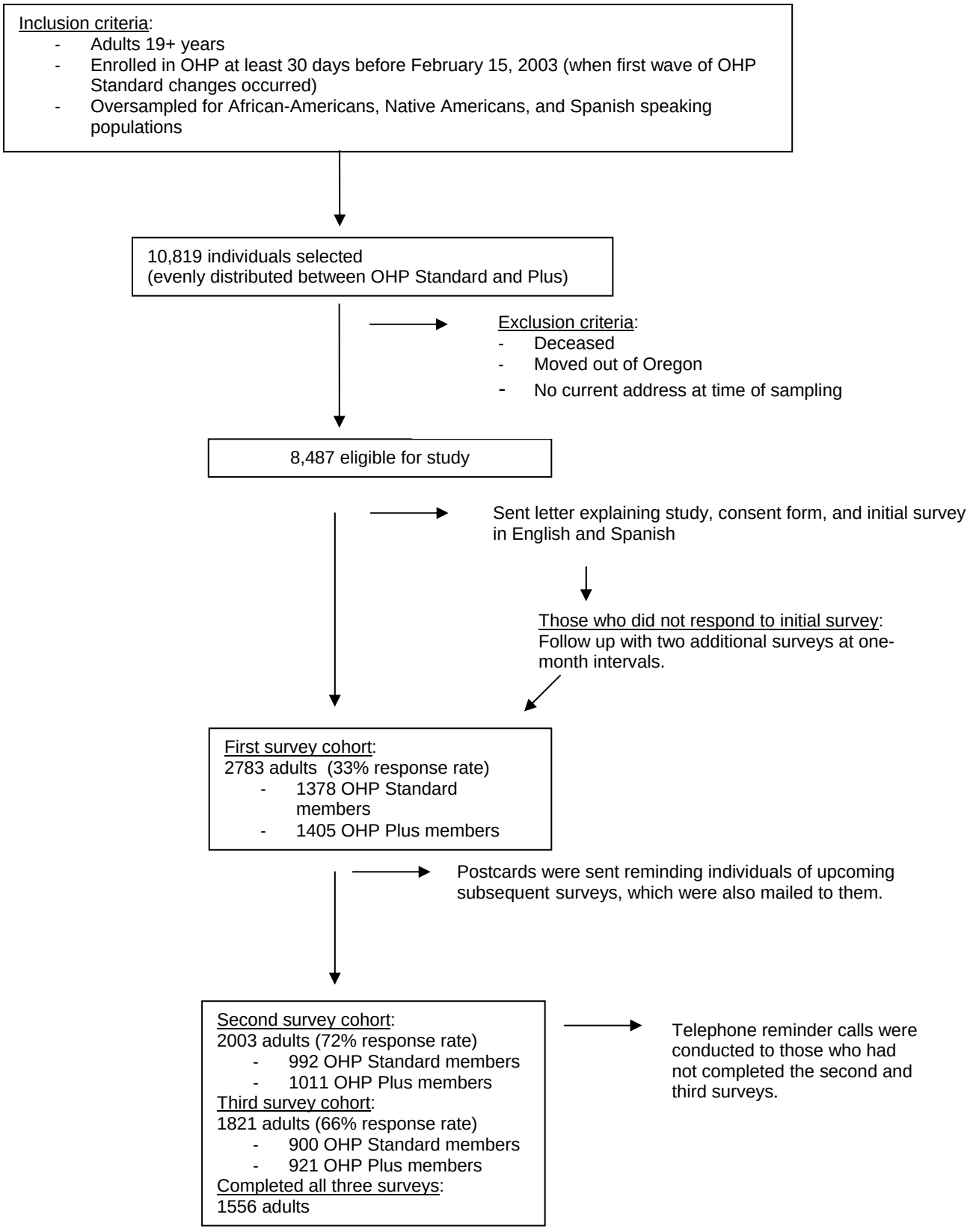
The Oregon Health Care Survey was conducted after the 2003 Oregon Health Plan cost sharing and administrative changes were implemented. The study was designed to prospectively follow a cohort of individuals enrolled in OHP prior to the February 2003 changes in OHP Standard for thirty months using three rounds of surveys. The surveys occurred at 6-, 18- and 30-months after implementation of OHP cost-containment strategies. Each survey assessed a participant's insurance enrollment changes, health care access, service utilization, financial and health outcomes, and whether household minors were insured. (Wright & Carlson, 2005) Data from this survey had already been collected prior to the current study.

2. Sampling Design and Weighting Methodology

The OHP Medicaid files provided a stratified random sample of study participants. These participants were eligible for the study if they qualified for OHP at least 30 days before February 15, 2003, when administrative and cost-sharing changes were put into effect for OHP Standard. A total of 10,819 individuals were selected and divided equally between OHP Plus and Standard. African American, Native American and Spanish-speaking populations were over-sampled to ensure adequate representation, with 500 people randomly selected from each of these racial and ethnic groups. Of the original 10,819 people selected, 8,487 were found to be eligible, and the rest were deceased, had moved out of the state or had no address at the time of the study. To account for oversampling by race and ethnicity, base weights represented the probability of selection. Iterative post-stratification 'raking' was used to adjust for each wave of data collection's non-response, with information such as demographics, health care utilization and health status.

## 3. Recruitment and Informed Consent

### Figure 1: Recruitment of original prospective cohort study



4. Validation of Oregon Health Care Survey

Several widely accepted data collection tools were used to devise this survey, which assessed health care access, health care utilization, financial and health outcomes, including the CAHPS survey, the Community Tracking Study and the SF-12 health assessment instrument. In addition, a small group of OHP members participated in cognitive testing of the survey and also a validation interview.

Spanish-language surveys were first translated from English to Spanish, and then independently translated back to English to certify accurate translation.

*CURRENT STUDY*

1. Study Overview

This is a secondary analysis using the de-identified Oregon Health Care Survey prospective cohort study dataset, with a specific focus on those adults who reported whether children living in the same household had insurance at 30 months. This study first aimed to better understand differences between participants who had children in their household at 30 months with varying amounts of health insurance coverage. Therefore, socioeconomic, health and health care characteristics were compared between those adults with 0-9 months of coverage, 10-18 months of coverage, 19-27 months of coverage and 28-30 months of coverage. Second, the association between the length of adult health insurance coverage and whether children in the same household had insurance at 30 months was explored.

2. Inclusion and Exclusion Criteria

Inclusion Criteria:

- OHP members who participated in all three surveys (1556 participants)
- OHP members who provided information about the length of their insurance coverage (680 participants)

- OHP members who reported whether minors under 19 years in the same household had health insurance during the third survey (559 participants)

Exclusion criteria:

- OHP members who did not participate in all three surveys
- OHP members who did not provide information about the length of their insurance coverage
- OHP members who did not provide information about whether minors under 19 years in the same household had health insurance during the third survey

Using these criteria, 559 adults were selected for this analysis.

3. Data Management and Statistical Analysis

All data was analyzed using STATA Version 10 (STATA Corporation) software package. Analyzing the data in STATA allowed for survey-data analysis to account for race and ethnicity oversampling and post-stratification raking for non-response.

4. Variable Selection and Coding

The primary independent variable was the *length of household adult insurance* partitioned for multivariate logistic regression into 0-9 months, 10-18 months, 19-27 months and 28-30 months. Because the length of insurance coverage could only be calculated to a precision of 3-month blocks, the insurance length interval of 28-30 months represented near full health insurance coverage.

The dependent variable of whether children in the same household had health insurance at 30 months was initially coded as:

1) All family members under 19 are covered by health insurance of some kind.

2) Some family members under 19 are insured, and some aren't.

3) None of the family members under 19 are insured.

However, in order to format whether children in the same household had health insurance for logistic regression, this variable was changed into a dichotomous variable. The answers “Some family members under 19 are insured, and some aren’t” and “None of the family members under 19 are insured” were combined into “At least one family member under 19 is uninsured”:

1) All family members under 19 are covered by health insurance of some kind.

2) At least one family member under 19 is uninsured.

Other characteristics of the adult respondents were chosen for analysis because of relevance to children’s health insurance including: age at start of study (continuous), race and ethnicity, gender, primary language, marital status, chronic illness (e.g. asthma, diabetes, hypertension, chronic obstructive pulmonary disease, and heart failure), depression, number of clinic visits (Range: 0 to 21 or more visits), primary care, income (by percentage of Federal Poverty Line), employment stability, OHP member type at study start, insurance type at 30 months, amount of Medical Debt at 30 months, and financial strain ever during the 30 months of study.

Age at Study Start: Age is measured in years in this study, and is a continuous variable.

Race/Ethnicity: In this study, race and ethnicity was originally categorized into non-Hispanic White, non-Hispanic Black, American Indian or Alaska Native, Asian/Pacific Islander/Other/Multi-ethnicity, and Hispanic. However, these variables were condensed into White and Non-White race to ensure adequate cells sizes.

Gender: Gender was considered as a potential confounding variable in this study, and was categorized into Male and Female.

Primary Language: Though over ten languages were categorized as primary languages, these categories were condensed into English and non-English language to ensure adequate cell size.

Marital Status: Marital status was originally categorized into Now Married, Divorced, Separated, Widowed, and Never Married. To account for the longitudinal aspect of this prospective cohort study and to also ensure robust cell sizes, these categories were condensed into Married all three waves, Change in marital status and Unmarried all three waves.

Chronic Illness: If a respondent stated they had diabetes, asthma, high blood pressure, emphysema or chronic bronchitis, or congestive heart failure at any point during the study, they were categorized as having a chronic illness at some point during the 30-month study.

Depression: If a study participant said in any of the three surveys that a doctor or health professional in the last 6 months had said that he or she had depression or anxiety, they were categorized as having depression at some point during the 30-month study.

Number of Clinic Visits: The number of clinic visits was totaled for each of the three surveys, ranging from 0 to over 21 visits.

Primary Care: Primary care was defined as participants receiving medical care at a private office, public clinic or hospital clinic. Having access to primary care excluded participants who stated their health care access was either a Hospital Emergency Room, Urgent Care, Other, No usual place, or did not know their usual source of care.

Employment: In the original study, employment was originally divided into Employed, Self-employed, Not currently employed and Retired. To condense the information from all three studies and to ensure robust cell sizes for logistic regression analysis, these variables were condensed into Employed during all 3 waves and Employed during less than all 3 waves.

Education Level: The highest education level of a participant was categorized into Less than High School, High School, and More than High School.

OHP Member Type: The different OHP member categories at study start were OHP Plus and Standard.

Income Level: In this study, income level was previously a dollar amount that was then converted into a continuous percentage based on the federal poverty line. This was further condensed for this study into 0-50%, 51-100% and more than 100% of the federal poverty line.

Insurance Type at 30 months: The original categories for insurance type at 30 months included Oregon Health Plan or Medicaid, Employer or family member's employer, Medicare, Indian Health Services, Self-paid private plan, Family Health Insurance Assistance Program, CHAMPUS/VA, Another type of insurance not listed, No health insurance coverage and Don't know. To ensure adequate cell sizes, these categories were condensed into OHP/OMAP or Medicare, Employer or Family member employer, Other Insurance type (Indian Health Services, Self-paid, FHIAP, CHAMPUS/VA, Other and Don't know), and No insurance.

Amount of Medical Debt at 30 months: Medical debt at 30 months was originally categorized into $0, $1 to $25, $26 to $50, $51 to $75, $76 to $100, $101 to $300, $301 to $500, $501 to $1000, $1001 to $5000, $5001 to $10,000, $10,001 to $15,000, more than $15,000 and Don't know. To ensure adequate cell sizes, this was condensed into $0, $1-$500, and greater than $500.

Financial Strain Ever During 30 months of Study: Participants were asked in each survey if in the last 6 months they were loaned money from family or friends, had to cut back on food budget, skipped paying bills, paid bills late or paid less than minimum payments to cover health care costs and medical bills. They were also asked in the 2nd and 3rd surveys only if in the last 6 months they had difficulty paying rent or mortgage, been forced to move or filed for bankruptcy because of medical bills. These measures of

financial strain due to medical bills and health care costs were categorized into Financial Strain ever during the study and No Financial Strain.

Please see Appendix A for more detailed descriptions of coding for each independent variable.

5. Survey Weights

As mentioned previously, each participant in the Oregon Health Care Survey had a base weight (to account for racial and ethnic minority oversampling), and also a non-response weight (to account for the number of survey waves that respondents participated in). To form a composite survey weight for each respondent, the base weight and non-response weight were multiplied together. The initial OHP group of Standard or Plus represented the survey strata. An equal amount of people were therefore surveyed in both OHP Standard and Plus, and within that strata racial and ethnic minorities were oversampled.

6. Adult's Socioeconomic, Health and Health Care Information

For each category of adult health insurance length, un-weighted amounts and weighted percentages were calculated for every other independent variable, including age at start of study, race and ethnicity, gender, primary language, marital status, chronic illness, depression, number of clinic visits, primary care, income (by percentage of Federal Poverty Line), highest education level, employment stability, OHP member type, insurance type at 30 months, amount of medical debt at 30 months, and financial strain ever during the 30 months of study

7. Simple Logistic Regression

Simple logistic regression models determined unadjusted odds ratios that examined significant associations between adult characteristics and whether children in the same household had insurance at 30 months. Simple logistic regression models of

each independent variable and the health insurance coverage of household children at 30 months used weighted t-tests.

8. Collinearity

In order to assess for collinearity between independent variables, the rho correlation coefficient was estimated for each pairing of independent variables.

9. Multivariate Logistic Regression Model Building

Independent variables with a simple logistic regression model p-value ≤ 0.25 were considered for inclusion in the Hosmer & Lemshow main effects model. There are no automated model selection tools in STATA, such as the forwards, backwards and stepwise multivariate logistic regression model building tools. Therefore, manual backward step-wise model building was utilized by first adding all variables with simple logistic regression p-values $\leq 0.25$, then taking out each variable individually. The resulting model that increased the odds of having at least one uninsured child in the household at 30 months most greatly was then used as the final main effects model. A second iteration of the final model was formed by manual backward step-wise model building based on the significance of the adjusted Wald test, which tests the significance of the entire multivariate logistic regression model.

Finally, any independent variable that was conceptually significant was included in the model, even if the p-value exceeded 0.25 or if model-building methods did not include the variable.

10. Interactions

Potential interactions were determined *a priori* to analysis of interactions in the final main effects model. If an interaction were to occur in the final model, then the association of the main independent variable (length of insurance for the adult) with the outcome variable (whether children in the same household had insurance at 30 months) would not be homogenous in the strata of a chosen third independent variable. Variable

categories were condensed as needed to provide adequate cells sizes for analysis of interactions.

11. Goodness-of-fit

To assess the goodness-of-fit for the final model while accounting for survey sampling design, the F-adjusted mean residual test was estimated. After the multivariate logistic regression model was fitted, residuals were obtained, which were used as the basis of the goodness-of-fit test as differences between observed and predicted values indicate the degree of fit. Observations were then sorted into deciles based on estimated probabilities, with each decile including approximately equivalent sample weights. The null hypothesis of the F-adjusted mean residual test (p-value > 0.05) states that the model fit well because there was not a significant difference between the observed and expected values. (Archer & Lemeshow, 2006)

## RESULTS

*SPECIFIC AIM 1*

1) Compare characteristics of OHP adults who have household children at 30 months and also varying lengths of health insurance coverage.

i. *Adult OHP Health insurance length categories include*: (1) 28 to 30 months (near continuous coverage, referent category), (2) 19 to 27 months (left OHP and had a relatively short gap), (3) 10 to 18 months (left OHP and had a medium gap), (4) 0 to 6 months (left OHP and had a relatively long gap of health insurance coverage). Characteristics that were compared include:

ii. *Socioeconomic characteristics*: age at study start, gender, race and ethnicity, primary language, marital status, highest education level, employment stability, and income.

iii. *Health and health care characteristics*: chronic disease, depression, OHP coverage type before cost-containment strategies, OHP members' type of health insurance coverage at 30 months, primary care, total number of health care visits, amount of medical debt at 30 months, and financial strain.

In this study, 559 adults responded to all three surveys and also provided information about whether children in the same household had insurance at 30 months, (3$^{rd}$ and final wave of study). There was a larger prevalence of households with all children insured at 30 months as the length of adult insurance coverage increased. For example, when adults were insured for less than 9 months of the 30-month study, 70.81% of these households had all children insured at 30 months. In contrast, when household adults

were insured for 28 to 30 months, a larger prevalence of households had all children insured at 30 months at 91.44%. Please see Table 1 for un-weighted amounts and weighted percentages of adult insurance coverage length cross-tabulated with whether children in the same household had insurance at 30 months.

Table 1: Bivariate Association Between Length of Adult Insurance Coverage and Whether Children in the Same Household had Health Insurance

| | | Length of Household Adult Insurance Coverage | | | | |
|---|---|---|---|---|---|---|
| | | **28-30 mos of Health Insurance Coverage** | **19-27 mos of Health Insurance Coverage** | **10-18 mos of health insurance coverage** | **0-9 mos of Health Insurance Coverage** | **Total** |
| **Whether children in the same household had health insurance** | **All insured at 30 months** | 264 (91.44) | 94 (83.71) | 68 (74.32) | 40 (70.81) | 466 (84.61) |
| | **Less than all insured at 30 months** | 26 (8.56) | 21 (16.29) | 25 (25.68) | 21 (29.19) | 93 (15.39) |
| | **Missing** | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) |
| | **Total** | 290 (100.00) | 115 (100.00) | 93 (100.00) | 61 (100.00) | 559 (100.00) |

Please see Table 2 for un-weighted amounts and weighted percentages of adult insurance coverage length cross-tabulated with socioeconomic, health and medical care characteristics.

1. Socioeconomic characteristics

In regards to socioeconomic information of adult participants, the prevalence of white participants for the whole study sample was 85.7%. For various lengths of adult insurance coverage, the prevalence of white participants ranged from 83.21% to 91.2% and was not significantly associated with length of adult insurance coverage (p=0.2052). The average age at the start of the study was similar for all lengths of insurance (33.45 years to 36.67 years), though the average age did increase slightly as the length of time with health insurance increased. Age at study start was also significantly associated with adult insurance length, (p=0.14). There was a larger prevalence of females compared to males for each length of health insurance category, ranging from 73.93% to 83.58%

females compared to 16.42% to 26.07% males. The vast majority of study participants stated English was their primary language, with the prevalence of English as a primary language ranging from 92.85% to 96.62% for the different lengths of health insurance coverage. Regarding marital status, 48.74% to 60.86% of study participants were unmarried during all study waves, while the prevalence of participants married during all study waves ranged from 23.15% to 35.07%. The percentage of participants who endured a change in marital status during the 30-month study ranged from 12.09% to 14.75%. Gender ($p=0.59$), primary language ($p=0.71$) and marital status ($p=0.65$) were all not significantly associated with length of adult insurance coverage.

Individuals who were employed during all three waves had shorter periods of insurance coverage, and employment was significantly associated with adult insurance coverage length ($p<0.01$). For example, while 38.15% of participants with 0-9 months of coverage were employed during the thirty months of study, only 11.63% of individuals with 28-30 months of coverage were employed throughout the thirty months of study. In contrast, the prevalence of participants with 28-30 months of insurance coverage who were unemployed during at least one study wave was 76.68% compared to 50.05% for participants with 0-9 months of health insurance coverage. A higher prevalence of participants with lower income levels (0-100% of the Federal Poverty Line) had longer lengths of insurance coverage. Conversely, a higher prevalence of participants with higher income levels (100% or more of the Federal Poverty Line) had shorter periods of health insurance coverage, and income level was significantly associated with the length of adult insurance coverage ($p<0.01$).

2. Health characteristics

For longer periods of health insurance, the prevalence of adults with chronic disease increased, as 37.67% and 62.63% of adults with chronic disease had 0-9 months and 28-30 months of health insurance, respectively. Chronic illness was

significantly associated with length of adult insurance coverage (p=0.04). The prevalence of adults with depression at any point during the study also increased with longer periods of health insurance coverage, though depression was not significantly associated with adult insurance coverage length (p=0.45). For example, 50.31% of adults with 0-9 months of health insurance had depression, while 60.47% adults with 28-30 months of health insurance had depression.

3. Health care characteristics

Total number of clinic visits by adult respondents increased with longer periods of health insurance coverage, as participants with 0-9 months of coverage had an average of 5.63 visits, while individuals with 28-30 months of insurance coverage had an average of 10.45 visits. With longer lengths of health insurance coverage, the prevalence of adults with primary care also increased from 36.73% to 62.29% at 0-9 months and 28-30 months, respectively. Primary care ($p<0.01$) and total number of clinic visits ($p<0.01$) were significantly associated with length of adult insurance coverage.

Regarding health insurance, adults with 0-9 months of health insurance had more than double the prevalence of individuals with OHP Standard, compared to adults with 28-30 months of health insurance. There was also a higher prevalence of adult participants with OHP, OMAP or Medicare with longer lengths of health insurance coverage. For example, while 11.28% of adults with 0-9 months of health insurance had OHP, OMAP or Medicare, 76.57% of adults with 28-30 months of health insurance had public insurance. In contrast, 3.90% of individuals with 28-30 months of insurance coverage were without health insurance at 30 months, compared to 57.35% of adults with 0-9 months of insurance coverage. The highest prevalence of adults with employer health insurance coverage was 23.85% in the group of participants with 19-27 months of health insurance coverage. The prevalence of individuals with employer health insurance ranged from 10.18% to 11.99% for other lengths of health insurance

coverage. OHP member type at study start (p<0.01) and insurance type at 30 months (p<0.01) were both significantly associated with length of adult insurance coverage.

The highest prevalence of individuals without medical debt at 30 months was in the group with 28-30 months of coverage (63.67%). In comparison, the highest prevalence of those with more than $500 of medical debt at 30 months was 45.89% in the group of participants with 10-18 months of coverage. For shorter lengths of health insurance coverage, a higher prevalence of adults experienced financial strain. Amount of medical debt at 30 months (p<0.01) and financial strain (p<0.01) were both significantly associated with length of adult insurance coverage.

Table 2: Socioeconomic, Health and Health Care Characteristics of Adults by Length of Insurance Coverage (un-weighted amounts, weighted percentages)

| | | Length of Household Adult Insurance Coverage | | | | | |
|---|---|---|---|---|---|---|---|
| **Adult Independent Covariates** | | **0-9 mos of Health Insurance Coverage** | **10-18 mos of Health Insurance Coverage** | **19-27 mos of Health Insurance Coverage** | **28-30 mos of Health Insurance Coverage (continuous)** | **Total** | **Pearson Chi-squared test $X^2$, p-value or ANOVA test F-statistic, p-value** |
| **Race/Ethnicity** | **White** | 41 (91.20) | 60 (87.58) | 74 (87.32) | 187 (83.21) | 362 (85.70) | 1.5321, 0.2052 |
| | **Non-White** | 20 (8.80) | 33 (12.42) | 41 (12.68) | 103 (16.79) | 197 (14.30) | |
| **Chronic Illness at any time during 30 months** | **Asthma, Diabetes Hypertension, COPD Heart Failure** | 28 (37.67) | 46 (48.44) | 63 (55.68) | 186 (62.63) | 323 (55.94) | 2.2474, 0.0364 |
| | **No** | 30 (59.44) | 43 (49.51) | 47 (41.45) | 96 (34.99) | 216 (41.57) | |
| | **Missing** | 3 (2.89) | 4 (2.06) | 5 (2.87) | 8 (2.38) | 20 (2.48) | |
| **Depression** | **Depression at any point during 30 months** | 28 (50.31) | 46 (51.78) | 61 (54.95) | 170 (60.47) | 305 (56.71) | 0.9581, 0.4519 |
| | **No Depression reported during 30 months** | 28 (42.19) | 40 (41.89) | 49 (41.70) | 112 (36.91) | 229 (39.33) | |
| | **Missing** | 5 (7.49) | 7 (6.32) | 5 (3.36) | 8 (2.62) | 25 (3.96) | |
| **Total number of clinic visits** | **Mean (Linearized standard error, N)** | 5.63 (0.56, 60) | 7.12 (0.62, 90) | 9.18 (0.62, 114) | 10.45 (0.36, 280) | 9.07 (0.26, 544) | 20.01, <0.0001 |
| | **Missing** | 1 | 3 | 1 | 10 | 15 | |
| **Primary Care** | **Private Office Public Clinic Hospital Clinic Hospital ER, Urgent Care Other, No Usual Place Don't Know** | 21 (36.73) | 41 (40.64) | 57 (49.87) | 182 (62.29) | 301 (53.17) | 3.9815, 0.0011 |
| | **Missing** | 38 (60.67) | 50 (56.19) | 56 (49.90) | 101 (34.66) | 245 (44.37) | |
| | | 2 (2.60) | 2 (3.17) | 2 (0.23) | 7 (3.06) | 13 (2.45) | |
| **Income** | **0-50% FPL** | 19 (27.10) | 30 (32.52) | 47 (42.27) | 153 (50.51) | 249 (43.10) | 2.7691, 0.0032 |
| | **51-100% FPL** | 24 (38.34) | 36 (41.78) | 35 (26.56) | 76 (27.61) | 171 (31.03) | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **100%+ FPL** | 16 (32.49) | 20 (21.29) | 24 (24.23) | 38 (14.14) | 98 (19.50) | |
| | **Missing** | 2 (2.08) | 7 (4.41) | 9 (6.94) | 23 (7.75) | 41 (6.37) | |
| **Highest Education Level** | **Less than high school** | 15 (18.27) | 17 (12.07) | 23 (17.09) | 63 (19.59) | 118 (17.66) | 0.8041, 0.6087 |
| | **High school diploma/GED** | 23 (37.68) | 27 (34.81) | 43 (37.19) | 105 (36.21) | 198 (36.34) | |
| | **More than high school** | 21 (41.46) | 45 (51.32) | 45 (43.02) | 105 (38.68) | 243 (42.01) | |
| | **Missing** | 2 (2.60) | 4 (1.80) | 4 (2.70) | 17 (5.51) | 27 (3.99) | |
| **Employment Stability** | **Employed all 3 waves** | 24 (38.15) | 23 (22.15) | 28 (24.40) | 36 (11.63) | 111 (19.05) | 4.3617, 0.0002 |
| | **Employed less than all 3 waves (Employment disturbance)** | 31 (50.05) | 57 (65.09) | 67 (57.16) | 223 (76.68) | 378 (67.71) | |
| | **Missing** | 6 (11.80) | 13 (12.76) | 20 (18.44) | 31 (11.69) | 70 (13.24) | |
| **Age at Study Start (Yrs)** | **Mean (linearized standard error, N)** | 33.45 (1.34, 61) | 35.59 (1.23, 93) | 35.44 (1.14, 115) | 36.67 (0.75, 290) | 35.86 (0.52, 559) | 1.81, 0.1444 |
| **Gender** | **Male** | 22 (26.07) | 17 (16.42) | 22 (18.05) | 58 (19.94) | 119 (19.68) | 0.6463, 0.5853 |
| | **Female** | 39 (73.93) | 76 (83.58) | 93 (81.95) | 232 (80.06) | 440 (80.32) | |
| **Primary Language** | **English** | 52 (96.62) | 79 (92.85) | 102 (94.18) | 266 (93.71) | 499 (94.00) | 0.4236, 0.7127 |
| | **Non English** | 9 (3.38) | 14 (7.15) | 13 (5.82) | 24 (6.29) | 60 (6.00) | |
| **Marital status** | **Married all 3 waves** | 23 (35.07) | 35 (34.61) | 32 (28.71) | 63 (23.15) | 153 (27.58) | 0.7603, 0.6531 |
| | **Marital status change** | 8 (13.89) | 10 (12.69) | 17 (14.75) | 36 (12.09) | 71 (12.93) | |
| | **Unmarried 3 waves** | 29 (48.74) | 43 (48.43) | 62 (53.10) | 180 (60.86) | 314 (55.80) | |
| | **Missing** | 1 (2.30) | 5 (4.27) | 4 (3.44) | 11 (3.90) | 21 (3.69) | |
| **OHP member type** | **Standard** | 53 (87.09) | 62 (67.26) | 61 (54.07) | 107 (37.97) | 283 (51.85) | 17.2793, <0.0001 |
| | **Plus** | 8 (12.91) | 31 (32.74) | 54 (45.93) | 183 (62.03) | 276 (48.15) | |
| **Insurance type or status at 30 months (Wave 3)** | **OHP/OMAP or Medicare** | 6 (11.28) | 26 (30.35) | 54 (47.67) | 213 (76.57) | 299 (55.39) | |
| | **Employer or family member employer** | 6 (11.99) | 12 (11.35) | 23 (23.85) | 28 (10.18) | 69 (13.33) | |
| | **Other: Indian Health Services, Self-paid, FHIAP, CHAMPUS/VA, Other, Don't know** | 6 (7.58) | 18 (16.55) | 13 (9.19) | 37 (9.36) | 74 (10.33) | 13.2386, <0.0001 |
| | **No Insurance** | 37 (57.35) | 34 (37.71) | 22 (16.87) | 12 (3.90) | 105 (18.41) | |
| | **Missing** | 6 (11.80) | 3 (4.04) | 3 (2.41) | 0 (0.00) | 12 (2.54) | |
| **Amount of medical debt (total = 3rd wave)** | **$0** | 27 (41.96) | 35 (37.54) | 55 (49.63) | 177 (63.67) | 294 (53.92) | 4.2474, 0.0003 |
| | **$1-$500** | 12 (21.20) | 19 (16.57) | 19 (14.29) | 49 (16.32) | 99 (16.52) | |
| | **>$500** | 22 (36.84) | 39 (45.89) | 41 (36.08) | 64 (20.01) | 166 (29.56) | |
| **Financial Strain during 30 months of study** | **Yes** | 44 (78.74) | 76 (83.56) | 80 (68.44) | 148 (51.81) | 348 (63.63) | 6.3738, <0.0001 |
| | **No** | 16 (18.96) | 16 (14.86) | 30 (26.67) | 139 (47.08) | 201 (34.28) | |
| | **Missing** | 1 (2.30) | 1 (1.58) | 5 (4.89) | 3 (1.11) | 10 (2.09) | |

*SPECIFIC AIM 2*

Evaluate whether the length of adult health insurance coverage is associated with whether household children had health insurance at 30 months.

i. *Main dichotomous outcome variable*: all compared to some or none of the household children have health insurance at 30 months

ii. *Main polychotomous independent variable*: OHP adult health insurance coverage patterns divided into: (1) 28 to 30 months (near continuous coverage, reference category), (2) 19 to 27 months (left OHP and had a relatively short gap), (3) 10 to 18 months (left OHP and had a medium gap), (4) 0 to 6 months (left OHP and had a relatively long gap of health insurance coverage).

1. Simple Logistic Regression

As shown in Table 3, individuals with less than 28 months of coverage were significantly more likely to have at least one uninsured child in the home at 30 months. However, there were no significant differences between the odds of having at least one uninsured child in the household at 30 months between the other groups (0-9 months, 10-18 months or 19-27 months of adult health insurance coverage). At the $p \leq 0.25$ level, there was also a significant association between having at least one uninsured child at 30 months and several adult characteristics including race and ethnicity, primary care, age at the start of the study, highest education level, primary language, OHP member type at study start, type of health insurance at 30 months, and medical debt at 30 months. In contrast, there were no statistically significant associations between having at least one uninsured child in the household and other adult characteristics including chronic illness, depression, total number of clinic visits, income level (by Federal Poverty Line), employment stability, adult gender, marital status, or financial strain during study.

Table 3: Weighted Univariate Analysis of Whether Children in the Same Household Had Health Insurance and Characteristics of Adult Study Participants

| Adult Study Participant Characteristics | OR | 95% CI (OR) | F | p-value |
|---|---|---|---|---|
| **Const** | | | | |
| **Adult Insurance Length:** | 1) 1.0000 | 1) | 6.66 | 0.0002 |
| **1) 28-30 months** | 2) 2.0804 | 2) 1.0092, 4.2886 | | |
| **2) 19-27 months** | 3) 3.6939 | 3) 1.8433, 7.4024 | | |

| | | | | |
|---|---|---|---|---|
| **3) 10-18 months** | 4) 4.4063 | 4) 2.0369, 9.5318 | | |
| **4) 0-9 months** | | | | |
| **Adult Race/Ethnicity** | 1) 1.0000 | 1) | 8.09 | 0.0046 |
| **1) White 2) Non-White** | 2) 2.2236 | 2) 1.2804, 3.8617 | | |
| **Adult Chronic Illness** | 1) 1.0000 | 1) | <0.01 | 0.9440 |
| **1) Chronic Illness 2) No Chronic Illness** | 2) 0.9814 | 2) 0.5808, 1.6583 | | |
| **Adult Depression** | 1) 1.0000 | 1) | <0.01 | 0.9857 |
| **1) Depression 2) No Depression** | 2) 1.0049 | 2) 0.5892, 1.7138 | | |
| **Total number of clinic visits for adult** | 1) 1.0000 | 1) | 0.54 | 0.4622 |
| **Range: 0-21+** | 2) 0.9810 | 2) 0.9319, 1.0326 | | |
| **Adult Primary Care** | 1) 1.0000 | 1) | 0.20 | 0.6584 |
| **1) Primary Care 2) No Primary Care** | 2) 0.8880 | 2) 0.5241, 1.5047 | | |
| **Adult Income** | 1) 1.0000 | 1) | 0.01 | 0.9909 |
| **1) 0-50%** | 2) 1.0418 | 2) 0.5689, 1.9075 | | |
| **2) 51-100%** | 3) 1.0089 | 3) 0.4979, 2.0443 | | |
| **3) 100%+** | | | | |
| **Highest Education Level** | 1) 1.0000 | 1) | 4.69 | 0.0095 |
| **1) Less than high school** | 2) 0.6705 | 2) 0.3469, 1.2963 | | |
| **2) High school diploma or GED** | 3) 0.3317 | 3) 0.1617, 0.6805 | | |
| **3) Higher than high school** | | | | |
| **Adult Employment Stability** | 1) 1.0000 | 1) | 0.70 | 0.4024 |
| **1) Employment Stability during 30 months** | 2) 0.7676 | 2) 0.4129, 1.4270 | | |
| **2) Employment Instability during 30 months** | | | | |
| **Adult Age at Study Start (years)** | 1) 1.0000 | 1) | 1.50 | 0.2218 |
| | 2) 1.0148 | 2) 0.9911, 1.039 | | |
| **Adult Gender** | 1) 1.0000 | 1) | 0.17 | 0.6824 |
| **1) Male 2) Female** | 2) 1.1391 | 2) 0.6097, 2.1281 | | |
| **Adult Primary Language** | 1) 1.0000 | 1) | 16.81 | <0.0001 |
| **1) English 2) Non-English** | 2) 4.7169 | 2) 2.2432, 9.9184 | | |
| **Adult Marital Status** | 1) 1.0000 | 1) | 0.52 | 0.5920 |
| **1) Married all 3 waves** | 2) 0.7803 | 2) 0.3257, 1.8697 | | |
| **2) Marital Status Change** | 3) 0.7387 | 3) 0.4111, 1.3274 | | |
| **3) Unmarried all 3 waves** | | | | |
| **Adult OHP member type at Study Start** | 1) 1.0000 | 1) | 1.83 | 0.1763 |
| **1) OHP Standard** | 2) 0.7002 | 2) 0.4175, 1.1742 | | |
| **2) OHP Plus** | | | | |
| **Adult Insurance Type at 30 months** | 1) 1.0000 | 1) | 10.25 | <0.0001 |
| **1) OHP/OMAP or Medicare** | 2) 0.8550 | 2) 0.3119, 2.3441 | | |
| **2) Employer or family member** | 3) 1.6436 | 3) 0.6665, 4.0531 | | |
| **3) Other** | 4) 5.2397 | 4) 2.8087, 9.7747 | | |
| **4) No Insurance** | | | | |
| **Amount of medical debt at 30 mos for Adult** | 1) 1.0000 | 1) | 1.58 | 0.2075 |
| **1) $0 2) $1 to $500 3)$500+** | 2) 1.4011 | 2) 0.6781, 2.8952 | | |
| | 3) 1.6676 | 3) 0.9383, 2.9636 | | |
| **Financial Strain Ever for Adult** | 1) 1.0000 | 1) | 0.55 | 0.4577 |
| **1) Financial Strain** | 2) 1.2336 | 2) 0.7082, 2.1489 | | |
| **2) No Financial Strain** | | | | |

## 2. Multivariate Logistic Regression Model Building

a. *Initial Main Effects Model*:

The initial main effects model was built using variables with p-values ≤ 0.25, which initially included race and ethnicity ($p < 0.01$), highest education level ($p < 0.01$), adult age at study start ($p = 0.19$), adult primary language ($p < 0.0001$), adult OHP member type at study start ($p = 0.18$), adult insurance type at 30 months (p-value < 0.01), and amount of medical debt at 30 months ($p=0.21$). Because the main independent variable,

length of adult insurance, is conceptually significant to this project's question it is also included in the model, though this independent variable is also statistically significant, (p-value < 0.01). This initial main effects model was statistically significant ($F_{13, 494}$=4.08, p-value < 0.01).

b. *Association of independent variables*:

The rho-statistic values all had relatively small magnitudes, so no independent variable pairing was found to be considerably collinear. The highest rho-statistic values for pairings of independent variables were between medical debt at 30 months and financial strain (0.3889), total clinic visits and depression (0.3884), race and ethnicity and primary language (0.3395), marital status and primary language (0.3684), and highest education level and primary language (-0.3279). Please see Appendix 2 for the results of each rho-statistic pairing.

c. *Manual backward step-wise model building*

Because of statistical and conceptual significance, adult insurance length, adult race and ethnicity, adult primary care, adult age at study start, adult primary language, adult OHP member type at study start, and adult insurance type at 30 months were all included in the initial main effects model.

Since the relationship between adult insurance length and whether children in the same household had health insurance at 30 months pertained to the main research question, this main independent variable was included in the final model regardless of its statistical significance. Because OHP group type was critical to the changes in OHP members' ability to maintain health insurance this independent variable was also included in the final model regardless of the statistical significance. Manual backward step-wise model building was based on enhancing the relationship between adult insurance coverage length and whether children in the household had health insurance at 30 months. This method resulted in a final main effects model that included adult

insurance length, OHP member type, age at study start, primary language and race and ethnicity. A main effects model including adult insurance length, OHP member type, age at study start, primary language, race and ethnicity and highest education level was also considered for the final model. The simple logistic regression model of adult insurance length and whether children in the same household had health insurance at 30 months, and the two adjusted multivariable logistic regression models described above are detailed in Table 4.

Table 4: Unadjusted and Adjusted Multivariate Logistic Regression Models

| Variables | Adult Insurance Length Only | Adult Insurance Length & 5 other variables | Adult Insurance Length & 4 other variables |
|---|---|---|---|
| **Model F-statistic & p-value** | $F_{3, 555}$ = 6.66<br>p-value = 0.0002 | $F_{9, 522}$ = 4.82<br>p-value <0.0001 | $F_{7, 551}$ = 5.68<br>p-value <0.0001 |
| **Adult Insurance Length**<br>**1) 28-30 months** | **1)** 1.0000 | **1)** 1.0000 | **1)** 1.0000 |
| **2) 19-27 months** | **2)** 2.0804<br>(1.0092, 4.2886)<br>p= 0.047 | **2)** 2.4519<br>(1.0662, 5.6385)<br>p=0.035 | **2)** 2.3904<br>(1.1084, 5.1553)<br>p=0.026 |
| **3) 10-18 months** | **3)** 3.6939<br>(1.8433, 7.4024)<br>p < 0.001 | **3)** 5.5272<br>(2.4501, 12.4689)<br>p<0.001 | **3)** 4.2901<br>(1.9795, 9.2976)<br>p<0.001 |
| **4) 0-9 months** | **4)** 4.4063<br>(2.0369, 9.5318)<br>p < 0.001 | **4)** 7.8264<br>(3.0861, 19.8475)<br>p<0.001 | **4)** 5.9444<br>(2.4066, 14.6830)<br>p<0.001 |
| **Primary Language** | | 3.4394<br>(1.1683, 10.1253)<br>p=0.025 | 3.7601<br>(1.5597, 9.0649)<br>p=0.003 |
| **OHP member type** | | 1.2629<br>(0.6679, 2.3878)<br>p=0.472 | 1.1021<br>(0.5918, 2.0524<br>p=0.759 |
| **Age at Study Start** | | 1.0187<br>(0.9918, 1.0463)<br>p=0.175 | 1.0161<br>(0.9900, 1.0428)<br>p=0.228 |
| **Race/Ethnicity** | | 1.6249<br>(0.7710, 3.4244)<br>p=0.201 | 1.7588<br>(0.9194, 3.3645)<br>p=0.088 |
| **Education Level**<br>**a. Less than High School**<br>**b. High School**<br>**c. More than High School** | | a. 1.0000<br>b. 0.9176<br>(0.4422, 1.9043)<br>p=0.031<br>c. 0.4139<br>(0.1858, 0.9217)<br>p=0.031 | |

Another iteration of model building included manual backward step-wise model building based on the significance of the adjusted Wald test. The resulting main effects model included adult insurance length, OHP member type, age at study start and

primary language. Please see Appendix 3 for a more detailed accounting of both iterations of manual backward step-wise model building.

3. Interactions

Highest education level was investigated as a potential interacting variable, as the odds ratios between adult insurance length and whether children in the same household had health insurance at 30 months decreased when highest education level was stepped out of the model. It was thus postulated that the association between length of adult insurance coverage and having at least one uninsured child at 30 months was modified by highest education level. Therefore, the potential effect modification of highest education level was explored in the main effects model, as detailed in Table 5.

To provide robust cell sizes for analysis, adult insurance length was condensed from 0-9 months and 10-18 months to 0-18 months for more robust cell sizes. The adult insurance lengths of 19-27 months and 28-30 months were also condensed into 19-30 months. Highest education level was also condensed by combining less than high school and high school into high school or less education. See Appendix 4 for the cross tabulation of adult insurance length and highest education level.

The interaction term between highest education level and the length of adult insurance coverage was statistically significant, (adjusted Wald test: $F_{1, 530} = 5.34$, p-value = 0.0212). The odds of having at least one uninsured child in the household with 0-18 months of adult insurance coverage compared to 19-30 months were also different when stratified by highest education level. For example, in terms of high school or less education, the odds of having at least one uninsured child in the household at 30 months for adults with 0-18 months of insurance was 7.2653 times greater than that of participants with 19-30 months of insurance coverage, (95% CI: 3.4786, 15.1743, p-value <0.001). However, for adults with more than a high school education level, the odds of having at least one uninsured child in the household at 30 months with 0-18

months of adult insurance was only 1.6411 times greater than that for 19-30 months of insurance coverage. This odds ratio was also not statistically significant (OR: 1.6411, 95% CI: 0.5590, 4.8181, p-value=0.367). Table 5 details the stratification by highest education level.

Table 5: The Association Between Whether Household Children Have Insurance and Adult Insurance Length, Stratified By Highest Education Level

| Highest Education Level | Adult Insurance Length | Odds Ratio | 95% Confidence Interval | p-value |
|---|---|---|---|---|
| High School or Less | 19-30 months | 1.0000 | | |
| | 0-18 months | 7.2653 | 3.4786, 15.1743 | <0.001 |
| More than High School | 19-30 months | 1.0000 | | |
| | 0-18 months | 1.6411 | 0.5590, 4.8181 | 0.367 |

4. Goodness of Fit

A goodness-of-fit F-adjusted mean residual test was run for the main effects model with adult insurance length, race and ethnicity, age at study start, OHP group at study start and primary language. The goodness-of-fit F-adjusted mean residual test was 0.7397 with a p-value much greater than 0.05 (p=0.6725). Therefore, we concluded that the main effects model of adult insurance length, race and ethnicity, age at study start, primary language and OHP group type at study start fits well because there is no significant difference between the observed and expected values.

The goodness-of-fit F-adjusted mean residual test for the model with adult insurance length, race and ethnicity, age at study start, primary language, OHP group type at study start and highest education level was 1.6679 with a p-value greater than 0.05 (p=0.0938). When the interaction between highest education level and adult insurance length was added to this model, the goodness-of-fit F-adjusted mean residual test decreased to 0.8440 and the p-value increased to 0.5758. Therefore, both of these models fit well, though the model that also includes the interaction between highest education level and adult insurance length better describes whether children in the household at 30 months have insurance.

Ultimately, the multivariate logistic regression model including adult insurance length, race and ethnicity, age at the start of the study, primary language and OHP group type best describes whether household children have insurance at 30 months due to its greater p-value.

## DISCUSSION

Despite efforts to increase the prevalence of children with insurance in the United States, many children eligible for insurance still remain uninsured. The results of this study better elucidate the relationship between the insurance, socioeconomic, health and health care characteristics of an adult and whether children in the same household have insurance. In addition, this study population uniquely includes low-income households with children that were all presumed to be eligible for public health insurance. Therefore, the findings of this study may provide critical information about how to insure more eligible low-income children in the United States.

### *STUDY LIMITATIONS*

The first survey had a response rate of 33%, and subsequently only 56% of the 2783 first survey participants responded to all three surveys. (Carlson et al., 2007) Selection bias may have occurred with this study, as adults who think that OHP changes caused subsequent health insurance and health care access events may be more motivated to participate. This selection bias would therefore bias results toward finding stronger associations. However, non-response was specifically accounted for in weighting participants' data in statistical analysis.

Because of the survey method of data collection, this study is also subject to recall bias, which may compromise the accuracy of information. This information bias may also bias results toward stronger associations, because more memorable experiences such as losing health insurance coverage may more likely be recorded. However, cognitive testing was used for the survey questions, and several widely

accepted surveys with previously validated questions were also utilized including the CAHPS survey, the Community Tracking Study and the SF-12 health assessment instrument. (Carlson et al., 2007) (Wright & Carlson, 2005)

There is no baseline health insurance information for children in this study. Therefore, the timing of when children and adults attain and lose health insurance coverage is not known. A causal association therefore, cannot be determined between an adult and children in the same household attaining or losing health insurance.

The results of this study also only included Oregon residents and there are regional differences in health insurance for children. (Olson et al., 2005) Therefore, the findings of this study may not be applicable to health policy changes for children living outside of Oregon. However, there is no conceptual reason why the association between the length of adult insurance coverage and whether children in the same household have health insurance is unique to Oregon. Thus, the results of this study can still be extrapolated to other low-income populations in the United Sates.

Several important child characteristics could not be studied including child health and child age, which have previously had significant associations with child health care access. For example, adolescents and older children have been found to have an increased likelihood of having health disparities and lack of health care access compared to younger children. (Voelker, 2009) (Currie, Decker, & Lin, 2008) (Committee on Adolescence and Committee on Child Health Financing, 2009) (DeVoe, Petering et al., 2008) Parents may also have more initiative to seek health insurance for a sicker child. Though these variables could not be assessed, many characteristics of adult participants were studied, which provide much detail about the family environment.

Details about family structure may correspond to the ability of adults to provide for children in their household, and previously has been associated with whether children have insurance coverage. (DeVoe et al., 2009) Though marital status was used to

characterize family structure in this study, this variable may not accurately define the relationship between family structure and whether children have insurance. For example, the person responding to the survey may not be a caretaker of children living in the same household. Therefore, their insurance experience may not directly influence whether children living in the same household have health insurance. Conversely, though study participants may be unmarried, they may still cohabitate with a partner, which can then provide increased insurance options for children in the household. Therefore, a more defined characterization of an adult's role as a child caretaker may better describe the ability to provide for health care needs. However, other independent variables examined in this study, including education level, employment, family income and financial strain, also provide information about family barriers that may prevent children from obtaining health insurance. (Committee on Adolescence and Committee on Child Health Financing, 2009) (Cassedy et al., 2008) (DeVoe et al., 2008) (Stevens et al., 2006)

*ADULT CHARACTERISTICS AND WHETHER CHILDREN HAVE INSURANCE*

Various adult characteristics provide a better picture of why eligible children in the same household remain uninsured.

1. Age at study start

With each increased year of age for adults, the odds that at least one child living in the same household was uninsured increased by 1.0148 (p-value = 0.2218). Therefore, increases of age at study start were significantly associated with having at least one uninsured child in the household at 30 months. However, age may actually be a proxy for the age of children in the household. For example, previous research has shown that adolescents have a higher prevalence of being uninsured compared to younger children. (Olson et al., 2005) The associations between age of children and age of adults with whether the children have health insurance should be studied further to make this

distinction. However, these findings point to an interesting relationship between adult age and whether household children have insurance.

2. Race and ethnicity and Primary Language

The categories of White and Non-white adults in this study do not differentiate between Hispanic and Non-white Non-Hispanic races. Previous literature has demonstrated that a relatively higher prevalence of Hispanic children were uninsured compared to other race and ethnicity groups. (Olson et al., 2005) (DeVoe, Graham, Krois, Smith, & Fairbrother, 2008) (Pylypchuk & Selden, 2008) Also, while children with Hispanic ethnicity have significantly higher odds of children having shorter lengths of insurance coverage, Non-white Non-Hispanic races do not have significantly higher odds of children having shorter lengths of insurance. (DeVoe et al., 2009)

In addition, this study uses the racial and ethnic group information of the adult who responded to the study, and not the child's race and ethnicity. It is likely that the race and ethnicity of adult study participants is the same as children who live in the same household. Previous research also shows that the race and ethnic group of the family unit is related to having at least one uninsured family member, and this family member may be a child. (Institute of Medicine, 2002)

Despite the inability to more specifically characterize race and ethnicity of both the adult responders and respective household children, the findings of this study are still important to consider. The prevalence of white participants in this study was 85.7% overall, without a significant difference between various lengths of insurance coverage. This proportion is relatively close to the United States' census proportion of white people living in Oregon, which was 90.1% in 2008. (U.S. Census Bureau, 2008)

Race and ethnicity has previously been significantly associated with whether children have insurance. (Hoilette et al., 2009) (Pylypchuk & Selden, 2008) (DeVoe et al., 2009) In this study, those that were of non-white race had significantly higher odds of

having less than all children insured at 30 months. Being of non-white race also attenuated the odds of having at least one uninsured child in the household at 30 months for shorter periods of adult insurance coverage. Therefore, interventions to help non-white race and ethnicity groups apply for health insurance may help to increase the prevalence of insured children in the United States.

3. Primary language

Children from households with a non-English primary language, especially Hispanic children, are more likely to be uninsured. (Federico et al., 2007) (Pylypchuk & Selden, 2008) (Pati & Danagoulian, 2008) In this study, having a non-English primary language led to significantly higher odds of having at least one uninsured child in the same household at 30 months, (OR: 4.7169, $p<0.0001$) and also attenuated the odds of having at least one household child being uninsured at 30 months for shorter lengths of adult health insurance coverage. Therefore, addressing communication barriers for families whose first language is not English may help these families to maintain health insurance for their children.

4. Health and Health Care Findings

The average number of clinic visits and the prevalence of participants with primary care increased with longer lengths of adult health insurance coverage, as seen in Table 2. Therefore, this study indicates that having health insurance leads to increased access to health care for adults. These findings support previous findings that state that parents without health insurance have had decreased access to health care and increased health disparities. (Dubay & Kenney, 2004)

Interestingly, the prevalence of adults with chronic illnesses and depression increases with increasing length of adult health insurance coverage. The reason behind these findings may be that those with chronic illnesses and depression may place an imperative on seeking out health insurance. (Institute of Medicine, 2002) However, adult

health and health care usage were not significantly related to whether household children had insurance at 30 months. Though adults with chronic health problems may be better able to access health care for themselves, they do not appear to be significantly more able to provide health insurance for their children. Despite being more familiar with accessing health care, it is possible that adults with debilitating health problems may still need assistance with navigating the health care system for their children. (Institute of Medicine, 2002)

5. Income level

Though the prevalence of lower income adults increased as the length of health insurance coverage also increased in this study, previous literature has found that lower income families are more likely to lack health insurance. (Institute of Medicine, 2002) These results may be due to the eligibility and cost of public insurance versus private or employee sponsored health insurance. Between 2000 and 2007, the cost for employers to provide health insurance doubled while workers' wages did not meet this increase in cost. Also, according to the United States Census Bureau's Current Population Survey in 2007, 82% of uninsured people were in families where at least one person worked. (Shields et al., 2008) This suggests that with increasing income, certain adults may be ineligible for public insurance but may also be unable to afford employer-based health insurance. Therefore, efforts to provide public insurance to working low-income individuals may increase the prevalence of insured adults in the United States.

In this study, income was not found to be significantly associated with whether children in the same household had health insurance at 30 months. In contrast, multiple studies have found that household income level is significantly related to whether children are insured. (DeVoe et al., 2009) (Currie & Lin, 2007) (Pylypchuk & Selden, 2008) Potential explanations for this difference in association significance are as follows. Income level was potentially subject to non-participant bias in this study, as 41 of 559

participants (6.37%) did not provide income information. Therefore, the association between household income level and whether children in the same household had health insurance may not be fully accounted for in this study. In addition, because the entire study population had public insurance coverage at the start of the study, all of the study participants likely live in low-income households. Thus, there may be a narrower range of income levels compared in this study. Therefore, when comparing individuals who all have low incomes, income level may no longer be significantly associated with whether children have health insurance.

6. Financial Situation

Shorter lengths of adult insurance coverage were associated with increased medical debt at 30 months. This result matches previous findings that families with uninsured members are more likely to have difficulty paying medical bills. (Institute of Medicine, 2002) In addition, less financial strain was associated with longer lengths of adult insurance coverage. This result matches previous findings that uninsured low-income parents reported trouble with paying bills and affording housing and food. (Dubay & Kenney, 2004) In this study, increased medical debt also led to increased odds of household children being uninsured at 30 months in simple logistic regression models. This finding indicates that the financial difficulty of a household may be related to an increased likelihood of having uninsured children. Therefore, providing more affordable health care in addition to increasing adult and child insurance coverage prevalence may decrease the financial burden of families who have endured periods without insurance.

*ADULT AND CHILDREN'S HEALTH INSURANCE*

Several adult health insurance variables confirm the association between adult and child health insurance coverage. These findings strongly support insuring both adults and children simultaneously to increase the prevalence of insured children in the United States.

1. OHP Coverage Type at Study Start

The eligibility and insurance package differences between OHP Plus and Standard may have contributed to whether both adults and children had health insurance coverage in this study. In addition to inherent differences based on eligibility, these groups also had differences in insurance packages changes, such as cost-sharing and administrative changes, which were implemented for OHP Standard members only. OHP Standard members were subsequently more likely to experience loss of insurance coverage. (Carlson et al., 2007) The higher likelihood of OHP Standard members to lose insurance was supported by the results of this study, as a larger prevalence of OHP Standard members had shorter lengths of health insurance.

Because of differences in eligibility, insurance coverage and health care experiences, OHP group type at study start was determined to be conceptually significant to the final model. (Oberlander, 2006) (Selden et al., 2004) Having OHP Plus was associated with decreased odds of having an uninsured child in the household compared to OHP Standard (OR 0.7002, 95% CI: 0.4175, 1.1742). Though this odds ratio did not have the strongest statistical significance, the difference in experiences between the OHP Plus and Standard groups appears to have still affected whether children living in the same household had health insurance. However, it is also possible that OHP group type is directly part of the association between adult insurance coverage and household children's insurance coverage. Therefore, OHP group type may not be independently associated with whether children in the same household have insurance and length of adult insurance. These findings still indicate that the insurance of an adult is significantly related to whether children in the same household have insurance.

2. Insurance type at 30 months

Insurance type at 30 months was found to be significantly associated with whether at least one child in the household lacked health insurance at 30 months. However, taking

this independent variable out of the initial main effects model led to a noticeable increase in the significance of the association between length of adult insurance coverage and whether children living in the same household had health insurance at 30 months, as seen in Appendix 3. In addition, there is no significant difference in the odds of having at least one uninsured child in the household at 30 months between OHP/OMAP and Medicare and either an employee health plan (OR 0.8550, 95% CI: 0.3119, 2.3441), or other health insurance (OR 1.6436, 95% CI: 0.6665, 4.0531). In fact, the only significant odds ratio of having at least one uninsured child in the household at 30 months is between OHP/OMAP and Medicare and having no insurance (OR 5.2397, 95% CI: 2.8087, 9.7747). Therefore, the significant association between adult insurance type at 30 months and whether children in the same household have insurance at 30 months may be due to the differences between uninsured and publicly insured adults. These results point to the importance of providing health insurance to both children and parents, to more effectively increase the prevalence of insured children.

3. Length of Adult Insurance Coverage

The main question of this study was to determine if the length of adult health insurance coverage was significantly associated with whether children in the same household had health insurance at 30 months. This study has shown that adults with shorter lengths of health insurance coverage are more likely to have uninsured children in the household. These findings strongly corroborate the results of previous studies indicating that a significant association between adult health insurance coverage and household children's health insurance coverage exists. (B. D. Sommers, 2007) (Dubay & Kenney, 2003) (DeVoe, Krois et al., 2008) (Davidoff et al., 2003) (Guendelman & Pearl, 2004) (DeVoe et al., 2009) In addition, these findings demonstrate an important association between decreased lengths of adult insurance coverage and increased odds of having an uninsured child in the household. Therefore, shortening durations without

insurance coverage is critical for both children and their caretakers to increase the prevalence of children with insurance in the United States.

4. Stratification by highest education level

For adults with a high school education or less, those with shorter lengths of insurance coverage were significantly more likely to have at least one uninsured child in the household at 30 months. In contrast, for adults with more than a high school education level, those with shorter lengths of insurance coverage were not significantly more likely to have at least one uninsured child in the household at 30 months. These findings identify the importance of providing support to adults with less education with regards to providing health insurance for their children. Such support for may include help with the insurance application process and also more awareness of the importance of health insurance for children.

5. Reasons for the relationship between adult and child insurance

The reasons why the length of adult insurance coverage is related to children's insurance coverage is likely very complex. However, this study has provided several areas of focus to better address this relationship. For example, socioeconomic information relating to both the length of adult insurance coverage and whether children in the household had insurance include medical debt and OHP group type. More manageable medical costs and less administratively complex insurance policies may effectively target the relationship between adult and children's health insurance coverage. In addition, continued focus on groups consistently found to be associated with uninsured children such as underprivileged racial and ethnic groups, non-English speakers, and those with less education may also target families with more difficulty providing insurance coverage for their children.

## SUMMARY AND CONCLUSIONS

*SUMMARY*

An adult's insurance coverage is associated with a host of socioeconomic, health and health care characteristics, and may also be related to whether children in their household have insurance. To better understand characteristics of adults with children in their household, this study first compared socioeconomic, health and health care characteristics of OHP adults with household children at 30 months who had varying lengths of health insurance coverage. Those adults who had longer lengths of insurance coverage were more likely to experience unemployment during the study, and had a relatively lower household income. Adults with longer lengths of insurance coverage were also more likely to have primary care access, a chronic illness, OHP Plus at the start of the study, no medical debt at 30 months, and no financial strain during the study. Insurance type at 30 months and age at study start were also significantly associated with length of adult insurance coverage. There were also non-significant associations between increasing lengths of adult insurance and being unmarried for at least part of the study, being non-white, and having depression.

To directly evaluate the relationship between the length of adult insurance coverage and having at least one uninsured child in the household, the second specific aim explored whether the length of adult health insurance coverage was associated with whether children in the same household had health insurance at 30 months. Results indicate that there are increased odds of having at least one uninsured child in the household at 30 months with decreasing lengths of adult insurance coverage. In addition, adult characteristics including being non-white, having a non-English primary

language, having less than a high school education level, being in OHP Standard at the start of the study, having no insurance coverage at 30 months and having medical debt at 30 months were all each associated with having at least one uninsured child in the household at 30 months (p-value < 0.25). A multivariate logistic regression model including length of adult insurance coverage, race and ethnicity, primary language, age at study start, and OHP group at study start, best described whether at least one child in the household was uninsured at 30 months, (F-adjusted mean residual test p-value = 0.6725).

*CONCLUSIONS*

While other studies have examined the impact of a parent's health insurance coverage on whether a child has health insurance, this study has specifically examined the association between various lengths of adult insurance coverage and whether at least one child in the household is uninsured. As previously mentioned, even brief periods of being without health insurance have effects on children's health care access and health. Therefore providing health insurance for children is integral to the complex process of ensuring health care access and optimal health for children. (DeVoe, Graham et al., 2008) (Hoilette et al., 2009) (Cummings et al., 2009) (Olson et al., 2005) (Cassedy et al., 2008) (Szilagyi et al., 2008) (Chung et al., 2008) In addition, this study shows that maintaining health insurance coverage and shortening the length of uninsured periods for children's caretakers is integral to maintaining children's insurance coverage.

# APPENDICES

## *Appendix A: Variable Coding*

Table 6: Recoding of Main Independent Variable and Dependent Variable

| Variable | Survey Question(s) | Original Coding | Recoding |
|---|---|---|---|
| Main Independent Variable: Length of Adult in Household's Insurance | For how many of the last 6 (1st survey) or 12 (2nd and 3rd surveys) months did you have health insurance? | 1st survey: 1) 0 months, 2) 1 month or less, 3) 2 months, 4) 3 months, 5) 4 months, 6) 5 months, 7) 6 months<br>2nd and 3rd surveys: 1) 0 months, 2) Less than 3 months, 3) 4 to 6 months, 4) 7 to 9 months, 5) 10 to 12 months | Combined total 30 months: 1) 0-9 months 2) 10-18 months 3) 19-27 months 4) 28-30 months |
| Dependent Variable: Whether Children in the Household had Insurance at 30 months | 3rd survey: Thinking about the family members in your household under 19 years of age, how many are currently covered by some kind of health insurance? | 3rd survey: 1) All family members under 19 are covered by health insurance of some kind. 2) Some family members under 19 are insured, and some aren't. 3) None of the family members under 19 are insured. | Compiled across all three surveys: 1) Less than all household members under 19 years of age are covered by health insurance 2) All household members under 19 years of age are covered by health insurance |

Table 7: Recoding of Socioeconomic Information for Adults of Household

| Variable | Survey Question(s) | Original Coding | Recoding |
|---|---|---|---|
| Age at Study Start | What is the year of your birth? | Fill in the blank | Continuous variable by year<br>Categorized into 5 year blocks |
| Race/Ethnicity | Would you describe yourself as Spanish, Hispanic or Latino(a)?<br><br>How would you describe your race? Mark all that apply. | 1st survey only: 1) White, not-Hispanic 2) Black, not-Hispanic 3) American Indian or Alaska Native 4) Asian/Pacific Islander/Other/Multi-ethnic 5) Hispanic | 1) White 2) Non-White |
| Gender | Are you male or female? | 1) Male 2) Female | 1) Male 2) Female |
| Primary Language | *Known before surveys were sent out* | English, Spanish, Russian, Vietnamese and Others | 1) English 2) Non-English |
| Marital Status | What is your current marital status? | 1) Now married 2) Divorced 3) Separated 4) Widowed 5) Never married | 1) Married all 3 waves 2) Marital Status Change 3) Unmarried all 3 waves |

Table 8: Recoding of Health and Health Care Information

| Variable | Survey Question(s) | Original Coding | Recoding |
|---|---|---|---|
| Chronic Illness at any time during 30 months | Have you ever been told by a doctor or other health professional that you | For each health condition: 1) Yes 2) No 3) Don't know | 1) Chronic Illness 2) No Chronic Illness |

| | | | |
|---|---|---|---|
| | have diabetes, asthma, high blood pressure, emphysema or chronic bronchitis, congestive heart failure? | | |
| Depression at any time during 30 months | In the last 6 months, have you been told by a doctor or other health professional that you have depression or anxiety? | 1) Yes<br>2) No<br>3) Don't know | 1) Depression<br>2) No Depression |
| Total number of clinic visits | In the last 6 months, how many times did you go to an emergency room to get care for yourself? | 1) None 2) 1<br>3) 2 4) 3<br>5) 4 6) 5<br>7) 6 8) 7 or more | 1 through 22 visits or more |
| Primary Care | Where do you usually go to receive medical care? | 1) A private doctor's office/clinic<br>2) A public health clinic, community health center or tribal health clinic<br>3) A hospital-based clinic<br>4) A hospital emergency room<br>5) An urgent care clinic<br>6) Some other place not listed here<br>7) I don't have a usual place<br>8) Don't know | 1) Primary Care (Private Office, Public Clinic, Hospital Clinic)<br>2) No Primary Care (Hospital ER, Urgent Care, Other, No Usual Place, Don't Know) |

Table 9: Recoding of Employment and Financial Demographics Information

| **Variable** | **Survey Question(s)** | **Original Coding** | **Recoding** |
|---|---|---|---|
| Average Income | What was your gross household income (before taxes and deductions are taken out) for last year? | 1) $0, 2) $1 to $2500,<br>3) $2501 to $5000, 4) $5001 to $7500, 5) $7501 to $10,000,<br>6) $10,001 to $12,500,<br>7) $12,501 to $15,000,<br>8) $15,001 to $17,500,<br>9) $17,501 to $20,000,<br>10) $20,001 to $22,250,<br>11) $22,251 to $25,000,<br>12) $25,001 to $27,500,<br>13) $27,501 to $30,000,<br>14) $30,001 to $32,500,<br>15) $32,501 to $35,000,<br>16) $35,001 to $37,500,<br>17) $37,501 to $40,000,<br>18) $40,001 to $42,500,<br>19) $42,501 to $45,000,<br>20) $45,001 to $47,000,<br>21) $47,501 to $50,000,<br>22) $50,001 or more<br><br>Converted to continuous percentage of Federal Poverty Line, averaged across all three waves | <u>Categorized continuous FPL averaged across all three waves</u>:<br>1) 0-50% FPL<br>2) 51-100% FPL<br>3) 100% + FPL |
| Employment Stability | Are you currently employed or self-employed? | 1) Yes, employed<br>2) Yes, self-employed<br>3) Not currently employed, retired<br>4) Not currently employed | 1) Employed all 3 waves<br>2) Employed less than all 3 waves |
| Initial OHP Member Type | *Known before surveys were sent out* | 1) Standard<br>2) Plus | 1) Standard<br>2) Plus |
| Current Insurance type/status (at 30 months) | Do you currently have health insurance through any of the following? | 1) Oregon Health Plan (OHP) or Medicaid (OMAP)<br>2) Employer or family member's employer<br>3) Medicare<br>4) Indian Health Service<br>5) Self-paid private plan<br>6) Family Health Insurance Assistance Program (FHIAP) | 1) OHP/OMAP or Medicare<br>2) Employer or Family member employer<br>3) Other: Indian Health Services, Self-paid, FHIAP, CHAMPUS/VA, Other, Don't know<br>4) No insurance |

| | | | |
|---|---|---|---|
| | | 7) CHAMPUS/VA<br>8) Another type of insurance not listed here<br>9) No health insurance coverage<br>10) Don't know | |
| Amount of Medical Debt at 30 months | About how much do you currently owe to a doctor, clinic, or hospital for your own medical bills? | 1) $0, 2) $1 to $25,<br>3) $26 to $50, 4) $51 to $75,<br>5) $76 to $100, 6) $101 to $300,<br>7) $301 to $500, 8) $501 to $1000,<br>9) $1001 to $5000,<br>10) $10,001 to $15,000,<br>11) More than $15,000,<br>12) Don't know | 1) $0<br>2) $1-$500<br>3) >$500 |
| Financial Strain during 30 months | In the last 6 months, have family and/or friends loaned or given you money so you could pay your medical bills?<br><br>In the last 6 months, have you cut back on your food budget to cover health care costs or pay medical bills?<br><br>In the last 6 months, have you skipped paying other bills, paid bills late, or paid less than the minimum payment to cover health care costs or pay medical bills?<br><br>2nd and 3rd surveys only: In the last 6 months, has owing money for medical bills made it difficult to pay your rent or mortgage?<br><br>2nd and 3rd surveys only: In the last 6 months, has owing money for medical bills forced you to move?<br><br>In the last 12 months, have you filed for bankruptcy because of your medical bills? | For each question:<br>1) Yes<br>2) No | Compiled across all 3 study waves:<br>1) Financial Strain (for a "yes" answer to any financial strain question across all three study waves)<br>2) No Financial Strain |

*Appendix B: Correlation of Independent Variables*

Table 10: Correlation of independent variables, rho-statistic

| Adult Study Participant Characteristics | Adult Race/ Ethnicity | Adult Chronic Illness | Adult Depression | Total number of clinic visits for adult | Adult Primary Care | Adult Income | Highest Education Level 1) Less | Adult Employment Stability 1) | Adult Age at Study Start (years) ** | Adult Gender | Adult Primary Language | Adult Marital Status | Adult OHP member type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Race/ Ethnicity | 1.0000 | | | | | | | | | | | | |
| Chronic Illness | 0.0609 | 1.0000 | | | | | | | | | | | |
| Depression | -0.1384 | 0.2326 | 1.0000 | | | | | | | | | | |
| Clinic Visits | -0.0757 | 0.2874 | 0.3884 | 1.0000 | | | | | | | | | |
| Primary Care | -0.0217 | 0.0873 | 0.0977 | 0.2596 | 1.0000 | | | | | | | | |
| Income | -0.0238 | -0.1730 | -0.0744 | -0.1557 | -0.0042 | 1.0000 | | | | | | | |
| Highest Education | -0.1602 | -0.1497 | -0.0216 | 0.0626 | 0.0355 | 0.2201 | 1.0000 | | | | | | |
| Employment stability | -0.0746 | 0.1436 | 0.2238 | 0.2402 | 0.0997 | -0.3410 | -0.1079 | 1.0000 | | | | | |
| Age | -0.0081 | 0.2185 | 0.1081 | 0.0535 | -0.0193 | -0.0015 | -0.0758 | 0.0109 | 1.0000 | | | | |
| Gender | 0.0724 | 0.0730 | -0.0954 | -0.0923 | 0.0355 | 0.0478 | -0.1583 | -0.0769 | 0.1997 | 1.0000 | | | |
| Primary Language | 0.3395 | -0.0643 | -0.1574 | -0.1273 | -0.0451 | 0.0206 | -0.3279 | -0.1401 | 0.1324 | 0.1475 | 1.0000 | | |
| Marital Status | 0.0009 | 0.1446 | 0.1058 | 0.0496 | -0.0574 | -0.2081 | 0.0910 | 0.0517 | -0.0483 | -0.2512 | -0.3684 | 1.0000 | |
| OHP member type | -0.0441 | 0.1107 | 0.1332 | 0.1547 | 0.0796 | -0.1233 | 0.0119 | 0.1069 | -0.1814 | -0.2114 | -0.2250 | 0.2719 | 1.0000 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adult Insurance Type | 0.1727 | -0.1672 | -0.1223 | -0.2539 | -0.1084 | 0.1251 | 0.0140 | -0.2528 | -0.0443 | 0.1035 | 0.1119 | -0.1702 | -0.3168 | 1.0000 | | |
| Amount of medical debt | -0.0320 | 0.1146 | 0.1468 | 0.1775 | -0.0233 | -0.0087 | 0.0466 | 0.0438 | -0.0645 | -0.1003 | -0.1732 | 0.0613 | -0.0799 | 0.1907 | 1.0000 | |
| Financial Strain Ever for Adult | -0.0729 | 0.1685 | 0.1743 | 0.1473 | -0.0614 | 0.1033 | 0.0165 | -0.0713 | 0.0371 | 0.0245 | -0.1150 | -0.0338 | -0.1181 | 0.0542 | 0.3889 | |

*Appendix C: Model Building*

Table 11: Manual Backward Step-wise Multivariate Logistic Regression Model Building:

| Variables | Adult Insurance Length Only | Adult Insurance Length & 7 other variables | Adult Insurance Length & 6 other variables | Adult Insurance Length & 5 other variables |
|---|---|---|---|---|
| **Model F-statistic & p-value** | $F_{3, 555}$ = 6.66<br>p-value = 0.0002 | $F_{14, 505}$ = 3.99<br>p-value <0.0001 | $F_{11, 520}$ = 4.59<br>p-value <0.0001 | $F_{9, 522}$ = 4.82<br>p-value <0.0001 |
| **Adult Insurance Length**<br>**1) 28-30 months** | **1)** 1.0000 | **1)** 1.0000 | **1)** 1.0000 | **1)** 1.0000 |
| **2) 19-27 months** | **2)** 2.0804<br>(1.0092, 4.2886)<br>p= 0.047 | **2)** 1.8455<br>(0.7508, 4.5364)<br>p=0.181 | **2)** 2.3282<br>(0.9812, 5.5244)<br>p=0.055 | **2)** 2.4519<br>(1.0662, 5.6385)<br>p=0.035 |
| **3) 10-18 months** | **3)** 3.6939<br>(1.8433, 7.4024)<br>p < 0.001 | **3)** 2.3124<br>(0.8502, 6.2890)<br>p= 0.100 | **3)** 4.9810<br>(2.0613, 12.0362)<br>p<0.001 | **3)** 5.5272<br>(2.4501, 12.4689)<br>p<0.001 |
| **4) 0-9 months** | **4)** 4.4063<br>(2.0369, 9.5318)<br>p < 0.001 | **4)** 3.1487<br>(0.9841, 10.0745)<br>p=0.053 | **4)** 7.2551<br>(2.7453, 19.1736)<br>p<0.0001 | **4)** 7.8264<br>(3.0861, 19.8475)<br>p<0.001 |
| **Primary Language** | | 3.8060<br>(1.3109, 11.0502)<br>p=0.014 | 4.1219<br>(1.3789, 12.3214)<br>p=0.011 | 3.4394<br>(1.1683, 10.1253)<br>p=0.025 |
| **OHP member type** | | 1.4189<br>(0.7284, 2.7638)<br>p=0.303 | 1.2698<br>(0.6711, 2.4027)<br>p=0.462 | 1.2629<br>(0.6679, 2.3878)<br>p=0.472 |
| **Age at Study Start** | | 1.0301<br>(1.0001, 1.0610)<br>p=0.049 | 1.0203<br>(0.9929, 1.0484)<br>p=0.147 | 1.0187<br>(0.9918, 1.0463)<br>p=0.175 |
| **Race/Ethnicity** | | 1.7968<br>(0.8859, 3.6442)<br>p= 0.104 | 1.5991<br>(0.7608, 3.3613)<br>p=0.215 | 1.6249<br>(0.7710, 3.4244)<br>p=0.201 |
| **Education Level**<br>**a. Less than High School**<br>**b. High School**<br>**c. More than High School** | | a. 1.0000<br>b. 1.1080<br>(0.5011, 2.4500)<br>p=0.800<br>c. 0.5831 (0.2677, 1.2701) p=0.174 | a. 1.0000<br>b. 0.9774<br>(0.4578, 2.0867)<br>p=0.953<br>c. 0.4357<br>(0.1924, 0.9868)<br>p=0.046 | a. 1.0000<br>b. 0.9176<br>(0.4422, 1.9043)<br>p=0.031<br>c. 0.4139<br>(0.1858, 0.9217)<br>p=0.031 |
| **Medical Debt at 30 months**<br>**a. $0**<br>**b. $1 to $500**<br>**c. $500+** | | a. 1.0000<br>b. 1.3372<br>(0.5624, 3.1796)<br>p=0.510<br>c. 1.5611<br>(0.7202, 3.3838)<br>p=0.259 | a. 1.0000<br>b. 1.5052<br>(0.6512, 3.4791)<br>p=0.338<br>c. 1.4546<br>(0.6837, 3.0947)<br>p=0.330 | |
| **Insurance type at 30 months**<br>**a. OHP/OMAP or Medicare**<br>**b. Employer or family member**<br>**c. Other**<br>**d. No Insurance** | | a. 1.0000<br>b. 1.0797<br>(0.3433, 3.3957)<br>p=0.895<br>c. 1.5935<br>(0.5336, 4.7592)<br>p=0.403<br>d. 4.2153<br>(1.6942, 10.4880)<br>p=0.002 | | |

Table 11 continued:

| Variables | Adult Insurance Length & 4 other variables | Adult Insurance Length & 3 other variables | Adult Insurance Length & 2 other variables | Adult Insurance Length & 1 other variables |
|---|---|---|---|---|
| **Model F-statistic & p-value** | $F_{7, 551} = 5.68$<br>p-value <0.0001 | $F_{6, 552} = 6.35$<br>p-value <0.0001 | $F_{5, 553} = 7.20$<br>p-value <0.0001 | $F_{4, 554} = 8.92$<br>p-value <0.0001 |
| **Adult Insurance Length**<br>**1) 28-30 months** | **1)** 1.0000 | **1)** 1.0000 | **1)** 1.0000 | **1)** 1.0000 |
| **2) 19-27 months** | **2)** 2.3904<br>(1.1084, 5.1553)<br>p=0.026 | **2)** 2.3500<br>(1.0950, 5.0435)<br>p=0.028 | **2)** 2.2470<br>(1.0502, 4.8077)<br>p=0.037 | **2)** 2.1815<br>(1.0402, 4.5751)<br>p=0.039 |
| **3) 10-18 months** | **3)** 4.2901<br>(1.9795, 9.2976)<br>p<0.001 | **3)** 4.2552<br>(1.9708, 9.1873)<br>p<0.001 | **3)** 4.0678<br>(1.8973, 8.7217)<br>p<0.001 | **3)** 3.8709<br>(1.8880, 7.9362)<br>p<0.001 |
| **4) 0-9 months** | **4)** 5.9444<br>(2.4066, 14.6830)<br>p<0.001 | **4)** 5.9584<br>(2.4272, 14.6270)<br>p<0.001 | **4)** 5.4702<br>(2.2676, 13.1957)<br>p<0.001 | **4)** 5.0367<br>(2.2750, 11.1506)<br>p<0.001 |
| **Primary Language** | 3.7601<br>(1.5597, 9.0649)<br>p=0.003 | 5.2448<br>(3.3713, 11.6002)<br>p<0.001 | 5.7523<br>(2.6308, 12.5774)<br>p<0.001 | 5.6357<br>(2.5952, 12.2382)<br>p<0.001 |
| **OHP member type** | 1.1021<br>(0.5918, 2.0524<br>p=0.759 | 1.2212<br>(0.6608, 2.2567)<br>p=0.523 | 1.1725<br>(0.6404, 2.1466)<br>p=0.606 | |
| **Age at Study Start** | 1.0161<br>(0.9900, 1.0428)<br>p=0.228 | 1.0160<br>(0.9898, 1.0429)<br>p=0.233 | | |
| **Race/Ethnicity** | 1.7588<br>(0.9194, 3.3645)<br>p=0.088 | | | |
| **Education Level**<br>**a. Less than High School**<br>**b. High School**<br>**c. More than High School** | | | | |
| **Medical Debt at 30 months**<br>**a. $0**<br>**b. $1 to $500**<br>**c. $500+** | | | | |
| **Insurance type at 30 months**<br>**a. OHP/OMAP or Medicare**<br>**b. Employer or family member**<br>**c. Other**<br>**d. No Insurance** | | | | |

Table12: Manual Backward Step-wise Multivariate Logistic Regression Model Building Based on Estimated Wald Statistics:

| Variables | Adult Insurance Length Only | Adult Insurance Length & 7 other variables | Adult Insurance Length & 6 other variables | Adult Insurance Length & 5 other variables |
|---|---|---|---|---|
| **Model F-statistic & p-value** | $F_{3, 555} = 6.66$<br>p-value = 0.0002 | $F_{14, 505} = 3.99$<br>p-value <0.0001 | $F_{11, 520} = 4.59$<br>p-value <0.0001 | $F_{9, 549} = 5.52$<br>p-value <0.0001 |
| **Adult Insurance Length**<br>**1) 28-30 months** | 1) 1.0000 | 1) 1.0000 | 1) 1.0000 | 1) 1.0000 |

| | | | | |
|---|---|---|---|---|
| **2) 19-27 months** | 2) 2.0804<br>(1.0092, 4.2886)<br>p= 0.047 | 2) 1.8455<br>(0.7508, 4.5364)<br>p=0.181 | 2) 2.3282<br>(0.9812, 5.5244)<br>p=0.055 | 2) 2.2457<br>(1.0197, 4.9457)<br>p=0.045 |
| **3) 10-18 months** | 3) 3.6939<br>(1.8433, 7.4024)<br>p < 0.001 | 3) 2.3124<br>(0.8502, 6.2890)<br>p= 0.100 | 3) 4.9810<br>(2.0613, 12.0362)<br>p<0.001 | 3) 3.7857<br>(1.6605, 8.6308)<br>p=0.002 |
| **4) 0-9 months** | 4) 4.4063<br>(2.0369, 9.5318)<br>p < 0.001 | 4) 3.1487<br>(0.9841, 10.0745)<br>p=0.053 | 4) 7.2551<br>(2.7453, 19.1736)<br>p<0.0001 | 4) 5.4465<br>(2.1324, 13.9111)<br>p<0.001 |
| **Primary Language** | | 3.8060<br>(1.3109, 11.0502)<br>p=0.014 | 4.1219<br>(1.3789, 12.3214)<br>p=0.011 | 4.6584<br>(1.9056, 11.3878)<br>p=0.001 |
| **OHP member type** | | 1.4189<br>(0.7284, 2.7638)<br>p=0.303 | 1.2698<br>(0.6711, 2.4027)<br>p=0.462 | 1.1166<br>(0.6008, 2.0753)<br>p=0.727 |
| **Age at Study Start** | | 1.0301<br>(1.0001, 1.0610)<br>p=0.049 | 1.0203<br>(0.9929, 1.0484)<br>p=0.147 | 1.0173<br>(0.9911, 1.0442)<br>p=0.197 |
| **Medical Debt at 30 months**<br>**a. $0**<br>**b. $1 to $500**<br>**c. $500+** | | a. 1.0000<br>b. 1.3372<br>(0.5624, 3.1796)<br>p=0.510<br>c. 1.5611<br>(0.7202, 3.3838)<br>p=0.259 | a. 1.0000<br>b. 1.5052<br>(0.6512, 3.4791)<br>p=0.338<br>c. 1.4546<br>(0.6837, 3.0947)<br>p=0.330 | a. 1.0000<br>b. 1.5920<br>(0.7082, 3.5791)<br>p=0.260<br>c. 1.6784<br>(0.8457, 3.3311)<br>p=0.138 |
| **Race/Ethnicity** | | 1.7968<br>(0.8859, 3.6442)<br>p= 0.104 | 1.5991<br>(0.7608, 3.3613)<br>p=0.215 | 1.7119<br>(0.9017, 3.2501)<br>p=0.100 |
| **Education Level**<br>**a. Less than High School**<br>**b. High School**<br>**c. More than High School** | | a. 1.0000<br>b. 1.1080<br>(0.5011, 2.4500)<br>p=0.800<br>c. 0.5831 (0.2677, 1.2701) p=0.174 | a. 1.0000<br>b. 0.9774<br>(0.4578, 2.0867)<br>p=0.953<br>c. 0.4357<br>(0.1924, 0.9868)<br>p=0.046 | |
| **Insurance type at 30 months**<br>**a. OHP/OMAP or Medicare**<br>**b. Employer or family member**<br>**c. Other**<br>**d. No Insurance** | | a. 1.0000<br>b. 1.0797<br>(0.3433, 3.3957)<br>p=0.895<br>c. 1.5935<br>(0.5336, 4.7592)<br>p=0.403<br>d. 4.2153<br>(1.6942, 10.4880)<br>p=0.002 | | |

Table 12 continued

| Variables | Adult Insurance Length & 4 other variables | Adult Insurance Length & 3 other variables | Adult Insurance Length & 2 other variables | Adult Insurance Length & 1 other variables |
|---|---|---|---|---|
| **Model F-statistic & p-value** | $F_{8, 550} = 6.23$<br>p-value <0.0001 | $F_{6, 552} = 6.35$<br>p-value <0.0001 | $F_{5, 553} = 7.20$<br>p-value <0.0001 | $F_{4, 554} = 8.92$<br>p-value <0.0001 |
| **Adult Insurance Length**<br>**1) 28-30 months** | 1) 1.0000 | 1) 1.0000 | 1) 1.0000 | 1) 1.0000 |
| **2) 19-27 months** | 2) 2.2083<br>(1.0073, 4.8411)<br>p=0.048 | 2) 2.3500<br>(1.0950, 5.0435)<br>p=0.028 | 2) 2.2470<br>(1.0502, 4.8077)<br>p=0.037 | 2) 2.1815<br>(1.0402, 4.5751)<br>p=0.039 |
| **3) 10-18 months** | 3) 3.7499<br>(1.6505, 8.5199)<br>p=0.002 | 3) 4.2552<br>(1.9708, 9.1873)<br>p<0.001 | 3) 4.0678<br>(1.8973, 8.7217)<br>p<0.001 | 3) 3.8709<br>(1.8880, 7.9362)<br>p<0.001 |
| **4) 0-9 months** | 4) 5.4381<br>(2.1365, 13.8418)<br>p<0.001 | 4) 5.9584<br>(2.4272, 14.6270)<br>p<0.001 | 4) 5.4702<br>(2.2676, 13.1957)<br>p<0.001 | 4) 5.0367<br>(2.2750, 11.1506)<br>p<0.001 |
| **Primary Language** | 6.4334<br>(2.8513, 14.5160)<br>p<0.001 | 5.2448<br>(3.3713, 11.6002)<br>p<0.001 | 5.7523<br>(2.6308, 12.5774)<br>p<0.001 | 5.6357<br>(2.5952, 12.2382)<br>p<0.001 |

| | | | |
|---|---|---|---|
| **OHP member type** | 1.2286<br>(0.6644, 2.2717)<br>p=0.511 | 1.2212<br>(0.6608, 2.2567)<br>p=0.523 | 1.1725<br>(0.6404, 2.1466)<br>p=0.606 |
| **Age at Study Start** | 1.0175<br>(0.9911, 1.0446)<br>p=0.196 | 1.0160<br>(0.9898, 1.0429)<br>p=0.233 | |
| **Medical Debt at 30 months**<br>**a. $0**<br>**b. $1 to $500**<br>**c. $500+** | a. 1.0000<br>b. 1.6370<br>(0.7334, 3.6539)<br>p=0.228<br>c. 1.6948<br>(0.8524, 3.3699)<br>p=0.132 | | |
| **Race/Ethnicity** | | | |
| **Education Level**<br>**a. Less than High School**<br>**b. High School**<br>**c. More than High School** | | | |
| **Insurance type at 30 months**<br>**a. OHP/OMAP or Medicare**<br>**b. Employer or family member**<br>**c. Other**<br>**d. No Insurance** | | | |

*Appendix D: Condensing Adult Insurance Length and Highest Education Level*

Table 13: Condensed Categories of Highest Education Level and Adult Insurance Length:

| | **Adult Insurance Length** | | |
|---|---|---|---|
| | **19-30 months** | **0-18 months** | **Total** |
| **High School or Less** | 234 (58.12%) | 82 (51.67%) | 316 (56.25%) |
| **More than High School** | 150 (41.88%) | 66 (48.33%) | 216 (43.75%) |
| **Total** | 384 | 148 | 532 |

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