Rural-Urban Differences in Access, Utilization and Time Spent

Uninsured in an Oregon Medicaid Population

By

G. Glenn Kautz

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CERTIFICATE OF APPROVAL

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G. Glenn Kautz

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Mentor/Advisor

Member

Member

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Abstract

Background: Rural citizens face many barriers to accessing and utilizing both health care services and health insurance. Medicaid covers a large portion of the Oregon population, represents a high-risk group that is distinct from the general population and plays a particularly crucial role in rural health systems. For individuals without health insurance, accessing health care services can be difficult and can lead to accruing substantial medical debt. While comparisons among the general population indicate that rural citizens are at a higher risk of less access and utilization than their urban counterparts, few studies have examined these differences longitudinally among a Medicaid population. There is some evidence to suggest that urban and rural populations to have similar risk for less access and utilization when compared *within* a Medicaid population. The current study is framed in a time of significant policy changes for Oregon's State Medicaid program, the Oregon Health Plan (OHP), when the State sought to increase enrollment by creating the OHP2 by shifting costs to a group of enrollees through premiums, copays and decreased benefit packages. In the ensuring months enrollment plummeted leaving many Oregonians without health insurance.

Objective: We sought to examine differences between urban and rural populations with reference to access, utilization, medical debt and time spent uninsured among beneficiaries of the OHP2 during a time of significant State Medicaid policy changes.

Methods: We utilized the Andersen Behavioral Model of Health Services Use as a conceptual model to frame our investigation. Our analyses utilized results from the Oregon Health Care Survey, a three-wave longitudinal panel study developed and implemented between 2003 and 2006 by the Providence Center for Outcomes Research and Education (CORE) and Portland State University. Our analyses included the 1535 adults who completed all three study surveys. We utilized univariate and multivariate logistic regression analyses to investigate the impact of living in a rural area on reported unmet medical need, unmet prescription need due to cost, unmet urgent care need, utilization of primary care services, utilization of emergency care services, medical debt and time spent uninsured while controlling for a common set of potential confounding variables.

Results: The results of the univariate analyses indicated that rural respondents were older, more educated and more likely to be Caucasian than urban respondents. Spending time without insurance was associated with increased risk for each of the outcomes except emergency department utilization. Further, the risk for these outcomes increased with increasing time spent uninsured. The multivariate models comparing rural versus urban revealed that the risk for unmet medical need, unmet prescription need due to cost, unmet urgent care need, going without primary care and emergency services and having greater medical debt were similar. Results also indicate that rural and urban respondents are equally likely to spend any amount of time uninsured.

Conclusions: Our findings support prior research, indicating that the longer individuals spend without health insurance the greater is their risk for less access and utilization of health care services, and greater medical debt. In addition, our results support the conclusions of prior research examining rural/urban differences within the Medicaid population, that rural and urban citizens experience similar levels of risk for less access and less utilization of health care services within this distinct population. State officials should incorporate an understanding of urban/rural differences in both population compositions and health system structures into Medicaid policies in order to ensure that all Medicaid enrollees receive the same opportunity for good health, regardless of where they live.

Introduction

Rural citizens face unique barriers to achieving and maintaining good health. Research using national data sources has found rural residents to be of lower socio-economic status, older, less educated and in worse health than their urban counterparts. These factors are compounded by a lack of providers, long travel distances to healthcare facilities, eroding local economies, lower prevalence of health insurance coverage, greater difficulty obtaining health insurance and longer periods without health insurance.[1,2] Many rural healthcare providers struggle to support their fellow citizens through discounts and charity, leading to decreased business viability. This can result in deleterious effects on the local economy. In addition, cultural aspects of rural life such as self-reliance and perceptions of healthcare need can affect the disposition of an individual to seek care.[3,4,5] Previous studies have found that preventable hospitalizations are more likely to occur in rural hospitals than urban. Moreover, prior research suggests that rural populations experience less difference in access to care between insured and uninsured groups than do urban populations.[1,6] Other studies have found that rural populations are more likely to have a usual source of care and less likely to utilize preventive services than their urban counterparts.[7,8]

Prior research also indicates that Medicaid is a crucial component of rural health systems, providing coverage for one in six rural citizens.[2] In addition, previous research has found that rural residents are 50 percent more likely to be covered by Medicaid than their urban counterparts.[9] While comparisons of the general population have suggested worse access and less utilization of healthcare services for rural citizens, some evidence suggests that many of these differences fail to persist when examined within a Medicaid population. Further, the relatively few differences in access and utilization between rural and urban Medicaid groups is explained by differences in demographic distributions and the healthcare delivery systems. Research indicates that rural Medicaid populations are demographically distinct from both rural low income uninsured and low income

privately insured populations.[8,10] Thus the rural Medicaid subpopulation may not experience the same differences in access and utilization as the general population.

Research on Medicaid coverage indicates that uninsured individuals previously enrolled in Medicaid are less likely to use preventive services as the amount of time spent uninsured increases, are more likely than privately insured individuals to lose their insurance, and are likely to return to Medicaid after becoming uninsured. Medical care has also been shown to cost fewer Medicaid dollars for enrollees with continuous Medicaid coverage than those who leave and return.[11,12]

Accessing healthcare services can be difficult for individuals without health insurance. The uninsured are more likely to postpone care, to report their experience with the healthcare system as negative and to have worse health outcomes.[13] Even brief periods without insurance can lead to a higher risk of poorer health, higher medical debt, poorer access to needed health services and less utilization of primary care services.[14] Many obstacles prevent the uninsured from obtaining health insurance, including preexisting illness, out-of-reach costs, health system complexities and a lack of employer-based options.[3,10] The interrelation between living in a rural area, Medicaid enrollment, experiencing gaps in health insurance and adverse health outcomes may be complex, yet achieving an understanding of these relations is vital to ensuring policies that accurately reflect the healthcare needs of rural Medicaid populations.

Much attention has been given to policies surrounding uninsurance and public health services regarding rural populations. However, few studies have examined urban/rural differences using a variety of measures of healthcare access, utilization and financing outside of descriptive analyses and fewer have examined these topics within a Medicaid population longitudinally. The effects of Medicaid policy change can be substantial, with great health and economic implications at the community and state levels.[14] This is especially true for rural communities. Therefore it is important not only to examine potential disparities between urban and rural populations, but to do so through a Medicaid lens.

The purpose of this study is to examine differences in access, utilization, medical debt and time spent uninsured between urban and rural beneficiaries of the Oregon Health Plan (OHP) during a time period when many beneficiaries lost coverage. The study used data from the Oregon Health Care Survey – a longitudinal panel survey conducted to assess the impact of policy changes in the OHP, namely the creation of the Oregon Health Plan 2 (OHP2), which shifted costs to a group of existing members in an attempt to cover a greater number of qualifying Oregonians.[15]

Conceptual Model

This study utilized the Andersen Behavioral Model of Health Services Use as a conceptual model. The Andersen Behavioral Model of Health Services Use was developed in the late 1960's as a framework to explain and/or predict use of healthcare services, to define equitable access to healthcare and to aid policy-makers in the development of policies that would facilitate equitable access. Three general categories are used in the model to explain and/or predict a person's use of health services: predisposition to use, enabling or impeding factors and the need for care.[16]

The first general category consists of *predisposing characteristics,* which Andersen separates into demographic, social structure and health belief categories. Demographic characteristics such as income, age and gender may influence an individual's need for healthcare services. An individual's social structure may determine his or her ability to deal with health issues. For example, an individual residing within a tight-knit community may find assistance more accessible than an individual living in a less interconnected community. Health beliefs may have great effect on an individual's perception of need and subsequent use of healthcare services.

Enabling resources, the second category, are available facilities, personnel and other modes of obtaining care such as health insurance.[11] Without adequate resources, an

individual will be less likely to use healthcare services. The third category, *needs* includes both *perceived* and *evaluated* healthcare needs. *Evaluated needs* are determined by medical professional assessment. How an individual perceives the state of his or her health and how he or she conceptualizes the role of healthcare services in solving health problems are examples of *perceived need* factors.

While *predisposing*, *enabling* and *needs* factors can each determine the use of health services directly, they can also do so indirectly by affecting one another. For example, an individual's income is a *predisposing factor* which may affect his or her ability to qualify for public coverage or afford private insurance as well as affect his or her ability to pay for out-of-pocket costs for healthcare services.

The Andersen Behavioral Model can be readily applied to studies of access, utilization and financial strain among low income rural populations. Each *predisposing characteristics* category is relevant to urban-rural comparisons within a Medicaid population. Rural populations often differ from urban populations by factors such as age, race and education level. In addition, urban and rural community dynamics may differ greatly due to differences in the interconnectivity of residents, leading to a stronger presence of accountability within a smaller community. For example, it may be harder for a physician to deny services to a patient whom they often see at the supermarket.[17]

Rural residence has been shown to be associated with community resource factors that *impede* use of health services such as travel distance to providers, a lack of providers, greater difficulty obtaining health insurance and longer periods without health insurance. Implicit in these associations is that urban residents have greater *enablement* of health services through these factors.[16] In addition, because rural and urban communities may be culturally distinct, the perceptions of medical needs may differ substantially. For example, compared to urban residents, rural individuals may be less likely to seek medical attention for similar symptoms.[17]
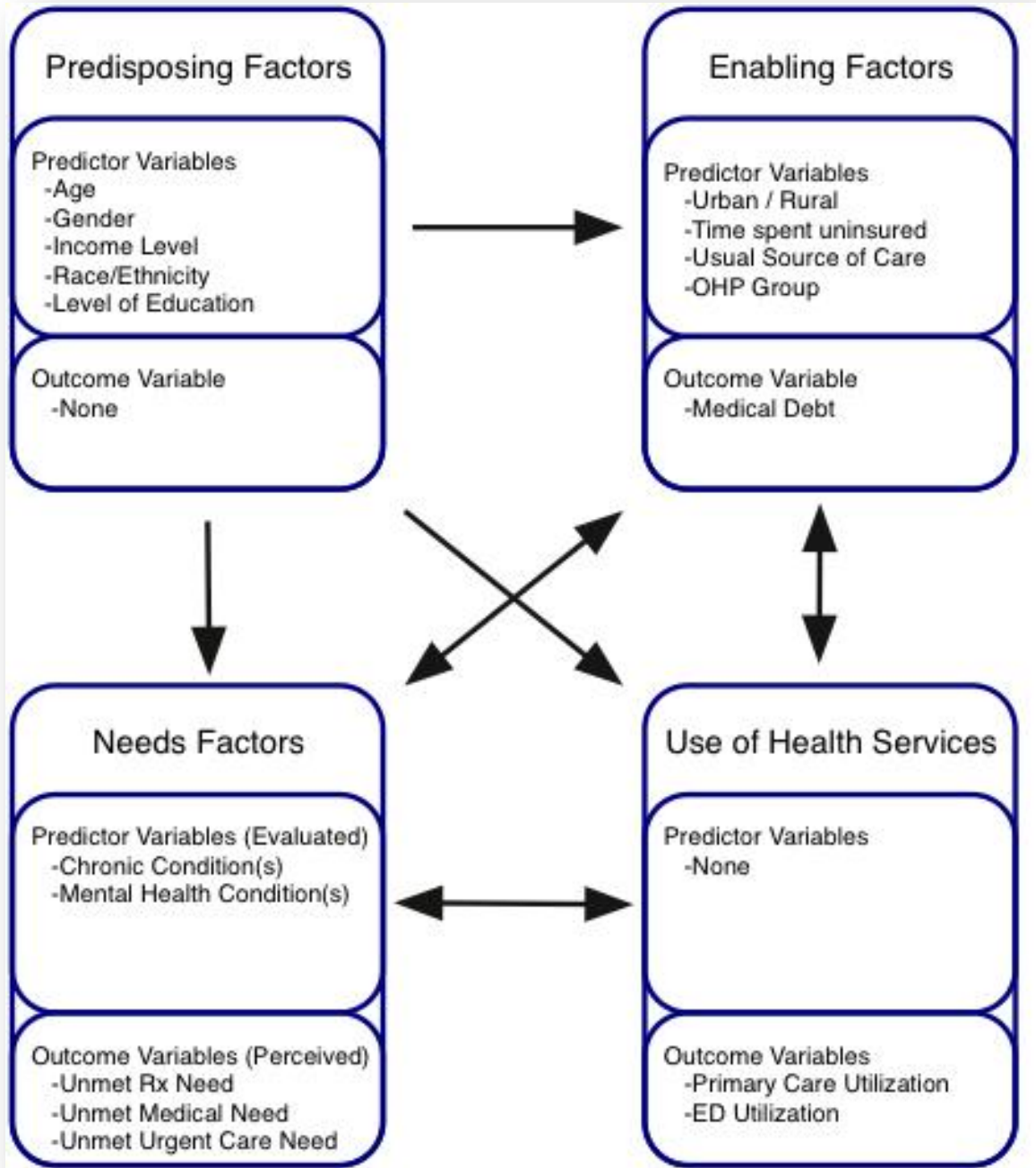
Figure 1. Adaptation of the Andersen Behavioral Model

Methods

Overview of Design

This longitudinal panel survey study utilized results from all three waves of the Oregon Health Care Survey conducted by Portland State University and the Providence Center for Outcomes Research and Education (CORE). The primary purpose of the survey was to measure health status, financial burden, and healthcare access and utilization for 30 months after policy change, in a cohort of adults who were enrolled in both OHP Plus and OHP Standard before program changes.[4] The current study uses multivariate logistic regression analysis to examine differences in access, utilization and financial burden between rural- and urban-dwelling OHP members, while controlling for a number of factors including time spent uninsured. The Oregon Health and Science University Institutional Review Board pre-approved the present study.

STUDY SUBJECTS

The study population for this historical cohort study was drawn from the Oregon Health Care Survey. In 2002 Oregon officials sought to expand coverage to 46,000 additional enrollees, incorporating individuals within 185 percent of the federal poverty level. The new program, called OHP2, would be divided into two parts, OHP Plus and OHP Standard.[18] Categorically eligible individuals such as pregnant women and children would be covered by OHP Plus while single adults and couples within 100% of federal poverty level would be covered by OHP Standard.[19]

To cover the cost of the expansion, OHP Standard members would be subject to decreases in covered benefits and increased cost in the form of premiums and copayments. Medicaid enrollment fell over 75% percent in the three years after these

changes. The purpose of the Oregon Health Care study, which began in 2003 immediately after the changes were made, was to assess the effects of these program changes on the healthcare experiences of members.

The survey included adults over the age of 18 years who were enrolled in the OHP for at least 30 days prior to program changes. Stratified random sampling was used to draw 10,600 potential cohort members from Medicaid eligibility files, divided evenly between members of OHP Standard and OHP Plus. Oversampling of Hispanic, African American and American Indian adults was utilized to ensure adequate representation.

Respondent experiences were assessed by a survey instrument created by Portland State University and the CORE, which utilized instruments such as the Consumer Assessment of Health Plans (CAHPS) survey, the SF-12 health assessment instrument, and the Community Tracking Study. Translation and independent back-translation were used to develop accurate Spanish language surveys.[11]

The survey asked respondents a variety of questions to assess self-reported access to and utilization of healthcare services and medical debt over the prior six month to minimize recall bias. Respondents were also asked to report the total amount of time spent uninsured since completion of the previous survey. Wave One surveys were mailed to participants between November, 2003 and January, 2004, eight and ten months after implementation of policy changes in March, 2003. Wave Two surveys were mailed to participants between October, 2004 and February, 2005, and Wave Three surveys were sent between October, 2005 and February, 2006.[14]

Of the members that were considered for participation 8,260 adults were eligible for cohort recruitment after exclusion of those who had moved out of Oregon, had no current address or had died by the time of the potential cohort drawing. Study participants were recruited using multi-wave mail methods, with second request and reminder cards sent to non-respondents after the eligible cohort was established. A response rate of 34% resulted in a total of 2,783 cohort members. Of the entire cohort, some participants completed only one of the three surveys, some completed two of the

surveys, and some completed all three of the surveys. Of the cohort members who agreed to participate in the first wave of the study, 1535 (55%) completed all three waves of the study.[14] ZIP code data were not available for 34 (1%) of the 2,783 cohort members. Because the urban/rural definitions used in the current study are dependent on ZIP code information, data derived from these cohort members was omitted from analysis.

The current study examined results only from participants who completed all three surveys. It was decided to analyze results of respondents who completed all three surveys for two reasons. First, several variables that were previously created by the Oregon Health Care Study analytic team and used in the current study were created only for participants who responded to all three waves. These variables were examined in a previous study by Heidi Allen using these data, thus enabling comparison of with the current study.[11] Second, examining participants across all three survey waves is necessary to achieving a continuity of participant experience without the use of statistical methods such as multiple imputation that are both methodologically complex and conceptually problematic when all the data from a survey are missing.

KEY VARIABLES

Predictor Variables (Table, Appendix A)

The survey on which the current study is based addresses many factors that play important roles in both the perception of medical care and the behaviors of distinct Medicaid populations. The variables used in the current analyses were chosen on the basis of both their ability to address the research questions and their congruity with the Anderson Behavioral Model as *enabling* factors.

Urban / Rural Residence (Appendix B)

Urban-rural status has been shown to be associated with varying levels of many factors that impede healthcare use; long travel distances to healthcare providers, provider shortages, difficulty obtaining health insurance and periods without health insurance. Therefore this predictor fits in well with the Andersen Behavioral Model's *enabling* category.[11,1]

A variety of taxonomies have been applied by previous healthcare studies seeking to define rural. Several taxonomies use counties to differentiate between urban and rural, yet this technique may create bias as a single county may contain both urban and rural areas. A more precise taxonomy for defining urban and rural is the Rural-Urban Commuting Area Codes (RUCA). Developed by researchers at the University of Washington, RUCA uses US Census tract population information and Census work commuting data to determine not only the population of an area, but the degree to which a population interacts with nearby populations.[20]

The RUCA code scheme classifies a Census tract as one of four **primary** population-based categories; Metropolitan (≥ 50,000 resident), Micropolitan (10,000 to 49,999 residents), Small Town (2,500 to 9,999 residents) or Rural Area (≤ 2,499 residents). Each primary category is then broken down into discrete categories by the percent of the

population that commutes to an Urbanized Area (≥ 50,000 residents), a Large Urban Cluster (10,000 to 49,999 residents), a Small Urban Cluster (2,500 to 9,999 residents) or an area smaller than a Small Urban Cluster. Up to 33 RUCA code categories can be employed, although researchers generally utilize three to four categories.[21]

Health care researchers generally use ZIP codes, not census tract codes, as geographic identifiers. For this reason the creators of the RUCA also developed a ZIP code approximation of the census tract-based RUCA codes. Each ZIP code contains multiple census tracts. An algorithm was developed to determine a representative RUCA code for each ZIP code, thereby combining the overall census tract make-up of each ZIP code into *one* ZIP code RUCA approximation. However, unlike the RUCA codes, the ZIP code RUCA approximations are based solely on census tract populations and not on commuting data. Like the RUCA codes themselves, 33 ZIP code RUCA approximations may be employed. Coding is available with RUCA codes corresponding to US Postal Service ZIP codes for all 50 states.[20, 21]

Urban and rural was analyzed as a dichotomous variable in the current study for three reasons. First, the current study was limited by n values, therefore creating more than two variables would have decreased statistical power. Second, the accuracy with which ZIP code RUCA approximations represent the census tract information on which they are based increases with a decreasing number of urban-rural categories.[4] Finally, the current definitions aim to examine urban and rural in an easily conceptualized manner.[21]

Previous research and expert opinion served as a guide for how best to dichotomize the data into urban and rural categories using the ZIP code RUCA approximations. RUCA definitions were based on RUCA version 2.0, which uses 2000 Census data and is relevant for the Oregon Health Care Study data that was obtained in 2003 and 2004. The current study defines Urban as any Metropolitan Area and any Micropolitan, Small Town or Rural Area with 30% to 49% of daily commuting to an Urbanized Area. Rural is defined as any Micropolitan Area, Small Town, or Rural Area that has less than 30% of daily commuting to an Urbanized Area.[21]
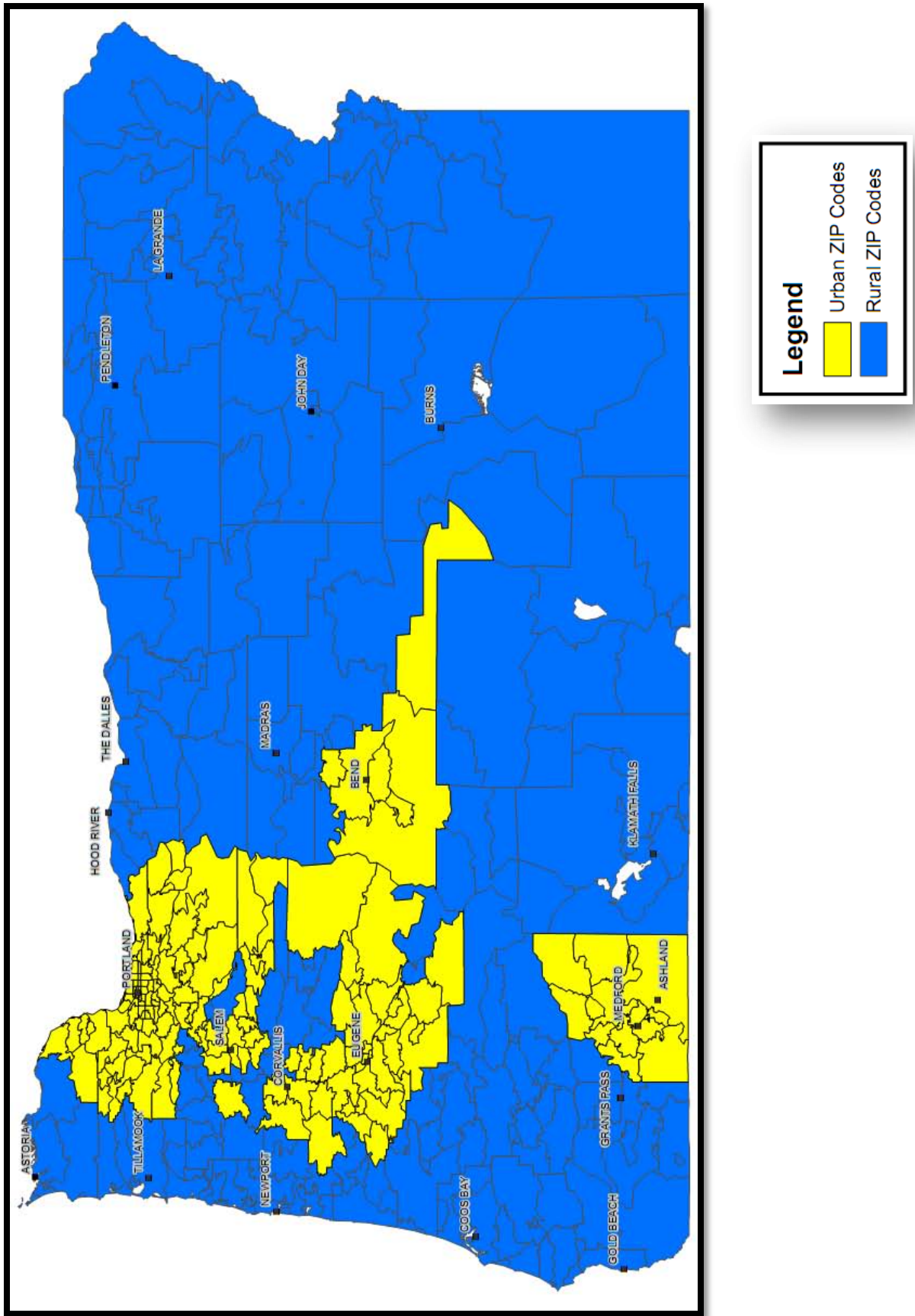
Figure 2. Map of urban and rural definitions used in the current study.

Time Spent Uninsured ("Gaps")

Continuity of insurance fits into the Andersen Behavioral Model as an *enabling resource* for access to healthcare services.[11,16] In the Oregon Health Care Study, each participant reported the total amount of time that he or she spent uninsured over the study period. A predictor variable called Gaps was created by the Oregon Health Care Study analytic team to capture the unique contribution of time that participants spent uninsured.

The Gaps variable separates participants into four categories: (1) continuously enrolled in some form of medical insurance throughout the study period (Continuously Enrolled); (2) disenrolled and spent less than 6 months uninsured (Short Gap); (3) disenrolled and spent between 6 and 17 months uninsured (Medium Gap); and (4) disenrolled and spent between 18 and 30 months uninsured (Long Gap). Unlike the healthcare need and healthcare utilization variables which asked about respondent experience over the previous six months in each survey, "Gaps" is representative of the participants' experience across the entire 30 month study period.[11]

Each of the Gaps levels represents either policy-relevant, or natural time span breaks. Category (2) was created because at the time of the variable's creation, OHP eligibility was dependent upon an applicant having been uninsured for at least six months. OHP eligibility currently requires a six month period without private health insurance for adults, making this a timely and relevant category. Categories (3) and (4) represent natural breaks in time across the study period.[11]

Potential Confounding Variables (Table 1, Appendix A)

Confounding variables correspond to either *needs, predisposing* or *enabling factors* of the Andersen Behavioral Model and include age, race, gender, level of education, employment status, Federal Poverty Level, self-reported use of a usual source of care,

self-reported diagnosis of a mental health condition and self-reported diagnosis of a chronic physical health condition.[11,16]

Predisposing Factors

Age

Age was determined at the onset of the study and examined in each of the models as a four-level categorical variable; 18 to 30, 31 to 40, and 51 to 64 years of age, corresponding to the categories used in previous work with the dataset.[11]

Gender

Regarding gender, respondents were asked, "Are you a male or female?" and given the two options, "Yes," or "No." This information was measured as a binary variable.[11]

Race / Ethnicity

Oversampling of OHP members by race (African American, American Indian) and ethnicity (Hispanic) was utilized to ensure adequate representation. Respondents of the surveys were asked to report their race with the following question, "How would you describe your race? *Mark all that apply*," and provided with six multiple choice options and a "*Print race*," space for write-in.

Separately, respondents were asked, "Would you describe yourself as Spanish, Hispanic, or Latino(a)?" and given a yes/no option. In this study, we combined race and ethnicity into a single variable and used the following categories: White, African American, American Indian / Alaskan Native, Asian and Hispanic.[14]

Because of insufficient sample size in the African American, American Indian/Alaskan Native and Asian groups, these categories were combined into one, "Other" category. The distinction of Hispanic was preserved within the race/ethnicity covariate due to sufficient sample size and because this is a relevant population in the State of Oregon. The assigned weighting information was maintained despite the combination of the racial categories.

Level of Education

Respondents were asked "What is the highest grade or level of school you have completed? *Mark only one*." and given six options ranging from "Less than high school," to "Graduate School." This information was analyzed in the current study as a three-level covariate; less than high school, high school and college or more.[11]

Income

Individuals with lower family incomes are less able to pay for needed care.[11,16] A FPL variable was created by the Oregon Health Care Study analytic team for each respondent's reported income and family size across all three surveys.[11]

Respondents were asked to report the number of family members, including themselves, living in their homes and given 8 choices numbering 1 through 7 people, and 8 or more. Household income was determined by asking respondents for their gross household income over the last year, and given twenty-two choices ranging from $0 to $50,000 or more.[11] Percent FPL was calculated based upon the number of family members and the total income for the household for each survey. Percent FPL was then averaged over the three surveys for a final FPL.

The income variable was composed of four categories; (1) ≤10% of FPL, (2) 11-50% of FPL, (3) 51-100% FPL, and (4) 101%+ FPL. These categories represent natural breaks in FPL. In addition, the 100% FPL is significant from a policy perspective as current Oregon Health Plan adult eligibility requires that applicants qualify as 100% or below the FPL.[11]

Employment Status

Employment can play a substantial role in the health of an individual. For someone who is unemployed, it may be difficult to afford essentials such as food and water much less health insurance or healthcare services. This information was analyzed as a binary variable; employed, or unemployed or retired, and based on the question, "Are you current employed?" Employment information from the first survey was used for creation of this variable.[11] This variable was used in the current study because it is highly relevant to access, utilization and financial burden of healthcare services and timely considering the current high unemployment rate experienced by the State of Oregon.

Enabling Factors

OHP Group

The two plans that constitute the OHP, Standard and Plus, differ in regards to the benefits available to members. Cost sharing, for the purpose of increasing the amount of people covered under the plan, resulted in a 77 percent decrease in OHP Standard member enrollment over the 30 month study period.[5] A previous analysis of the current study's data showed that over half of those who disenrolled from OHP Standard did so because of cost sharing or benefit changes.[15] This binary variable was created using Medicaid administrative data, and provided information relevant to the current analyses.

Usual Source of Care

Allen argued that having a usual source of care has been demonstrated as a moderating effector in the relationship between access and insurance status.[11] In addition, previous

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studies have found that rural residents are more likely to have a usual source of care than their urban counterparts.[7] Each survey asked participants, "Is there a place you usually go when you need care?"[11]

This is a binary variable. Respondents who answered "Yes," were then asked to identify where they receive their care. Those who responded "Yes," and identified their usual source of care as public clinics, private clinics, hospital-based clinics or "Some other place," were considered to have a usual source of care. Respondents who chose "No," to the question, or answered "Yes," and then identified an emergency department as their usual source of care were coded as not having a usual source of care. Respondents were categorized as having a usual source of care if they reported having at least one throughout the study period.

Needs Factors

Mental Health Conditions

This binary variable is based on the question, "In the last 6 months, have you been told by a doctor or other health professional that you have depression or anxiety?" Options provided were "Yes," "No," and "Don"t know."

Chronic Health Conditions

Individuals with chronic conditions are at a high level of need for medical care. This variable was created from self-reported answers to three separate questions asking about diabetes, asthma, and high blood pressure; emphysema or chronic bronchitis; or congestive heart failure (see descriptions of each below). The answers to these questions were combined into one binary variable; if a respondent indicated "Yes," to any of these questions on any of the three surveys, then they were considered to have a

chronic condition. Categorizing this information into a binary variable allows for ease of data analysis.

Diabetes

The diabetes question asked, "Have you ever been told by a doctor or other health professional that you have diabetes or sugar diabetes?" with "Yes," "No," or "Don"t know," as possible answers.

Asthma

The asthma question asked, "Have you ever been told by a doctor or other health professional that you have asthma?" with "Yes," "No," or "Don"t know," as possible answers.

High Blood Pressure, Emphysema/Chronic Bronchitis, or Congestive Heart Failure

The high blood pressure, emphysema or bronchitis, and congestive heart failure question asked respondents, "Have you ever been told by a doctor or other health professional that you have any of the following?" Respondents were asked to mark all that applied for, "High blood pressure," "Emphysema or chronic bronchitis (Chronic obstructive Pulmonary Disease)," and "Congestive Heart Failure."[11] Respondents were coded as having or not having a chronic disease.

Outcome Variables (Table 1, Appendix A)

Unmet Medical Care Needs

This variable was created from yes/no results of the question, "Was there a time in the last 6 months when you needed medical care but did not get it?" In the present study, as in Allen's work with this dataset, the "unmet medical care" variable is dichotomized as "ever," or "never," having provided a positive response to this survey question, across all three surveys. In other words, if a participant claimed to have an unmet health care need on one, two or all three of the surveys, then the variable was categorized as "ever." This allowed for a broad understanding of respondent's medical needs experience.[11]

Unmet Medication Need

Like the unmet medical needs variable, this variable was created from yes/no results of a question to assess respondent needs; "In the last 6 months, was there ever a time you needed prescription medications but did not get them because you couldn't afford it?" As with the unmet medical needs variable, the variable was dichotomized as "ever," or "never," having provided a "Yes," response to this survey question, across all three surveys.[11]

Unlike the *unmet medical need* variable, which does not address the reason the medical need is unmet, the *unmet medication need* variable specifically addresses the respondent's ability to *afford* the prescription. Examining unmet healthcare need through a financial lens is relevant to the current study's low-income population.[11]

Unmet Urgent Care Need

The urgent care need variable is based on two separate questions; a screener and a follow-up question. The screener question asked, "In the last 6 months, did you have an

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illness, injury, or condition that needed care right away?" A "Yes" answer led to the follow-up question, which asked, "In the last 6 months when you needed care right away for an illness or injury, how often did you get care as soon as you wanted?" There were four possible answers that were grouped into two categories; (1) "Always/usually/sometimes," or (2) "Never." Only individuals who answered "Never" for the unmet urgent care question across all three surveys were coded as such.[11]

The variable could very well have been dichotomized at a different point in the continuum between "Always," and "Never." However, dichotomizing the variable as "Never" versus less concerning categories represents a more worrisome experience from a policy perspective. In addition, there would be potential for decreased internal validity if the variable were dichotomized at some other point. For example, it is more likely that different respondents thought of "Usually," or "Sometimes," differently, than they thought of "Never," differently from one another. Therefore measuring the variable in the current manner represents a more valid understanding of the respondents' experience.

Medical Debt

The medical debt outcome variable was defined using information from two different questions, each used in all three studies. The two questions to be combined asked about different forms of medical debt separately; credit-based (owed to a bank, credit cards, etc.) or provider-based (owed to a hospital, doctor, or clinic).[11,16]

Credit-based medical debt was determined by the question, "About how much money do you currently owe to a credit card company, bank, or private loan company (like American General, Household Finance (HFC) etc.) for your own medical bills?" Provider-based debt was determined by the question, "About how much money do you currently owe to a doctor, clinic or hospital for your own medical bills?" Thirteen possible answers ranged from $0 to more than $15,000, for both questions.[11]

By combining the two questions into one variable, a bottom-line understanding of participant experience with medical debt is achieved. Only the results of the medical debt questions from the third survey were considered, to represent the total level of medical debt accumulated by end of the study period. By looking at debt in this way, an understanding of the accumulation of participant experience over the entire study period was achieved.

The variable was defined as (1) < $500 or (2) ≥ $500 in medical debt. Several studies using data from the Oregon Health Care Study have examined medical debt with $500 of debt as the cut-off, because it was reasoned that $500 was a significant amount of debt for a low-income population. In addition, this variable is timely with reference to the current state of Oregon's struggling economy.[11]

Emergency Department Use

A variable was previously created to describe Emergency Department (ED) utilization by respondents. Previous studies exploring ED utilization have found that greater distances to hospitals is associated with less ED use.[26,27] Rural residents usually have greater travel distances to hospitals; therefore examining urban-rural differences in ED use is relevant to the current study.[15] The variable was created from information derived from the question, "In the last 6 months, how many times did you go to an emergency room to get care for yourself?" Respondents who did not report visiting an ED at any point in the study period were categorized as, "never," while respondents who reported at least one ED visit were categorized as, "ever."[11]

Primary Care Use

A primary care variable was previously created to describe respondent usage of this area of care. This variable was used in the current study to assess urban-rural differences in primary care utilization. This exploration fits in the *use of health services* category of the Andersen Behavioral Model.[11, 16]

The variable was created from the collapsed responses of all three surveys to the following question; "In the last 6 months, how many times did you go to a doctor's office, clinic, or other health care provider to get care for yourself?" This binary variable is defined as (1) none or (2) one or more primary care visits over the study period. Defining primary care use in this way sought the cleanest possible differences in utilization, rather than attempting to dichotomize the data with reference to an ideal number of primary care visits.[11]

This outcome variable was explored because primary care use is a relevant topic from a policy perspective as previous studies have indicated a shortage of primary care providers in rural areas, and because primary care use has been shown to be lower among the uninsured.[10,11] Additionally, this variable was explored because it has been used in previous research using these data.[11]

Time Spent Uninsured ("Gaps")

In addition to acting as a main predictor variable (see Predictor Variables section), Gaps was also examined as an outcome variable to determine if there are differences in the time spent uninsured between urban and rural residents. To accomplish this, separate analyses were done for Gaps as an outcome variable, with use of models that did not contain any other outcome variables but that did control for the potential confounding factors. Because insurance status can greatly determine an individual's ability to obtain needed medical care, the Gaps variable applies to the *enabling resources* category of the Andersen Behavioral Model.[11,16] The Gaps variable was previously created by the Oregon Health Care Study analytic team.

Statistical Analysis

This study sought to: **(1)** describe the distributions of demographic and outcome variables with reference to rural-urban residence and time spent uninsured, **(2)** use multivariate logistic regression analysis to assess whether or not rural residents are at a greater risk than urban residents for less primary care use, less timely access to urgent care, less emergency department use, greater medical debt and higher level of unmet medical and medication needs, while controlling for time spent uninsured, **(3)** use multivariate logistic regression analysis to assess whether or not time spent uninsured affects urban and rural residents differently with regards to these health outcomes and **(4)** use multivariate logistic regression analysis to test the hypothesis that rural residents who leave OHP are uninsured for longer periods of time when compared to urban residents.

The Center for Outcomes Research and Education (CORE) provided the Oregon Health Care Study data analyzed in this study. Stratified random sampling for race and OHP Plus/Standard groups was used to ensure adequate OHP population representation. Post-stratification weighting was used to account for oversampling and non-response across the study period. Both race and OHP Plus/Standard categories were used as the weighted strata. All analyses were based upon the derived poststratification weights. SAS® Version 9.2 software was used for all analyses. Specifically surveyfreq and surveylogistic were used to account for postratification weights.[26]

Data derived from the entire cohort was analyzed to assess whether those who completed all three surveys were similar in socio-demographic characteristics to those who responded to one and/or two surveys. The main analyses used data from respondents who completed all three surveys. The variables used in this analysis were created by the analytic staff of the Oregon Health Care Study, who prepared the data for

statistical analyses and ensured that skip patterns within the study were appropriately coded.[11]

The ZIP Code RUCA Approximation dataset was merged with the Oregon Health Care Study dataset before creating urban and rural categories. The weighted counts and percentages of respondents were summarized for each of the main outcomes, main predictors and potential confounding variables. Cross tabulations were used to summarize weighted and un-weighted counts and percentages of demographic factors by urban-rural residence, number of surveys completed, and time spent uninsured. Counts and percentages from cross tabulations were also used to summarize main outcome variables by urban-rural residence and time spent uninsured.

Chi-square tests of independence were performed to determine differences in demographic variables between urban and rural respondents, measures of time spent uninsured and the number of surveys completed. Chi-square tests of independence were also performed to assess potential differences in the distribution of main outcome variables with reference to both urban-rural residence and measures of time spent uninsured. Univariate logistic regression analyses were performed for all main outcome variables and both main predictor and potential confounding variables.

Multivariate Regression – Access, Utilization, and Financial Outcomes

Known confounders and variables with p-values ≤ 0.25 in the univariate logistic regression analyses were considered for inclusion in the multivariate models. An identical set of confounders was used for all of the outcome models for ease of interpretation and comparison of the models. For this reason, if a potential confounding factor was found to be significantly associated with at least four of the six main outcomes, then it was included in all six outcome models.

Cross tabulation of the primary care outcome and demographic factors revealed zero cell counts for rural Asian and African American categories. Therefore, except for Hispanic category, the non-Caucasian race category levels were collapsed into one level called "Other." Multivariate logistic regression was used to assess associations between residence and dichotomized outcome measures of unmet medical care, unmet urgent care, unmet medication needs, emergency department and primary care utilization and medical debt. Odds ratios and 95% Wald confidence intervals were calculated for all covariates.

The unmet healthcare need model did not include the potential confounding factor *usual source of care*. It was felt that including usual source of care could mask the association between other predictor variables and unmet health care need because respondents with a usual source of care would be less likely to have unmet medical need. If having a usual source of care were positively associated with a predictor variable, the likely negative association between usual source of care and unmet medical need would confound the relation between predictor and outcome variable toward the null.

Each model was run separately for urban and rural populations in order to compare potential differences in the relationships between main outcomes and time spent uninsured. This resulted in 3 different odds ratio and 95% Wald confidence interval estimates for each outcome; one for urban, one for rural and one for urban and rural combined. The urban and rural confidence intervals were examined for overlap. This method was carried out to test the hypotheses that the relationship between time spent uninsured and the outcomes varied by levels of the urban-rural categories. This method was also used to investigate the role of each of the variables in the model as an effect modifier between residence and the outcomes.

Potential confounding variables that were found to be associated (chi-square ≤ 0.25) with *both* the predictor and outcome variables in univariate logistic regression analyses were assessed for confounding in the model. If removal of a potential confounding

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variable was found to cause a greater than 10% difference in the OR estimate of association for the urban-rural predictor variable, then the variable in question was considered to be a confounding variable. This method was carried out for each of the outcome models to assess for confounding.

Multivariate Regression – Time Spent Uninsured Outcome

Time spent uninsured was also assessed as an outcome. Multiple logistic regression analysis was used to test the hypothesis that rural residents who are not continuously enrolled in the OHP over the study period spend more time uninsured than urban residents. Three separate models were examined comparing each of the non-continuous enrollment categories to the continuous enrollment category; Short Gap vs. Continuous Enrollment, Medium Gap vs. Continuous Enrollment and Long Gap vs. Continuous Enrollment. In each case the respondents without continuous coverage were compared to respondents with continuous coverage, using urban/rural status as the main predictor variable.

Three different datasets were created; one for each of the non-continuous enrollment categories with the continuous enrollment category. A logistic model was run for each of the three datasets. Variables included in the final model were those found to be significantly associated (chi-square p-value < 0.25) with the time spent uninsured variable in univariate analysis, or that were known confounders. Odds ratios and 95% Wald confidence intervals were calculated for an identical set of variables for each of the three datasets.

Variables that were found to be significantly associated (p-value < 0.25) with both the time spent uninsured and residence were assessed for confounding in the model. Variables were considered confounders if their removal caused a ≥ 10% difference in the odds ratio estimate between measures of time spent uninsured and residence.

To investigate potential differences in the relationships between times spent uninsured and all variables in the model, urban and rural categories were analyzed separately, and the resulting 90% Wald confidence intervals were examined for overlap. High-low-close charts were used for comparisons of confidence intervals of all variables in the model.

Results

Description of Study Participants

Assessing Potential Non-Response Bias (Table 1)

Of the 2749 respondents who completed at least one survey, 1535 (55%) completed all three. Results from the Chi-square tests for independence indicate that respondents completing all three surveys were significantly older, more likely to be Caucasian, more educated, more likely to have a mental health condition and more likely to have a usual source of care.

Characteristics of the Study Population (Table 2)

Data derived from the 1535 survey respondents to all three surveys were analyzed. Five hundred and forty-nine (35.8%) of the three-survey respondents were found to live in rural areas. Results of the Chi-square tests for independence indicate that rural populations are significantly more likely to be Caucasian, older and more educated.

Urban-Rural Differences in Medical Service Access, Utilization and Debt (Table 3)

In univariate analyses, Chi-square tests for independence did not indicate significant differences between urban and rural populations with reference to any of the outcomes. The number of respondents to main outcome survey questions ranged from 392 to 1516. Among the six questions on which outcomes were based, the mean number of respondents was found to be 1184, with an average difference of 471 respondents between the outcome questions. There were at least 1420 respondents to four of the six outcome questions.

Multivariate Logistic Regression - Main Outcomes

Medical Debt – (Table 5)

Data from 1421 respondents, including 512 (36%) rural residents, were analyzed for risk of owing more than $500 in medical debt by the end of the study. Rural residence was not found to be a significant predictor of risk for medical debt (OR = 1.23, 95% CI: 0.86, 1.75). The risk of owing at least $500 in medical debt was significantly higher for respondents spending any amount of time without health insurance when compared to respondents who were continuously covered by health insurance. The Gaps variable as a whole was found to be highly significant in the model, with the odds of having medical debt increasing as insurance gap length increased. Examination of separate urban and rural models revealed that time spent uninsured affected respondents living in the different areas of residence similarly. Self-reported diagnosis of both a mental health condition and a chronic disease were found to significantly increase the risk of medical debt, relations that were similar for urban and rural residents. These findings indicate that rural and urban residents experience time spent uninsured and mental and chronic health conditions in similar ways with reference to acquiring medical debt.

Unmet Medical Need - (Table 6)

Data from 1493 observations, 513 (36%) of whom were rural residents, were assessed for risk of unmet medical need. Rural residence was not found to be significantly associated with unmet medical need (OR = 0.84, 95% CI: 0.62, 1.15). As seen for the *medical debt* outcome, a dose response pattern was observed of increased risk of unmet medical need with increased duration of uninsurance. OHP Standard members and individuals reporting mental health conditions and chronic conditions were also at a greater risk of unmet medical need. Similar to the medical debt model, each of the aforementioned relations persisted upon stratification of urban and rural groups, suggesting that these factors have similar effects for urban and rural groups.

Unmet Prescription Need Due to Cost – (Table 7)

Data from 1516 respondents, of which 540 (36%) were rural, were analyzed to assess the risk of unmet prescription need due to cost. Rural residence was not found to be significantly associated with unmet prescription need (OR = 1.13, 95% CI: 0.83, 1.53). Similar to the other outcome models, a dose-response relation existed between time spent uninsured categories and unmet prescription need due to cost. The risk of unmet prescription need due to cost was found to be significantly higher for respondents with a mental or chronic health condition, OHP Standard members and females. Each of these relations were maintained upon stratification of the urban and rural groups, lending further evidence to a similarity of experience between subgroups of urban and rural Medicaid populations with reference to obtaining needed medical services.

Unmet Urgent Care Need – (Table 8)

A relatively low number of observations, 392, were analyzed in the unmet urgent care model. One hundred forty (35%) of the observations met the definition of rural. Residing in a rural area was not found to be significantly associated with unmet urgent care need (OR = 0.61, 95% CI: 0.31, 1.19). Similar to other outcomes, a dose-response relation between time spent uninsured and unmet prescription need was found. Each of the Gaps levels was found to significantly raise the risk of unmet urgent care need. Significantly lower risk of unmet urgent care need was found for respondents reporting a chronic condition and a usual source of care. These results were consistent across urban and rural groups when examined in stratified analyses, providing further evidence that urban and rural respondents had similar experiences obtaining needed services.

Primary Care Utilization – (Table 9)

A total of 1467 observations, including 513 (35%) from rural residents, were analyzed for the risk of no primary care service utilization. Living in a rural area was not found to be significantly associated with a lack of primary care service use (OR = 0.99, 95% CI: 0.53, 1.83). The Short Gap level was also not found to be significantly associated with no use of primary care services over the study period. However, both Medium and Long Gap levels were found to significantly increase the risk of the outcome. An apparent dose response of increasing risk was found with increasing time spent uninsured. A relatively small number of both urban and rural respondents claimed no primary care visit across the study period compared to other outcome measures. There was also a relatively large jump in the risk of never having a primary care visit between the medium and long gaps of coverage. This may indicate that the both urban and rural populations are able to obtain primary care until they reach a certain length of time spent uninsured.

Emergency Department Utilization – (Table 10)

The odds of a respondent going to the Emergency Department (ED) for medical care was assessed using 813 observations, 289 (36%) of which were found to be of rural areas. Having more than a high school education was found to significantly increase the odds of ED use (OR = 0.55, 95% CI: 0.32, 0.93). This was the only covariate level significantly associated with the outcome. None of the Gaps levels was found to have significant associations with ED utilization. Unlike each of the other models, spending time without healthcare insurance did not have an effect on emergency department utilization, an observation that persisted with stratification by residence. This indicates that both urban and rural groups use emergency medical services to a similar degree regardless of insurance coverage.

Description of Time Spent Uninsured (Gaps) Outcome

Demographic Distributions of Time Spent Uninsured (Appendix C)

Seven hundred nineteen (52%) of all respondents were found to be continuously enrolled throughout the study period, 214 (15%) were uninsured for less than six months, 254 (18%) for six to 17 months and 208 (15%) for 18 to 30 months.

For the combined urban and rural population, the Gaps variable was found to be significantly associated with each of the potential confounding and predictor variables except race and residence. These same results were found for separate rural and urban groups, except for gender which was not found to be associated with Gaps within the urban group.

Outcome Distribution of Time Spent Uninsured (Table 4)

Significantly greater problems with access, utilization and medical debt were consistently seen in respondents reporting longer gaps in coverage.

Multivariate Logistic Regression - Time Spent Uninsured

The Multivariate Gaps models explored the risk of spending up to six, six to 17 and 18 to 30 months without health insurance using the same covariates explored in the Main Outcome models. Respondents belonging to each of the non-continuous Gaps groups were separately compared to respondents that were continuously insured for the entire study period. Thus three separate models were explored.

Being a member of the OHP Standard group was associated with a significantly greater risk of spending any amount of time uninsured. The odds of an OHP Standard member spending 18 to 30 months without insurance were greater than the odds of spending six to 17 months without insurance, which were greater than the odds of spending up to six months without insurance. Respondents with incomes above the Federal Poverty Level (FPL) were found to have a significantly higher risk of insurance gaps in most cases.

Short Gap – Up to Six Months Spent Uninsured (Table 11)

When we compared respondents with a short insurance gap (less than six months) to respondents who were continuously insured, we found that rural residence was not significantly associated with being uninsured for less than six months (OR = 0.88, 95% CI: 0.58, 1.33). The risk of going up to six months without health insurance for OHP Standard members was found to be over twice the risk for OHP Plus members. When

compared to respondents above 100% Federal Poverty Level (FPL), respondents in each of the three FPL subcategories below 100% FPL were found to have a significantly lower risk of spending up to six months without health insurance. This indicates that the poorest respondents were obtaining some sort of coverage, most likely the OHP. The relation was maintained after stratification by residence, indicating that income level affects urban and rural Medicaid populations similarly.

Medium Gap – Between Six and 17 Months Spent Uninsured (Table 12)

Upon comparison of respondents with a medium gap (six to 17 months) to continually insured respondents rural residence was not found to be significantly associated with experiencing six to 17 months without insurance (OR = 0.86, 95% CI: 0.56, 1.31). Poorer residents were again less likely to experience uninsurance, likely because this group best qualifies for public assistance. Respondents who were older, male and unemployed or retired were also found to have a significantly lower risk of going without insurance for six to 17 months. Older individuals may be in a better position financially to obtain needed coverage after losing public assistance. Each of these relations persisted after stratification by urban/rural residence.

Long Gap – Between 18 and 30 Months Spent Uninsured (Table 13)

When we compared respondents with a long gap (between 18 and 30 months) with continually insured respondents, we did not find rural residence to be significantly associated with spending 18 to 30 months without health insurance (OR = 1.08, 95% CI: 0.66, 1.78). Being at least 51 years of age, between 11 and 50% of FPL, unemployed or retired and having a usual source of care were found to significantly lower the risk of spending over a year and a half without health insurance. Again, this may be a reflection of the fact that lower income individuals are better able to maintain their public

assistance coverage and that older individuals are in addition more able to afford replacement coverage after leaving the OHP.

Membership in the OHP Standard program at the onset of the study was associated with a significantly increased risk of spending between 18 and 30 months without insurance. This makes sense as OHP Standard membership decreased significantly after program changes, leading to a greater number of these members to leave the program. A low-income population would likely have a difficult time affording private coverage if they could not afford public coverage.

Discussion

In this historical cohort study of Oregonians who, at study onset, were beneficiaries in the Oregon Health Plan (OHP), rural respondents were found to be older, more educated and more likely to be Caucasian than their urban counterparts. The longer respondents went without health insurance the greater was their risk for unmet healthcare needs, less utilization of medical services and greater medical debt. Whether or not respondents lived in a rural area had no bearing on their abilities to obtain needed healthcare services, the amount of services utilized or the amount of debt that they had incurred from healthcare services.

Time spent uninsured was consistently found to be associated with the main outcomes, and the dose response relation of increased risk for outcome with increased time spent uninsured was readily apparent for each of the outcomes except emergency department utilization. The amount of time that one spends without health insurance appears to be associated with a similar risk for all of the outcomes. These relationships are qualitatively similar for urban and rural residents, indicating that for this population the experience of uninsurance is similar across the two Medicaid populations.

Both urban and rural respondents with depression, anxiety or a chronic physical health condition are at a higher risk of owing greater than $500 in medical debt, having unmet medical needs and having unmet prescription needs due to cost. Both urban and rural respondents with a chronic physical health condition reported more primary care utilization and less unmet urgent care need.

OHP Standard members had twice the odds of spending 18 to 30 months without health insurance than they did for spending between six and 17 months without health insurance, and almost seven times the odds of experiencing 18 to 30 months than spending up to six months without coverage.

Previous comparisons have found rural Medicaid populations to be more male, more Caucasian and more Hispanic than the urban Medicaid populations.[10] Similar to these

findings the present study finds rural respondents more likely to be Caucasian. However, unlike prior research the current study found rural respondents to be older and more educated than their urban counterparts. Prior research has also found that Medicaid enrollees living in rural areas are more likely to have a usual source of care than their urban counterparts.[7,10] Our study examined having a usual source of care as a potential confounding factor for this reason but did not find a significant association with residence.

Previous research has also found that individuals of the rural general population are more likely than urban individuals to be uninsured. Our findings indicate that once OHP members leave their plan, the risk of going without health insurance is similar for urban and rural residents. However, the similarity in risk may be due to the fact that the current study sample is derived from a Medicaid population. A previous analysis of the current study data found that of the OHP Standard members who left the plan, a large portion re-enrolled at some point in the study period.[11] This churning of enrollees off and on Medicaid may have decreased the association between rural residence and time spent uninsured, when compared to the general population.

While a number of studies have found urban/rural differences in access and utilization amongst the general population, the limited research on these differences within Medicaid populations makes comparison of the current results difficult.[8,9] However, we find results similar to the existent Medicaid urban/rural research, namely that there are no differences in the risk of access or utilization of healthcare services among Medicaid eligibles.[10] This uniformity in need might be explained by the fact that states are required to provide equivalent coverage regardless of a member's area of residence. This similarity in coverage could mitigate differences in healthcare systems such as provider and facility supply, distance to clinics and longer periods without health insurance. In addition, it is important to realize that the current study examined a very specific population for the comparison of urban and rural. The individual characteristics of Medicaid populations have been shown to differ from those of both low-income

privately insured and low-income uninsured populations.[10] This may represent an inherent bias in examining urban/rural differences within a Medicaid population.

This study was subject to several limitations. As with all survey studies, self-reporting may have led to inaccuracy or bias in responses. However, the instrument from which the data were derived utilized several prominent surveys that have been used in other major studies such as the Rand Medical Outcomes Survey (MOS), and the Medical Expenditure Panel Survey (MEPs) to assess healthcare access and utilization. In addition, recall bias was addressed by asking the participants to include information about the previous six months only.[11]

Another limitation to this study is the low response rate. Only 34% of the eligible sample chose to participate in the study. However, of this sample 55% completed all three surveys over a 30 month time period. Complicating the low response rate is the fact that rural residents were not oversampled; the survey was not intended to specifically explore rural versus urban health.[11]

There are several implications of the current study. First, as has been established in a large body of research, going without health insurance greatly decreases one's ability to access and utilize health care services.[13] Furthermore, for this high-risk population, the longer one goes without health insurance, the greater their risk for adverse health outcomes. The magnitude of this relation is similar for urban and rural residents.

Second, depression, anxiety and chronic physical health conditions contribute to the risk of unmet needed medical care and greater medical debt. Providers should consider these findings when caring for OHP members, recognizing that patients with these ailments may have a greater need of services than those without. Third, our finding that OHP Standard members are at a greater risk of going without health insurance when compared to OHP Plus members supports previous findings using these data, which found that the percentage of Standard members leaving the program was significantly greater than the percentage of Plus enrollees who left the program during the study period. The studies also found that close to half of the Standard members who left in

the first six months cited cost as one reason for leaving, a proportion significantly greater than for Plus members.[14]

This makes sense as Standard members were the subject of increased cost sharing in the form of copayments, premiums and other costs while Plus members were not. OHP policy makers should recognize that increased cost-sharing can have substantially deleterious effects on an individual's ability to remain on the OHP plan.

Lastly, although rural populations have been shown to have a greater risk for worse access and less utilization of healthcare services among the general population, these differences are not experienced within the Medicaid population. OHP policy-makers should recognize that the Oregon Medicaid population differs in several important regards from the general population. Therefore while studies examining urban/rural differences provide important information about the healthcare experiences of those populations, looking through a Medicaid lens is essential to answering residence-based questions about this population. The most effective medical service delivery system tailors its response to health care need in a way that best matches the population in need. An awareness of the differences in population characteristics may lead to greatly improved delivery of care for the Oregon Medicaid population.

Conclusions

In this population of Oregonians who had, or recently lost, coverage under the Oregon Health Plan, increasing time spent uninsured was significantly associated with impaired access to medical care, reduced use of healthcare services and greater medical debt. Those who were covered by OHP Standard at the start of the study were more likely to experience insurance gaps than were OHP Plus members. Our findings support the conclusions of prior research using these data, namely that within a Medicaid population urban and rural groups are equivalent with regard to their ability to access and utilize medical services. In addition, increasing the cost of coverage increases the likelihood that Medicaid enrollees will experience gaps in their health insurance. Medicaid policy makers should take these findings into consideration when determining how best to cover its financially vulnerable populations when faced with difficult economic circumstances. State officials should also consider existing differences in key demographic factors and perceptions of medical need between urban and rural populations. Programs should be responsive to these differences to ensure the best care delivery to the entire population.

References

1. Zhang W, Mueller KJ, Chen LW. Uninsured hospitalizations: Rural and urban differences. Journal of Rural Health 2008;24(2):194-202.

2. The Kaiser Commision on Medicaid and the Uninsured. Health insurance coverage in rural america. The Henry J. Kaiser Family Foundation; 2003 September, 2003.

3. Burman ME, Mawhorter S, Vanden Heede F. Multiple perspectives on being uninsured and barriers to health coverage in a rural western state. J Health Care Poor Underserved 2006 Aug;17(3):625-40.

4. National Advisory Committee on Rural Health and Human Services. ; 2008.

5. Wright BJ, Carlson MJ, Allen H, Holmgren AL, Rustvold DL. Raising premiums and other costs for oregon health plan enrollees drove many to drop out. Health Aff 2010 Dec;29(12):2311-6.

6. Ziller EC, Coburn AF, Anderson NJ, Loux SL. Uninsured rural families. J Rural Health 2008;24(1):1-11.

7. Larson SL, Fleishman JA. Rural-urban differences in usual source of care and ambulatory service use: Analyses of national data using urban influence codes. Med Care 2003 Jul;41(7 Suppl):65-74.

8. Casey MM, Thiede Call K, Klingner JM. Are rural residents less likely to obtain recommended preventive healthcare services?. Am J Prev Med 2001 Oct;21(3):182-8.

9. Hurley RE, Crawford H, Praeger S. Medicaid and rural health care. J Rural Health 2002;18(Suppl):164-75.

10. Long SK, King J, Coughlin TA. The health care experiences of rural medicaid beneficiaries. J Health Care Poor Underserved 2006 Aug;17(3):575-91.

11. Allen H. Up a creek: The perilous journey of recently uninsured low-income adults in oregon. ProQuest Information & Learning; US; 2009:Source: Dissertation Abstracts International Section A: Humanities and Social Sciences. Vol.70(5-A),2009, pp. 1782.; Format Availability: Electronic, Print; Population Group: Human.; Location: US; Methodology: Empirical Study; Quantitative Study; Update Code: 20100111 (PsycINFO).

12. Ku L, Cohen R. Staying covered: The importance of retaining health insurance for low-income families. New York: The hCommonwealth Fund; 2002.

13. Freeman JD, Kadiyala S, Bell JF, Martin DP. The causal effect of health insurance on utilization and outcomes in adults: A systematic review of US studies. Med Care 2008 Oct;46(10):1023-32.

14. Carlson MJ, DeVoe J, Wright BJ. Short-term impacts of coverage loss in a medicaid population: Early results from a prospective cohort study of the oregon health plan. Ann Fam Med 2006 Sep-Oct;4(5):391-8.

15. Wright BJ, Carlson MJ, Edlund T, DeVoe J, Gallia C, Smith J. The impact of increased cost sharing on medicaid enrollees. Health Aff (Millwood) 2005 Jul-Aug;24(4):1106-16.

16. Andersen RM. Revisiting the behavioral model and access to medical care: Does it matter? 1995;36(1):1.

17. Winters, C.A., Lee, H.J., editor. Rural nursing concepts, theory, and practice. 3rd ed. New York: Springer Publishing Company; 2010. .

18. Oregon Department of Human Services. Oregon health plan: An historical overview. Salem, OR: Office of Medical Assistance Programs; 2006 July, 2006.

19. Oberlander J. Health reform interrupted: The unraveling of the oregon health plan. Health Aff 2007 Jan-Feb;26(1):w96-105.

20. Hart LG, Larson EH, Lishner DM. Rural definitions for health policy and research. Am J Public Health 2005 Jul;95(7):1149-55.

21. Rural Health Research Center [Internet]: Rural Health Research Center [cited 2010 October]. Available from: http://depts.washington.edu/uwruca/ruca-codes.php.

22. Baldwin LM, Chan L, Andrilla CH, Huff ED, Hart LG. Quality of care for myocardial infarction in rural and urban hospitals. Journal of Rural Health 2010;26(1):51-7.

23. Baldwin LM, Grossman DC, Murowchick E, Larson EH, Hollow WB, Sugarman JR, Freeman WL, Hart LG. Trends in perinatal and infant health disparities between rural american indians and alaska natives and rural whites. Am J Public Health 2009 Apr;99(4):638-46.

24. Doescher MP, Jackson JE. Trends in cervical and breast cancer screening practices among women in rural and urban areas of the united states. Journal of Public Health Management & Practice 2009 May-Jun;15(3):200-9.

25. Chen F, Fordyce M, Andes S, Hart LG. Which medical schools produce rural physicians? A 15-year update. Academic Medicine 2010 Apr;85(4):594-8.

26. Ludwick A, Fu R, Warden C, Lowe RA. Distances to emergency department and to primary care provider's office affect emergency department use in children. Acad Emerg Med 2009 May;16(5):411-7.

27. Lowe RA, Fu R, Ong ET, McGinnis PB, Fagnan LJ, Vuckovic N, Gallia C. Community characteristics affecting emergency department use by medicaid enrollees. Med Care 2009 Jan;47(1):15-22.

Table 1 Assessing Potential Non-Response Bias

	Three Surveys			One or Two Surveys				
	n	Weighted n	Weighted %	n	Weighted n	Weighted %	χ2	p
Residence								
Rural	549	544	36	980	952	36	0.02	0.9
Urban	986	981	64	1769	1723	64		
Group								
Standard	755	757	50	1355	1320	49	0.09	0.77
Plus	780	769	50	1394	1355	51		
Usual Source of Care								
No	657	653	45	1153	1123	58	374.94	<0.001
Yes	802	800	55	833	829	42		
Age								
18-30	327	331	22	708	698	26	69.28	<0.001
31-40	300	289	19	602	571	21		
41-50	416	411	27	666	645	24		
≥ 51	492	494	32	773	762	28		
Gender								
Male	493	490	32	644	633	32	0.005	0.94
Female	1042	1036	68	1359	1336	68		
Race								
White	1092	1228	81	1832	2062	77	25.1	<0.001
Hispanic	174	149	10	347	301	11		
Other	269	148	10	570	312	12		
Education								
> HS	328	309	22	633	588	23	9.13	0.014
HS	540	543	38	969	955	38		
< HS	569	584	41	969	971	39		
Employment Status								
Employed	429	430	29	788	775	30	1.83	0.19
Unemployed or Retired	1067	1058	71	1868	1813	70		
Mental Health Condition								
No	734	724	47	1410	1351	51	13.58	<0.001
Yes	801	801	53	1339	1324	49		
Chronic Condition								
No	680	675	44	890	871	44	0.001	0.97
Yes	855	850	56	1113	1098	56		

Table 2 Characteristics of the Study Population

	Rural			Urban				
	n	Weighted n	Weighted %	n	Weighted n	Weighted %	Chi	p
Insurance Gaps								
Continuous	260	260	53	459	454	51	2.36	0.54
< 6 months	73	73	15	141	142	16		
6 - 17 months	82	82	16	172	168	19		
18 - 30 months	84	80	16	124	126	14		
OHP Group								
Standard	271	264	48	484	493	50	0.44	0.51
Plus	278	280	52	502	488	50		
Usual Source of Care								
No	214	216	42	443	437	46	2.32	0.14
Yes	300	296	58	502	505	54		
Age								
18-30	99	102	19	228	229	23	10.09	0.03
31-40	103	97	18	197	192	20		
41-50	145	143	26	271	268	27		
≥ 51	202	202	37	290	292	30		
Gender								
Male	167	164	30	326	325	33	1.44	0.25
Female	382	380	70	660	656	67		
Race								
White	417	467	86	675	762	78	20.84	< 0.0001
Hispanic	63	49	9	111	100	10		
Other	69	28	5	200	119	12		
Education								
> HS	127	122	24	201	187	20	7.86	0.03
HS	209	206	40	331	336	36		
< HS	177	183	36	392	401	43		
FPL								
100% +	56	50	10	116	114	13	2.59	0.49
51-100%	140	135	28	244	239	28		
11-50%	201	204	42	355	352	41		
0-10%	88	91	19	143	150	18		
Employment								
Employed	144	143	27	285	288	30	1.57	0.23
Unemployed or Retired	390	387	73	677	672	70		
Mental Health Condition								
No	270	269	49	464	455	46	1.27	0.28
Yes	279	275	51	522	526	54		
Chronic Condition								
No	236	231	42	444	444	45	1.15	0.30
Yes	313	313	58	542	537	55		

Table 3 Differences in Urban-Rural Distributions of Medical Service Access, Utilization and Debt

	Rural			Urban				
	n	Weighted n	Weighted %	n	Weighted n	Weighted %	χ²	p
Medical Debt								
Owe <=$500	390	386	75.9	719	718	79.0		
Owe >$500	122	122	24.1	190	190	21.0	1.84	0.19
Total	512	508	100.0	909	908	100		
Unmet Health Need								
No	289	284	53.5	473	471	49.3		
Yes	244	246	46.5	487	485	50.7	2.43	0.13
Total	533	530	100.0	960	956	100		
Unmet Urgent Care Need								
No	75	75	54.0	121	117	46.0		
Yes	61	64	46.0	135	137	54.0	2.30	0.15
Total	136	140	100.0	256	254	100		
Unmet Rx Due to Cost								
No	230	222	41.0	394	391	40.4		
Yes	313	319	59.0	579	578	59.6	0.06	0.81
Total	543	540	100.0	973	969	100		
Primary Care Visits								
None	32	34	6.7	56	55	5.8		
≥ 1 Visits	486	479	93.3	893	889	94.2	0.38	0.56
Total	518	513	100.0	949	944	100.0		
ED Visits								
None	129	124	42.9	218	223	42.7		
≥ 1 Visits	165	165	57.1	301	299	57.3	0.00	0.95
Total	294	289	100.0	519	522	100.0		

Table 4 Main Outcome Distributions by Health Insurance Status

	Continuous			Short Gap			Medium Gap			Long Gap				
	n	W n	W %	n	W n	W %	n	W n	W %	n	W n	W %	χ2	p
Medical Debt														
≤$500	586	584	88.4	154	155	77.3	147	146	62.8	125	123	65.0	93.7	<.0001
>$500	77	77	11.6	45	45	22.7	87	87	37.2	67	66	35.0		
Unmet Medical Need														
No	479	478	68.7	103	106	51.5	78	77	31.3	47	42	20.9	199.9	<.0001
Yes	221	218	31.3	102	100	48.5	172	169	68.7	157	160	79.1		
Unmet Prescription Need														
No	365	358	50.6	85	88	41.2	76	75	30.4	47	43	21.0	72.9	<.0001
Yes	345	349	49.4	127	125	58.8	176	172	69.6	161	163	79.0		
Primary Care Visits														
None	12	12	1.8	5	6	2.7	21	19	7.8	40	42	21.3	108.7	<.0001
≥ 1	668	663	98.2	203	204	97.3	228	226	92.2	158	154	78.7		
ED Visits														
None	151	151	39.1	59	59	48.2	64	67	48.3	46	46	43.4	5.29	0.182
≥ 1	236	234	60.9	63	63	51.8	74	72	51.7	59	61	56.6		
Unmet Urgent Care														
No	105	104	73.5	33	31	57.3	28	27	38.9	19	18	21.4	63.9	<.0001
Yes	38	38	26.5	24	23	42.7	41	42	61.1	64	67	78.6		

Table 5 Results of the Multivariate Medical Debt Model

	Odds Ratio	95% CI	Likelihood Ratio p-value
Residence			0.26
Urban	Reference		
Rural	1.23	0.86 - 1.75	
Insurance Gaps			<.0001
Continuous	Reference		
< 6 months	2.55	1.52 - 4.28	
6 - 17 months	4.80	2.97 - 7.75	
18 - 30 months	5.09	2.90 - 8.93	
OHP Group			0.36
Plus	Reference		
Standard	1.20	0.81 - 1.80	
Usual Source of Care			0.19
No	Reference		
Yes	0.79	0.56 - 1.12	
Age			0.32
18 - 30	Reference		
31 - 40	1.09	0.67 - 1.77	
41 - 50	0.80	0.49 - 1.31	
≥ 51	0.68	0.40 - 1.17	
Gender			0.15
Male	Reference		
Female	1.32	0.91 - 1.92	
Race			0.66
Caucasian	Reference		
Hispanic	0.74	0.39 - 1.42	
Other	0.98	0.59 - 1.63	
Education			0.93
> HS	Reference		
HS	0.92	0.57 - 1.49	
< HS	0.97	0.60 - 1.58	
FPL			0.29
> 100%	Reference		
51-100%	0.84	0.52 - 1.37	
11-50%	1.27	0.77 - 2.10	
0-10%	1.09	0.58 - 2.06	
Employment			0.67
Employed	Reference		
Unemployed or Retired	0.92	0.62 - 1.37	
Mental Health Condition			0.00
No	Reference		
Yes	2.02	1.41 - 2.89	
Chronic Condition			0.01
No	Reference		
Yes	1.61	1.10 - 2.35	

Table 6 Results of the multivariate Unmet Medical Need Model

	Odds Ratio	95% CI	Likelihood Ratio p-value
Residence			0.28
Urban	Reference		
Rural	0.81	0.60 - 1.09	
Insurance Gaps			<.0001
Continuous	Reference		
< 6 months	1.87	1.27 - 2.78	
6 - 17 months	4.56	3.07 - 6.80	
18 - 30 months	9.39	5.6 - 15.76	
OHP Group			0.02
Plus	Reference		
Standard	1.46	1.07 - 1.99	
Age			<.0001
18 - 30	Reference		
31 - 40	0.89	0.58 - 1.36	
41 - 50	0.70	0.46 - 1.06	
≥ 51	0.38	0.24 - 0.59	
Gender			0.40
Male	Reference		
Female	1.13	0.83 - 1.53	
Race			0.50
Caucasian	Reference		
Hispanic	0.84	0.51 - 1.37	
Other	1.16	0.76 - 1.78	
Education			0.00
> HS	Reference		
HS	1.02	0.69 - 1.50	
< HS	1.74	1.19 - 2.54	
FPL			0.24
> 100%	Reference		
51-100%	1.03	0.67 - 1.58	
11-50%	1.49	0.94 - 2.37	
0-10%	1.42	0.82 - 2.45	
Employment			0.92
Employed	Reference		
Unemployed or Retired	1.04	0.74 - 1.46	
Mental Health Condition			<.0001
No	Reference		
Yes	2.32	1.72 - 3.14	
Chronic Condition			0.002
No	Reference		
Yes	1.51	1.10 - 2.07	

Table 7 Results of the multivariate Unmet Prescription Need Model

	Odds Ratio	95% CI	Likelihood Ratio p -value
Residence			0.45
Urban	Reference		
Rural	1.13	0.83 - 1.53	
Insurance Gaps			<.0001
Continuous	Reference		
< 6 months	1.54	1.03 - 2.29	
6 - 17 months	3.08	2.02 - 4.70	
18 - 30 months	5.88	3.47 - 9.96	
OHP Group			0.05
Plus	Reference		
Standard	1.36	1.00 - 1.87	
Usual Source of Care			0.08
No	Reference		
Yes	0.77	0.58 - 1.04	
Age			0.001
18 - 30	Reference		
31 - 40	1.24	0.80 - 1.91	
41 - 50	0.92	0.60 - 1.42	
≥ 51	0.54	0.35 - 0.84	
Gender			0.02
Male	Reference		
Female	1.44	1.05 - 1.97	
Race			0.99
Caucasian	Reference		
Hispanic	1.04	0.63 - 1.73	
Other	0.99	0.66 - 1.50	
Education			0.21
> HS	Reference		
HS	1.01	0.68 - 1.50	
< HS	1.31	0.89 - 1.94	
FPL			0.01
> 100%	Reference		
51-100%	1.09	0.71 - 1.67	
11-50%	1.76	1.12 - 2.77	
0-10%	0.99	0.56 - 1.74	
Employment			0.50
Employed	Reference		
Unemployed or Retired	1.12	0.80 - 1.58	
Mental Health Condition			<.0001
No	Reference		
Yes	3.41	2.53 - 4.60	
Chronic Condition			<.0001
No	Reference		
Yes	2.21	1.59 - 3.06	

Table 8 Results of the multivariate Unmet Urgent Care Need Model

	Odds Ratio	95% CI	Likelihood Ratio p-value
Residence			0.14
Urban	Reference		
Rural	0.61	0.31 - 1.19	
Insurance Gaps			<.0001
Continuous	Reference		
< 6 months	2.46	1.06 - 5.71	
6 - 17 months	4.16	1.84 - 9.43	
18 - 30 months	12.39	4.58 - 33.51	
OHP Group			0.67
Plus	Reference		
Standard	0.86	0.43 - 1.73	
Usual Source of Care			0.002
No	Reference		
Yes	0.38	0.20 - 0.70	
Age			0.98
18 - 30	Reference		
31 - 40	1.11	0.45 - 2.76	
41 - 50	1.07	0.47 - 2.42	
≥ 51	0.92	0.38 - 2.24	
Gender			0.16
Male	Reference		
Female	0.62	0.32 - 1.21	
Race			0.52
Caucasian	Reference		
Hispanic	0.62	0.19 - 1.99	
Other	1.37	0.56 - 3.37	
Education			0.68
> HS	Reference		
HS	0.76	0.31 - 1.86	
< HS	0.68	0.29 - 1.59	
FPL			
> 100%	Reference		0.41
51-100%	1.38	0.56 - 3.41	
11-50%	0.77	0.32 - 1.87	
0-10%	0.77	0.23 - 2.56	
Employment			0.63
Employed	Reference		
Employed	1.21	0.55 - 2.66	
Mental Health Condition			0.30
No	Reference		
Yes	0.70	0.35 - 1.37	
Chronic Condition			0.01
No	Reference		
Yes	0.44	0.24 - 0.83	

Table 9 Results of the multivariate Primary Care Utilization Model

	Odds Ratio	95% CI	Likelihood Ratio p-value
Residence			0.96
Urban	Reference		
Rural	0.99	0.53 - 1.83	
Insurance Gaps			
Continuous	Reference		<.0001
< 6 months	2.46	0.79 - 7.62	
6 - 17 months	3.42	1.34 - 8.76	
18 - 30 months	12.68	5.10 - 31.5	
OHP Group			0.36
Plus	Reference		
Standard	0.71	0.35 - 1.47	
Usual Source of Care			<.0001
No	Reference		
Yes	0.16	0.07 - 0.34	
Age			0.11
18 - 30	Reference		
31 - 40	2.42	1.08 - 5.40	
41 - 50	1.07	0.46 - 2.50	
≥ 51	1.80	0.78 - 4.14	
Gender			0.22
Male	Reference		
Female	0.68	0.37 - 1.26	
Race			0.15
Caucasian	Reference		
Hispanic	0.70	0.44 - 1.13	
Other	0.16	0.07 - 0.34	
Education			0.03
> HS	Reference		
HS	0.47	0.21 - 1.04	
< HS	0.36	0.16 - 0.79	
FPL			0.96
> 100%	Reference		
51-100%	1.10	0.48 - 2.52	
11-50%	1.27	0.53 - 3.08	
0-10%	1.22	0.40 - 3.70	
Employment			0.38
Employed	Reference		
Unemployed or Retired	0.74	0.38 - 1.44	
Mental Health Condition			0.000
No	Reference		
Yes	0.25	0.13 - 0.51	
Chronic Condition			0.000
No	Reference		
Yes	0.30	0.15 - 0.58	

Table 10 Results of the multivariate Emergency Department Utilization Model

	Odds Ratio	95% CI	Likelihood Ratio p-value
Residence			0.57
Urban	Reference		
Rural	0.90	0.61 - 1.31	
Insurance Gaps			0.42
Continuous	Reference		
< 6 months	1.53	0.90 - 2.58	
6 - 17 months	1.31	0.78 - 2.21	
18 - 30 months	1.20	0.66 - 2.19	
OHP Group			0.28
Plus	Reference		
Standard	1.26	0.83 - 1.90	
Usual Source of Care			0.68
No	Reference		
Yes	1.08	0.75 - 1.56	
Age			0.87
18 - 30	Reference		
31 - 40	1.17	0.67 - 2.03	
41 - 50	1.10	0.65 - 1.87	
≥ 51	0.95	0.56 - 1.61	
Gender			0.68
Male	Reference		
Female	0.92	0.62 - 1.36	
Race			0.45
Caucasian	Reference		
Hispanic	1.21	0.67 - 2.20	
Other	0.76	0.44 - 1.30	
Education			0.08
> HS	Reference		
HS	0.67	0.39 - 1.14	
< HS	0.55	0.32 - 0.93	
FPL			0.02
> 100%	Reference		
51-100%	1.05	0.63 - 1.76	
11-50%	1.48	0.85 - 2.57	
0-10%	0.55	0.28 - 1.09	
Employment			0.53
Employed	Reference		
Unemployed or Retired	0.87	0.56 - 1.35	
Mental Health Condition			0.87
No	Reference		
Yes	0.97	0.67 - 1.41	
Chronic Condition			0.64
No	Reference		
Yes	0.91	0.62 - 1.35	

Table 11 Results of the Multivariate Short Gaps Model (Up to Six Months Without Health

Insurance)

	Odds Ratio	95% CI	Likelihood Ratio p -value
Residence			0.54
Urban	Reference		
Rural	0.88	0.58 - 1.33	
OHP Group			0.001
Plus			
Standard	2.07	1.36 - 3.14	
Usual Source of Care			0.74
No	Reference		
Yes	1.07	0.72 - 1.6	
Age			0.44
18 - 30	Reference		
31 - 40	0.70	0.38 - 1.27	
41 - 50	0.68	0.39 - 1.18	
≥ 51	0.64	0.35 - 1.16	
Gender			0.33
Male	Reference		
Female	1.23	0.81 - 1.88	
Race			0.84
Caucasian	Reference		
Hispanic	1.11	0.56 - 2.18	
Other	1.16	0.68 - 1.98	
Education			0.19
> HS	Reference		
HS	0.87	0.49 - 1.52	
< HS	1.30	0.76 - 2.24	
FPL			< 0.0001
> 100%	Reference		
51-100%	0.27	0.16 - 0.47	
11-50%	0.27	0.15 - 0.47	
0-10%	0.28	0.14 - 0.60	
Employment			0.14
Employed	Reference		
Unemployed or Retired	0.70	0.43 - 1.13	
Mental Health Condition			0.95
No	Reference		
Yes	1.01	0.68 - 1.50	
Chronic Condition			0.92
No	Reference		
Yes	1.02	0.67 - 1.56	

Table 12 Results of the Multivariate Medium Gaps Model (Between Six and 17 Months Without Health Insurance)

	Odds Ratio	95% CI	Likelihood Ratio p -value
Residence			0.47
Urban	Reference		
Rural	0.86	0.56 - 1.31	
OHP Group			<0.0001
Plus	Reference		
Standard	5.20	3.43 - 7.88	
Usual Source of Care			0.001
No	Reference		
Yes	0.49	0.33 - 0.74	
Age			0.05
18 - 30	Reference		
31 - 40	0.79	0.44 - 1.43	
41 - 50	0.67	0.38 - 1.17	
≥ 51	0.45	0.25 - 0.80	
Gender			0.004
Male	Reference		
Female	1.98	1.25 - 3.15	
Race			0.78
Caucasian	Reference		
Hispanic	1.09	0.59 - 2.04	
Other	0.85	0.49 - 1.46	
Education			0.93
> HS	Reference		
HS	0.96	0.56 - 1.66	
< HS	1.05	0.59 - 1.85	
FPL			0.01
> 100%	Reference		
51-100%	0.40	0.22 - 0.72	
11-50%	0.47	0.25 - 0.88	
0-10%	0.29	0.13 - 0.64	
Employment			0.002
Employed	Reference		
Unemployed or Retired	0.48	0.30 - 0.76	
Mental Health Condition			0.81
No	Reference		
Yes	0.95	0.63 - 1.43	
Chronic Condition			0.22
No	Reference		
Yes	0.76	0.50 - 1.17	

Table 13 Results of the Multivariate Long Gaps Model (Between 18 and 30 Months Without Health Insurance)

	Odds Ratio	95% CI	Likelihood Ratio p -value
Residence			0.75
Urban	Reference		
Rural	1.08	0.66 - 1.78	
OHP Group			< 0.0001
Plus	Reference		
Standard	13.63	7.65 - 24.29	
Usual Source of Care			0.004
No	Reference		
Yes	0.50	0.31 - 0.80	
Age			0.05
18 - 30	Reference		
31 - 40	0.61	0.29 - 1.29	
41 - 50	0.53	0.28 - 1.01	
≥ 51	0.39	0.20 - 0.76	
Gender			0.55
Male	Reference		
Female	0.86	0.53 - 1.40	
Race			0.61
Caucasian	Reference		
Hispanic	1.54	0.63 - 3.76	
Other	1.14	0.61 - 2.13	
Education			0.04
> HS	Reference		
HS	0.62	0.33 - 1.17	
< HS	1.30	0.71 - 2.38	
FPL			0.03
> 100%	Reference		
51-100%	0.63	0.29 - 1.34	
11-50%	0.34	0.16 - 0.75	
0-10%	0.42	0.17 - 1.07	
Employment			< 0.0001
Employed	Reference		
Unemployed or Retired	0.31	0.19 - 0.52	
Mental Health Condition			0.14
No	Reference		
Yes	0.69	0.42 - 1.13	
Chronic Condition			0.56
No	Reference		
Yes	0.87	0.53 - 1.41	

Appendix A - Variable List

Variable	Type of Variable	Specific Question	Possible Responses	Variable Coding
RUCA Code	Primary Predictor	Does the zip code belong to an urban or a rural area of Oregon?	Urban or Rural	0; Urban 1; Rural
Gaps	Primary Predictor	For how many of the last 12 months did you have health insurance?	1) No health insurance during the last 12 months 2) Less than 3 months 3) 4 to 6 months 4) 7 to 0 months 5) 10 to 12 months	Calculated total over 30 month period 1) Continuously Enrolled 2) Short Gap; < 6 months 3) Medium Gap; 6-17 months 4) Long Gap; 18 - 30 months
OHP Group	Potential Confounder	Determined from administrative sources		0; OHP Plus 1; OHP Standard
Usual Source of Care	Potential Confounder	Is there a place you usually go when you need care?	1) Yes 2) No	0; Never answered 'Yes,' 1; Answered, 'Yes,' at least once over study period
Age	Potential Confounder	What is your year of birth?	Write in	1; 18-30 2; 31-40 3;41-50 4;51 -64
Gender	Potential Confounder	Are you male or female?	1) Male 2) Female	0; Male 1; Female

Race	Potential Confounder	How would you describe your race? Mark all that apply.	1) White 2) Black or African-American 3) American Indian or Alaska Native 4) Asian 5) Native Hawaiian or other Pacific -- Islander	0; Caucasian 1; African American, American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander 2; Hispanic
Education	Potential Confounder	What is the highest grade or level of school you have completed?	1) Less than high school 2) High school diploma or GED 3) Some college 4) Completed vocational/technical training or a 2 year degree program (e.g., Associates degree or AA degree) 5) Completed a 4-year degree program 6) Graduate school	0; > High School 1; High School 2; < High School
Hispanic/ Latino	Potential Confounder	Would you describe yourself as Spanish, Hispanic, or Latino(a)?	1) Yes 2) No	Coded as part of Race variable
Income	Potential Confounder	What was your gross household income (before taxes and deductions are taken out) for last year (2002)? Mark only one.	22 Choices, in $2,500 increments, from $0 to $50,000.	0; 100% + FPL 1; 51 – 100% FPL 2; 11 – 50% FPL 3; 0 – 10% FPL
Employment Status	Potential Confounder	Are you current employed?	1) Yes, employed 2) Yes, self-employed 3) Not current employed, retired	0; Employed 1; Unemployed or Retired

			4) Not currently employed	
Mental Health Condition	Potential Confounder	In the last 6 months, have you been told by a doctor or other health professional that you have depression or anxiety?	1) Yes 2) No 3) Don't Know	0; Yes 1; No/Don't know
Chronic Condition	Potential Confounder	Presence of a chronic condition?	Variety of possibilities, see Method section for detailed description	0; No 1; Yes
***Debt; Doctor, Hospital, Clinic**	Primary Outcome	About how much money do you currently owe to a doctor, clinic or hospital for your own medical bills?	**Mult. Choice range; $0 to $15,000	0; < $500 1; >= $500
***Debt; credit card, bank, private loan**	Primary Outcome	About how much money do you currently owe to a credit card company, bank, or private loan company (like American General, Household Finance (HFC) etc.) for your own medical bills?	**Mult. Choice range; $0 to $15,000	0; < $500 1; >= $500
Unmet Medical Needs	Primary Outcome	Was there any time in the last 6 months when you needed medical care, but did NOT get it?	1) Yes 2) No	0; Never answered 'Yes,' 1; Answered, 'Yes,' at least once over study period.
Unmet Medication Needs	Primary Outcome	In the last 6 months, was there ever a time you needed prescription medicines but did not get them because you	1) Yes 2) No	0; Never answered 'Yes,' 1; Answered, 'Yes,' at least once over

		couldn't afford it? (Do not count samples as having a prescription filled.)		study period
Unmet Urgent Care Need	Primary Outcome	In the last 6 months, did you have an illness, injury, or condition that needed care right away? (Y) *When you needed care right away for an illness or injury, how often did you get care as soon as you wanted?*	1) Always 2) Usually 3) Sometimes 4) Never	0; Never 1; Always / Usually / Sometimes
ED Visits	Primary Outcome	In the last six months, how many times did you go to an emergency room to get care for yourself?	Multi. Choice range; None to 7 or more	0; None 1; 1 or more visits
Primary Care Visit	Primary Outcome	In the last six months, how many times did you go to a doctor's office, clinic, or other health care provider to get care for yourself?	Multi. Choice range; None to 7 or more	0; None 1; 1 or more times

Appendix B – Gaps by Demographics

	Continuously Enrolled			Short Gap		
	n	Weighted n	Weighted %	n	Weighted n	Weighted %
OHP Group						
Standard	218	218	31	99	103	48
Plus	501	496	69	115	112	52
Usual Source of Care						
No	253	251	37	83	82	39
Yes	423	423	63	123	126	61
Gender						
Male	229	229	32	63	64	30
Female	490	486	68	151	151	70
Age						
18-30	120	123	17	56	57	26
31-40	124	119	17	41	41	19
41-50	202	196	27	53	52	24
51 and above	273	276	39	64	65	30
Race						
White	523	573	80	157	177	82
Hispanic	65	70	10	20	18	8
Other	131	71	10	37	21	10
Education						
> High School	166	163	24	41	37	18
High School	277	276	41	64	65	32
< High School	230	233	35	97	102	50
FPL						
0-10%	88	83	14	22	22	12
11-50%	189	183	30	51	49	25
51-100%	289	289	48	64	65	34
100% +	50	52	9	54	56	29
Employment						
Employed	113	112	16	57	57	27
Unemployed or Retired	590	587	84	152	154	73
Mental Health Condition						
No	308	304	43	97	95	44
Yes	411	410	57	117	120	56
Chronic Condition						
No	270	265	37	95	96	45
Yes	449	449	63	119	119	55

	Medium Gap			**Long Gap**				
	n	Weighted n	Weighted %	n	Weighted n	Weighted %	χ2	p
OHP Group								
Standard	172	171	69	180	178	86	251.3	<.0001
Plus	82	79	31	28	28	14		
Usual Source of Care								
No	134	134	55	125	124	62	54.4	<.0001
Yes	112	108	45	76	75	38		
Gender								
Male	62	60	24	86	82	40	13.4	0.006
Female	192	189	76	122	124	60		
Age								
18-30	73	72	29	55	55	27	48.8	<.0001
31-40	63	59	24	44	43	21		
41-50	68	69	28	59	60	29		
51 and above	50	50	20	50	49	24		
Race								
White	177	204	82	142	168	81	0.6	0.99
Hispanic	32	22	9	31	19	9		
Other	45	23	9	35	19	9		
Education								
> High School	45	40	17	44	39	20	30.9	<.0001
High School	93	95	40	56	55	28		
< High School	104	104	44	96	100	51		
FPL								
0-10%	27	28	12	26	22	12	70.9	<.0001
11-50%	66	65	29	43	42	22		
51-100%	81	78	34	76	77	41		
100% +	54	55	24	44	47	25		
Employment								
Employed	106	107	43	107	108	54	143.9	<.0001
Unemployed or Retired	145	141	57	95	93	46		
Mental Health Condition								
No	124	123	49	124	124	60	21.0	0.0002
Yes	130	127	51	84	82	40		
Chronic Condition								
No	139	137	55	113	115	56	37.3	<.0001
Yes	115	113	45	95	91	44		

Appendix C - RUCA Coding Scheme Definition

RUCA Category	RUCA Code	Urban = Blue
		Rural = Beige
1		**Metropolitan area core: primary flow within an Urbanized Area (UA)**
	1.0	No Additional Code
	1.1	Secondary flow 30% through 49% to a larger UA
2		**Metropolitan area high commuting: primary flow 30% or more to a UA**
	2.0	No Additional Code
	2.1	Secondary flow 30% through 49% to a larger UA
3		**Metropolitan area low commuting: primary flow 10% to 30% to a UA**
	3.0	No Additional Code
4		**Micropolitan* area core: primary flow within an Urban Cluster (UC) of 10,000 through 49,999 (large UC)**
	4.0	No Additional Code
	4.1	Secondary flow 30% through 49% to a UA
	4.2	Secondary flow 10% through 29% to a UA
5		**Micropolitan* high commuting: primary flow 30% or more to a large UC**
	5.0	No Additional Code
	5.1	Secondary flow 30% through 49% to a UA
	5.2	Secondary flow 10% through 29% to a UA
6		**Micropolitan* low commuting: primary flow 10% to 30% to a large UC**
	6.0	No Additional Code
	6.1	Secondary flow 10% through 29% to a UA
7		**Small town core: primary flow within an Urban Cluster of 2,500 through 9,999 (small UC)**

	7.0	No Additional Code
	7.1	Secondary flow 30% through 49% to a UA
	7.2	Secondary flow 30% through 49% to a large UC
	7.3	Secondary flow 10% through 29% to a UA
	7.4	Secondary flow 10% through 29% to a large UC
8		**Small town high commuting: primary flow 30% or more to a small UC**
	8.0	No Additional Code
	8.1	Secondary flow 30% through 49% to a UA
	8.2	Secondary flow 30% through 49% to a large UC
	8.3	Secondary flow 10% through 29% to a UA
	8.4	Secondary flow 10% through 29% to a large UC
9		**Small town low commuting: primary flow 10% through 29% to a small UC**
	9.0	No Additional Code
	9.1	Secondary flow 10% through 29% to a UA
	9.2	Secondary flow 10% through 29% to a large UC
10		**Rural areas: primary flow to a tract outside a UA or UC (including self)**
	10.0	No Additional Code
	10.1	Secondary flow 30% through 49% to a UA
	10.2	Secondary flow 30% through 49% to a large UC
	10.3	Secondary flow 30% through 49% to a small UC
	10.4	Secondary flow 10% through 29% to a UA
	10.5	Secondary flow 10% through 29% to a large UC
	10.6	Secondary flow 10% through 29% to a small UC

Adapted from Rural Health Research Center[21]

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