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The Impacts of Medicaid Expansion on Rural Low-Income Adults – Lessons from the Oregon Health Insurance Experiment

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Abstract

Medicaid expansions through the Affordable Care Act began in January 2014, but we have little information about what is happening in rural areas where provider access and patient resources might be more limited. In 2008, Oregon held a lottery for restricted access to its Medicaid program for uninsured low-income adults not otherwise eligible for public coverage. The Oregon Health Insurance Experiment used this opportunity to conduct the first randomized controlled study of a public insurance expansion. This analysis builds off of previous work by comparing rural and urban survey outcomes and adds qualitative interviews with 86 rural study participants for context. We examine health care access and use, personal finances, and self-reported health. While urban and rural populations have unique demographic profiles, rural populations appear to have benefited from Medicaid as much as urban. Qualitative interviews revealed the distinctive challenges still facing low-income uninsured and newly insured rural populations.

Keywords

Medicaid; rural; access; Affordable Care Act

What should rural areas expect from Medicaid expansion? Reducing health disparities is a key goal of the Affordable Care Act, and Medicaid expansion is a central strategy for achieving that goal. Proponents of the optional Medicaid expansions hope that increasing health insurance coverage will make healthcare more accessible to poor and underserved populations, better connect them to existing resources within the delivery system, and improve their outcomes. But health disparities between urban and rural populations may be a function of more than just the affordability of care. With Medicaid expansion, will rural areas see the same “bang for the buck” as urban settings?

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There is no shortage of evidence that rural health disparities exist. When compared to suburban and urban settings, rural differences have been documented in such varying outcomes as obesity (O'Connor & Wellenius, 2012), heart disease (O'Connor & Wellenius, 2012), general chronic disease (Meit, et al., 2014), cancer mortality (Singh et al., 2011), cancer diagnosis and treatment (Sariego, 2009), diabetes (O'Connor & Wellenius, 2012; Krishna, Gillespie, & McBride, 2010), renal disease (Fan et al., 2007), and injury and trauma (Grossman et al., 1997).

What is less clear, however, is why those disparities exist. Rural residents certainly face different socioeconomic and environmental challenges than urban or suburban counterparts. They are more likely to be older, to be poor, to be less educated, to smoke more, to exercise less, and to have poor diets (Anderson, Saman, Lipsky, & Lutfivva, 2015; Meit, et al., 2014). In some areas they consume more alcohol (Meit, et al., 2014). Rural residents also often face more difficult environmental and occupational conditions (Anderson, et al., 2014; Fraser et al., 2005).

Prior to the ACA, rural adults were also more likely than urban adults to be uninsured (estimated 22.1% versus 17.4%). With Medicaid expansions this gap is narrowing, but has not yet closed (Karpman, 2015). Rural residents are less likely to have employer-sponsored coverage (57% versus 51%) and, in states that haven't expanded Medicaid, they often fall in the 'coverage gap' between Medicaid and Marketplace Exchange eligibility; two out of every three uninsured rural residents live in a state that hasn't expanded Medicaid, compared to 1 of every 2 of the urban uninsured (Newkirk & Damico, 2014).

But there are other systemic differences related to the health care delivery system that could also contribute to rural disparities. Although one in five Americans lives in a rural area, less than 11% of physicians practice in rural communities (Rosenblatt, Chen, Lishner, & Doescher,. 2010). Thus, rural residents often face reduced access to physicians, particularly in specialty areas such as mental health (Fields, Bigbee, & Bell, 2015). A lack of public transportation infrastructure may also make it more likely that transportation barriers will prevent rural populations from travelling to the care they need (Douthit, Kiv, Dwolatzky, & Biswas, 2015; Weaver, Geiger, Lu, & Case 2013). Gaining insurance doesn't necessarily give you access to a resource that doesn't exist in or near your community.

There is also mixed evidence about the quality of care available to rural residents. Because rural practitioners see more patients, the quality of care may be compromised by high patient loads (Fields, Bigbee, & Bell, 2015). Some studies have found that rural residents are less likely to receive recommended preventive services and more likely to experience a delayed diagnosis (Aboagye, Kaiser, & Hayanga, 2014; Nguyen-Pham, Leung, & McLaughlin, 2014). On the other hand, there is also some evidence that access and quality of some types of health care is actually the same or even better in rural areas (Kirchhoff, Hart, & Campbell, 2014; Miedema, Easley, & Robinson, 2013).

Overall, it is likely that urban-rural health disparities are both a function of socio-economic differences and a function of rurality itself (Erwin, et al., 2010; Peterson & Litaker, 2010; Smith, Humphreys, & Wilson, 2008). The prevailing interpretation of the research is that

Medicaid expansions may be disproportionately important to rural low-income adults, but such individuals may also experience unique challenges and barriers to benefiting from the program when compared with their urban counterparts (Mueller, et al., 2014). An assessment of the effectiveness of the ACA and Medicaid expansions should include a concentrated look at the experience of rural populations (Coburn, et al., 2014) and AHRQ has identified those who live in rural areas as a high priority population (Agency for Healthcare Research and Quality, 2011).

This study uses data from Oregon's 2008 Medicaid expansion, which was allocated by lottery to uninsured adults, to see if the causal impacts of Medicaid are similar across rural and urban populations. Previous findings from this study - the Oregon Health Insurance Experiment (OHIE) - found that overall, Medicaid increased health care use with significant increases in outpatient visits, prescriptions, hospitalizations, and emergency department visits (Finkelstein et al., 2011; Baicker et al., 2013; Allen, Wright, Harding, & Broffman, 2014). Coverage improved the financial stability of low-income adults by lowering medical debt and almost eliminating catastrophic medical costs (Finkelstein, Taubman et al., 2012). Medicaid reduced the prevalence of clinical depression, but it did not produce statistically significant reductions in high cholesterol, high blood pressure, high blood sugar, obesity, smoking, or cardiovascular risk (Baicker, Taubman et al., 2013).

NEW CONTRIBUTION

For this study, we investigate whether gaining access to health insurance has a differential effect in urban areas compared to rural using several measures of rurality that capture increasingly isolated areas. Other research has addressed the impact of Medicaid cuts on rural populations (Smith, 2013; Silberman et al., 2005), but the Oregon Health Insurance Experiment is the first study offering the opportunity to compare Medicaid expansions across rural and urban populations with an experimental design. In this paper, we provide detailed comparisons not reported in our prior work. To produce a more nuanced understanding of potential coverage impacts among rural participants, we also follow-up with in-depth qualitative interviews.

Our conceptual model for this work is the "voltage drop" notion described by Eisenberg and Power (2000). They argue that availability of health insurance does not guarantee that Americans receive high quality care. Using the metaphor of an electric circuit that can lose voltage at multiple points, there are several notable points of vulnerability for low-income adults, particularly those in rural geographic regions. Individuals in our study have gained access to a Medicaid expansion program through a lottery, thus the points identified by Eisenberg and Power most relevant for this study are 1) access to covered services, individual and institutional providers, 2) choice of providers and institutions, 3) access to consistent primary care, 4) access to referral (specialty) services, and 4) delivery of high-quality health care.

BACKGROUND

In 2008, Oregon allocated limited slots in their otherwise closed Medicaid-expansion program, Oregon Health Plan Standard, by lottery. Oregon Health Plan (OHP) Standard operates under a federal 1115 waiver to offer a Medicaid package to able-bodied low-income Oregonians, ages 19–64, not categorically eligible for public coverage. To qualify, an individual must be a U.S. Citizen or legal immigrant, an Oregon resident, without insurance for 6 months, have assets under $2,000, and make less than 100% of the federal poverty level (FPL), which changes each year to adjust for inflation. OHP Standard offers a comprehensive benefit package of inpatient, outpatient, and prescription coverage, with sliding scale monthly premiums ($0–20) and no other cost-sharing. There is no coverage for non-emergent dental care or vision. (Allen et al., 2010)

OHP Standard closed to new enrollment in 2004 and experienced attrition to 19,000 covered lives by 2008, when there was adequate funding to add 10,000 new members (Allen et al., 2010). To manage anticipated demand and allocate the expansion fairly, the state opened a “reservation list” for five weeks (Jan-Feb, 2008) with a broad outreach effort that allowed anyone who identified as low-income and uninsured to sign up by phone, online, in person, or by mail. When the list closed, 89,824 individuals were on it. During eight lottery drawings from March through September 2008, 35,169 individuals were selected to apply for coverage. Individuals could enroll themselves and any family member but everyone had to meet eligibility requirements.

The OHIE was built around this natural experimental design and provides the first causal estimates of the impact of public coverage expansion for low-income adults (Finkelstein et al., 2012). OHIE is unique because prior studies on the impact of Medicaid expansions cannot infer causality due to selection bias: individuals with Medicaid are different in many ways from those who are uninsured, and it is impossible to know if any observed differences between the two groups are attributable to the coverage or to something else. For example, studies comparing Medicaid members to the uninsured have sometimes found that Medicaid patients fare worse than those with no coverage at all (Gaglia et al., 2011; LaPar et al., 2010); selection bias may help explain these findings if healthier people are less likely to sign up for coverage in the first place. The OHIE avoids such bias because whether or not someone had access to Medicaid was randomly determined, so any other differences between the groups should be equally present by chance.

For this paper we rely on our only sources of statewide survey data, collected at baseline and approximately one-year after the Oregon Medicaid lottery. We also conducted qualitative interviews three-years post-lottery with individuals who had returned a mail survey; the qualitative data is meant to enhance and complement the experimental quantitative findings.

STUDY METHODS

Mail Surveys. Questionnaires were mailed to almost all individuals who were selected to receive an OHP application, and a roughly equal number of individuals who weren’t. Surveys were developed by the research team using previously validated measurement

constructs, and were conducted in English and Spanish. Outcomes of interest included access to care, use of care, healthcare quality, personal finances, and self-reported health outcomes. We followed a three-attempt fielding protocol and the first survey contained a $5 incentive. Baseline surveys were mailed in June and November of 2008. Twelve-month follow-up surveys were mailed in July and August of 2009. For the follow-up survey, we implemented an intensive protocol for approximately 30% of non-responders that included phone calls, tracking efforts for those with bad addresses, and additional mailings; our effective response rate for the 12-month survey was 50%. Due to the considerable risk posed by response bias (particularly related to balance between treatment and control responses), this concern was empirically examined in Finkelstein et al. (2012) using a variety of data sources for comparisons and robustness checks under conservative assumptions - the results were reassuring (see Finkelstein, et al., 2012, Appendices 1 and 2). Details on our survey measures are available in Appendix A.1, and more information about the survey and study methodology can be found at www.nber/oregon.

Qualitative Interviews. We randomly selected a sample of 462 individuals living in rural zip codes in Oregon who had also returned a mail survey. Potential participants received a letter informing them about the study, the days that researchers would be in their area, and an offer of a $75 incentive for their time if they agreed to participate. Approximately a week after the invitation letter, a recruiting team made follow-up calls to secure participation. Oregon is comprised of 7 defined regions, 6 of them include rural townships where we recruited from: Willamette Valley (5 towns), Oregon Coast (3 towns), Mt. Hood/Gorge (1 town), Central Oregon (2 towns), Eastern Oregon (4 towns), and Southern Oregon (5 towns). Over a period of two weeks, 76 rural interviews were conducted across 12 locations that were central to the 20 townships in the sample. The number of interviews was limited by how many could be completed in each location in one day by two interviewers. However, to achieve diversity of experience in our sample we conducted 10 phone interviews with people who expressed interest in participating but were unable to do so in person because of transportation barriers or poor health, for a total of 86 completed interviews.

Researchers used an interview guide that explored a variety of themes related to the study with follow-up probes focused on potential impacts specific to the rural experience. Instead of relying on semi-structured questions, interviewers were trained to probe around these themes of interest, focusing on the most relevant to the individual participant. Examples of these included access to care, management of acute and chronic conditions, financial outcomes and medical debt, and other potential health impacts as a result of living in a rural area. This approach allowed the interviewer and respondent to focus on whatever facets of the participants' stories would elicit the richest data.

Survey Data Analysis

The main study sample consisted of 23,741 low-income adult respondents who signed up for a 2008 Oregon Medicaid lottery and responded to the 12-month follow-up mail survey in 2009. There were 5,986 participants who provided a zip code outside of a Metropolitan Statistical Area (MSA), which was our primary definition of rural, and 17,755 urban participants who provided a zip code within a MSA. We evaluate 2008 baseline urban-rural

differences using an overlap sample of 9,389 individuals who returned a baseline survey prior to being notified of lottery selection status and who also participated in the 2009 survey.

For our analysis of twelve-month outcomes, we examined more restrictive definitions of rurality using United States Department of Agriculture's (USDA) 2013 rural-urban continuum codes (RUCC) with two additional model specifications. The USDA RUCC codes range from 1 to 9, with 1 being most urban. A MSA definition (25% rural in our sample) most closely resembled a RUCC definition of rural between 4–9 (27% rural). We additionally estimated compared urban outcomes with RUCC 5–9 (15% rural, n = 3501) and 6–9 (8% rural, n = 1942). More restrictive definitions of rural were more likely to highlight the experiences of those who are truly geographically isolated, but there was a trade-off in statistical power to detect meaningful treatment differences; our sample size did not allow for further restrictions.

We assessed 2008 baseline urban-rural disparities using ordinary least squares regression, controlling for known demographic differences: race, ethnicity, English-language, age, gender, and insurance status (insured vs. uninsured). To estimate differential impacts of Medicaid coverage resulting from the lottery, we used an instrumental variable approach, where the lottery was an instrument for Medicaid coverage. We calculated the Local Average Treatment Effect (LATE) of Medicaid using two-stage least squares regression (2sls).

For insurance, defined as ever having OHP Standard (Medicaid) during the study period, the first-stage equations were modeled as:

$$\text{INSURANCE}_{ih} = \delta_0 + \delta_1 \text{LOTTERY}_h + \delta_2 \text{URBAN}_{ih} + \delta_3 \text{LOTTERY} * \text{URBAN}_{ih} + X_{ih} + \mu_{ih}$$

$$\text{INSURANCE} * \text{URBAN}_{ih} = \delta_0 + \delta_1 \text{LOTTERY}_h + \delta_2 \text{URBAN}_{ih} + \delta_3 \text{LOTTERY} * \text{URBAN}_{ih} + X_{ih} + \mu_{ih}$$

Lottery is an indicator variable for selection to receive a Medicaid application (0 = not selected) in each household h. Urban is an indicator variable for either residing in a Metropolitan Statistical Area (MSA) or in a RUCC defined urban area (0 = rural) for each individual i in household h. Lottery*Urban is an interaction term of the two (0 = not selected, rural). All 2sls equations were adjusted for household size on the lottery list, the month of selection, and an interaction of the two, since selection was random but all members of the associated household were invited to apply for Medicaid (X). Standard errors were clustered by household (h) to address intra-household correlation. The error term is signed as u.

The second stage equations were modeled as:

$$y_{ih} = \pi_0 + \pi_1 \text{INSURANCE}_{ih} + \beta_2 \text{URBAN}_{ih} + \beta_3 \text{INSURANCE}_{ih} * \text{URBAN}_{ih} + X_{ih}\beta_4 + \varepsilon_{ih}$$

Insurance, defined above, represents the implied effect of Medicaid coverage attributable to the lottery. The p-value of the interaction term between insurance and urban indicates any

statistical difference in LATE between the two. X and urban are defined in the first-stage equations above and ε is the error term.

Consistent with our previous work, we used linear regression even with binary outcomes. Our analytic approach has been extensively described elsewhere (Finkelstein et. al, 2012) and mirrors prior work. All analyses were weighted to account for the sampling, intensive follow-up, and fielding design. Survey responders were 3 percentage points more likely to be female and on average 2 years older than non-respondents. Those not selected for the lottery were equally likely to respond to the survey as those selected (all p-values were at least .28). For all of our statistical modeling, we used STATA 12.0.

Qualitative Data Analysis

The Qualitative data was transcribed and entered into ATLAS.ti, a qualitative analytical software tool. Interviewers coded transcripts using a dictionary that had been used for 584 other qualitative interviews collected as part of the larger qualitative arm of the Oregon Health study. Each interview transcript was individually coded by a research assistant, then those codes were reviewed by a different research assistant; any discrepancies between the research assistants were adjudicated by a trained qualitative analyst. Interviews were analyzed using framework analysis (Bryman & Burgess, 2002), which lends itself well to applied policy research, and interpreted to provide context for the quantitative findings.

RESULTS

Table 1 highlights the demographic characteristics of the study universe (lottery list) and study participants (survey returners) with any statistical differences between rural and urban populations. We present control means only because some of the reported characteristics could be modifiable by insurance. Individuals living in rural areas were similar to those living in urban areas on many characteristics. However, on average, the rural population was slightly older, more likely to be English-speaking and non-Hispanic White, had lower educational attainment and had higher pre-study diagnoses of high blood pressure and emphysema.

Survey Results

Table 2 shows available comparable outcomes from the baseline survey, prior to individuals being informed of their lottery selection status. There were some observable urban/rural differences in our baseline survey, even when adjusting for demographic factors. However, the disparities were not consistently better for those in urban areas. Individuals in urban areas were 8 percentage points (pp) less likely to report having a usual source of health care ($p < .001$) and 11pp less likely to have a clinic-based usual source of care ($p < .001$). Similarly, urban survey responders were 4pp less likely to have a personal healthcare provider (PCP) than rural. Urbanites were slightly healthier on average than the rural cohort, which was reflected in their overall assessment of health being good, very good, or excellent ($p<.05$) and fewer days of poor physical health ($p<.001$) and overall impairment ($p<.05$).

The lottery was associated with an average “first-stage” 29 percentage-point increase in Medicaid in the treatment group. While the lottery was random, applying and meeting

eligibility criteria were not. We did not observe meaningful differences in "take up" between urban and rural selected households; the lottery was associated with a 29% increase in Medicaid among MSA urban participants and a 30% increase among rural (see Appendix Table A.2).

Across the board, there were no statistically significant differences in the Medicaid treatment effect between urban and rural populations (see Table 3). A few measures neared statistical significance, such as physical activity level ($p<.10$) and health improvement or stability ($p<.10$), which may be indicative of the underlying health advantage in urban areas observed in the baseline survey. The lack of statistical differences in the LATE of Medicaid between urban and rural study participants held true using the RUCC specifications of rurality, where we examine stricter definitions of geographic isolation (see Appendix Table A.3) and when applying logistic regression as the functional form for the statistical models (not shown).

Rural Qualitative Interview Results: Rural Health Challenges

Distance as an access barrier—Despite improvements in access for rural insured respondents, our qualitative interviews suggest that proximity to care is a notable access barrier for both Medicaid-insured and uninsured respondents; 77% of qualitative interviewees (n = 86) reported living far from necessary care. Though many participants articulated that travelling long distances for anything was a part of rural life, living several miles away from care facilities was a common impediment to receiving all types of care, from primary to emergency. Respondents described forgoing a variety of care because they lacked access to a vehicle:

> Interview 40: "I haven't tried [Medicaid] yet. I need to start taking better care of my teeth, and like I said, I let it slide. I should have checked into when I first got picked again with the Oregon Health Plan, but I've just been busy and living out in the woods without transportation right now, and so my situation is kind of dismal as far as that goes."
>
> Interview 11: "There are problems where people can't get in [to the hospital]. So they go home with a broken finger or a broken toe or possibly even a leg and sit it out because they don't know anybody that has a car or they can't get anybody that's got a car."

For the many of the participants without a car in rural communities, public transportation was nonexistent; in the few areas it was available, there were barriers to accessing and using it. Examples cited included long wait times between bus or van arrivals and difficulty waiting or standing at a bus stop for an extended period of time.

Access to Specialists—For OHP-insured participants, nearly half noted that access to specialty care was particularly challenging in rural areas. Even if respondents in a rural location had access to a hospital and/or options for primary care, they still faced a notable dearth of specialists and specialty care. For some, this meant significant, regular travel for continued care:

> Interview 30: “So it’s like a 5–6 hour ride [to redacted urban hospital]. The connections especially coming back aren’t very good. When you come back you have to wait in [redacted small town] for 2 hours for our city bus to pick you up.

Access to the Safety Net for the Uninsured—Uninsured participants described facing a different set of challenges in relation to receiving care - a lack of community health centers and sliding scale clinics in their area. Uninsured participants expressed a desire to seek low-cost care for a variety of medical issues; however, about 15% reported these types of care facilities were few and far between:

> Interview 23: “[redacted city] has a program (84 miles one way), it’s like a community program, a conglomerate and they have doctors that volunteer their time to see patients that don’t have health insurance. They have a whole community type system, but they don’t here [where I live].”

> Interview 31: “[There are no safety net clinics] that I am aware of. [Redacted urban city] perhaps, but I have no transportation these days so I’m pretty much limited to local.”

Quality of Available Care—The qualitative interviews suggested that living in a rural area might impact how individuals perceive the quality of care they received. About 15% of both insured and uninsured qualitative respondents professed some lack of confidence in the quality of local care providers and hospitals in rural areas.

> Interview 55: “These doctors here freak me out, I don’t know, but they do…I don’t trust the physicians here.”

For many participants, this mistrust contributed to the distance they travelled for care; though there might be a closer facility, the poor reputation of providers and facilities led some respondents to seek care elsewhere. This perception was often a result of living in a small, close-knit community, having a poor personal experience, knowing someone who received subpar care, or having friends who worked at a particular facility such that the awareness of low quality care at a certain facility was considered common knowledge:

> Interview 1: **“**[Redacted hospital] turned into a medical center because they’re idiots. I wouldn’t go there anyway. I’d go to [redacted larger rural town], probably…[because] they call it Death’s [Redacted hospital] up there…You check in but you don’t check out, they say.”

> Interview 24: “This hospital really has a nasty reputation - most of the people are well meaning but it’s a rural thing. One of my best friends is a retired nurse from here that was a full-blown alcoholic the whole [time] I knew her. I mean she worked here just drunk on her butt all the time. I knew it and I knew her, she’s a nice lady other than the fact that she drinks. Like I said, I’m not that excited about the hospital.”

> Interview 58: “You hear a lot of negative things [about the hospital]…there’s really no competition in this town for hospitals. This is the only one so they can do things

however they want because there is no one to compete with. A lot of people opt to go to [redacted larger small town], at least."

Interview 23: "With the amount of pay and stuff, the quality of the personnel isn't as great as it would be in [redacted urban city] or somewhere where the patient versus those is higher and it all boils down to money…where you get a larger salary, the higher quality people are going to want to be there. The more educated, more experienced people go to where more money is, and [redacted small town] is the smallest city out of the city's that you've talked about, [redacted larger small town] and [redacted larger small town] and [redacted urban city]."

Rural Culture—Analysis of the interview narratives underscored a notable level of stoicism in rural respondents that may influence their use of healthcare and their health. This stoicism affected the way respondents sought care and, in many cases, avoided care. There were several accounts of respondents struggling with longstanding symptoms from unresolved injuries and the inevitable impacts of living life without health care; however, the general attitude among these respondents was to accept the outcomes and attempt to move on with their lives. The presence of stoicism was noted in almost one fifth (17%) of the rural interviews:

Interview 24: **"**I've pretty much learned to live with it. The toughest part was when the 2–3 vertebras up from my hip were going. It was pinching that sciatic nerve, which is kind of intense, and after that it sometimes hurts a lot and sometimes it hurts just a little and you just learn to live with it."

Interview 56: "I'm a cowboy, I suck it up, you know. I don't whine too much."

LIMITATIONS

We need to exercise caution when generalizing these results to the Affordable Care Act expansions. While our study population is similar to those who will be gaining eligibility to Medicaid, the ACA expansions are much broader in scope and our study measures a limited expansion, which would be less likely to strain the delivery system. Further, we can only generalize our findings to individuals who are likely to take up coverage since our average treatment effects are based on those who enrolled in Medicaid. However, low-income adults are offered an affordability exemption to the individual mandate, which means Medicaid take-up may still be perceived as voluntary. The smaller sample size of rural survey respondents may contribute to less sensitivity in detecting heterogeneous treatment effects; particularly using the more restrictive definitions of rurality. There was a notably higher percentage of whites in the sample compared to the national average, which reflects the demographics of Oregon and many rural areas in general (Housing Assistance Council, 2012). Last, our survey measures the short-term impacts of gaining insurance; long-term impacts may differ.

The qualitative interviews provide rich context for the survey results but suffer from the limitations of qualitative research in general, where respondents are not asked standardized questions and are not limited to standardized answers. The interview methods and the small

sample size limits generalizability. Relatedly, while we noted the dominant themes from the 86 interviews as a whole, the themes were not present or proportional in every region we captured. To highlight this point, we created a "truth table" (Appendix Table A.4) that shows the frequency of our highlighted themes as they were distributed regionally.

DISCUSSION

Given the many challenges of rural health care – distance, lack of access to specialists, and other factors – our experimental data suggests that Medicaid coverage resulted in considerable benefits for those living in rural Oregon, indistinguishable from those in urban areas. Despite concerns about inadequate provider networks or transportation issues, gaining coverage significantly increased the likelihood that rural individuals who reported health care needs felt those needs were addressed. Comparing urban and rural study participants, we found similar improvements in access to primary care, use of preventive screenings, and continuity of care. Rural participants also equally benefitted from the financial protections afforded by coverage. Whether it was because of increased financial security or actual health improvements, rural individuals who gained coverage reported better overall health and happiness.

However, remaining barriers to optimal care in rural areas were evident in our qualitative interviews. When respondents described how they interacted with the healthcare system, living in a rural community meant travelling long distances to get necessary care, and bearing the burden of the financial hardship associated with the trip. This access barrier was especially pronounced when it came to seeking specialty care. Some rural respondents also had concerns about the quality of their care that is a result of being part of a small, close knit community in which stories of poor care travel fast, as well as a sense that "good" doctors do not practice in rural communities. Of note, many rural participants expressed stoicism when it came to their circumstances and health; this culturally distinctive phenomenon (Beard, Tomaska, Earnest, Summerhayes, & Morgan, 2009) should be factored in when understanding how insurance expansion will impact the health of rural communities.

Placing the qualitative interviews in the context of the survey results suggests that gaining insurance reduced a first-order barrier to accessing quality health services. Once insured, individuals in rural areas still needed to navigate second-order access barriers such as transportation and availability of specialty providers (DeVoe, Graham, Angier, Baez, & Krois, 2008). Second-order barriers, such as Medicaid-associated stigma or reservations about the quality of safety-net care, have been noted in newly-insured urban populations as well (Allen et al., 2014). Despite some concern among rural interviewees about the quality of available providers, survey respondents showed strong overall satisfaction with their care.

We conclude that Medicaid provides rural populations with benefits above and beyond what is currently being provided to uninsured adults through the safety net. As one person said: "I'm truly thankful and grateful that I do have OHP [Medicaid] because I've needed to see the doctor from time to time and without it, I wouldn't be able to". Additionally, we find that the impacts of Medicaid coverage are not "washed out" by access barriers or other unique challenges of rural healthcare; in fact, the effects of coverage are of similar magnitude to

those enjoyed by the urban respondents in the OHIE. Taken together, these results suggest that rural areas should expect comparable benefits from Medicaid expansion to those in more urban settings: improvements in access to health care services, use of preventive care, financial protection, and subjective well-being, balanced against the costs of providing the coverage and its associated increase in utilization of services.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Sample Characteristics

	Rural Control Mean %	Urban Control Mean %		Rural Control Mean %	Urban Control Mean %
Full Sample (from lottery list)			**Survey Responders Only (from lottery list)**		
Female	55	55	Female	58	59***
Age 20–49	70	75***	Age 19–49	62	70***
Age 50–64	30	25***	Age 50–64	38	29***
English language preferred	96	90***	English language preferred	95	91***
12-month Mail Survey Responders					
White	87	80***	***Education***		
Black	1	5***	< high school	20	17**
Hispanic/Latino	10	13***	HS diploma or GED	53	48***
			Vocational training	20	23**
Ever diagnosed with:			4-yr college +	7	13***
Diabetes	19	17			
Asthma	28	27	***Employment***		
High blood pressure	42	39*	Unemployed	55	55
Emphysema or chronic bronchitis	15	12**	<20 hours per week	9	9
Depression	54	56	20–29 hours per week	11	10
			30+ hours per week	26	26
% FPL					
< 50	40	41	***Insurance coverage***		
50–75	14	14	Any?	29	34***
75–100	14	14	OHP/Medicaid	10	12*
100–150	19	17	Private	11	14***
>150	13	14	Other	10	10

Notes:

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Lottery list data is from the Department of Medical Assistance Programs (DMAP) in the Oregon Health Authority. Survey data is from the Oregon Health Insurance Experiment 12 month survey, available at: http://www.nber.org/oregon/data.html. Numbers are in percentage points.

Table 2

Baseline Comparisons Between Urban and Rural Survey Responders.

	Model Constant	Rural-Urban Difference	Robust Standard Error	p-Value
Access and Use				
Usual Source of Care (USC)	0.66	−0.08	0.012	0.000
Clinic-based USC	0.65	−0.11	0.013	0.000
Any primary care visit	0.63	−0.04	0.012	0.000
# of primary care **visits**	2.30	−0.11	0.070	0.103
Any emergency room (ER) visits	0.11	0.01	0.010	0.368
# of ER **visits**	0.13	0.01	0.024	0.817
Needs Met				
Needed medical care	0.50	−0.02	0.010	0.071
Medical needs met	0.95	−0.00	0.013	0.993
Needs not met, cost	−0.04	−0.01	0.012	0.294
Needs not met, couldn't get an appointment	0.02	0.00	0.005	0.811
Needed prescription (Rx) in past 6 months	0.52	−0.01	0.011	0.366
Any prescriptions filled	0.47	−0.02	0.012	0.226
Rx needs met	0.96	0.01	0.012	0.380
Rx needs not met, cost	−0.00	−0.02	0.011	0.034
Rx needs not met, no doctor	−0.00	0.03	0.007	0.000
Needed dental in the past 6 months	0.45	0.01	0.011	0.282
Dental needs met	0.83	−0.01	0.012	0.268
Health-related outcomes				
Health is good, very good, or excellent	0.50	0.03	0.012	0.027
Health is poor	0.15	−0.01	0.008	0.122
Health has gotten better or stayed the same	0.86	−0.00	0.011	0.992
# of bad (not good) **days** of physical health	10.42	−1.07	0.290	0.000
# of bad (not good) **days** of mental health	6.23	−0.02	0.300	0.945
# of **days** impaired in usual activities	6.84	−0.57	0.266	0.032
Financial outcomes				
Had out of pocket medical expenses	0.75	−0.03	0.012	0.016

	Model Constant	Rural-Urban Difference	Robust Standard Error	p-Value
Currently owes $$ for health care costs	0.30	−0.02	0.012	0.170
Borrowed $$ or skipped paying bills d/t medical debt	0.22	−0.05	0.013	0.000
Was refused medical care due to existing medical debt	−0.01	−0.01	0.007	0.049

Notes: Data are from the Oregon Health Insurance Experiment 0 month surveys, available at: http://www.nber.org/oregon/data.html. Overlap 0 and 12 month sample N = 9,389. OLS regressions were adjusted by race, ethnicity, private insurance, education, gender, age, and English language preferred. Columns are in decimals, except where indicated in **bold (# of visits or days).** Rural is the referent category, see Appendix A for additional survey questions and coding.

Table 3

Heterogeneous Treatment Effects of Medicaid by Urban/Rural Status

	Model Constant	LATE of Medicaid (SE), p-value	Urban/Rural (SE), p-value	LATE of Medicaid and Urban/Rural (SE) Interaction	p-value of Interaction
Access and Use					
Usual Source of Care (USC)	0.68	0.17 (0.043) ***	−0.08 (0.016) ***	0.03 (0.051)	0.580
Clinic-based USC	0.50	0.31 (0.052) ***	−0.09 (0.019) ***	0.05 (0.060)	0.443
Has primary care provider (PCP)	0.48	0.27 (0.050) ***	−0.06 (−0.018) **	0.02 (0.057)	0.712
Any primary care visit	0.58	0.20 (0.047) ***	−0.03 (0.017)	0.02 (0.054)	0.703
# of primary care visits	1.78	1.66 (0.652) *	0.04 (0.178)	−0.36 (0.706)	0.614
Any emergency room (ER) visits	0.27	0.01 (0.043)	−0.01 (0.016)	0.01 (0.050)	0.814
# of ER visits	0.47	0.11 (0.106)	0.07 (0.044)	−0.13 (0.139)	0.356
Prevention					
Has ever had cholesterol checked	0.61	0.14 (0.048) **	0.00 (0.018)	−0.03 (0.056)	0.596
Has ever had a blood test for high blood sugar	0.59	0.10 (0.048) *	−0.01 (0.018)	−0.01 (0.056)	0.899
Has had a mammogram in the past year (women 40 +years only)	0.25	0.19 (0.073) **	0.00 (0.025)	−0.01 (0.085)	0.944
Has had a pap test or pap smear in last 12 months (women only)	0.28	0.26 (0.063) ***	0.06 (0.039) *	−0.11 (0.074)	0.143
Currently smokes some days or every day	0.48	0.03 (0.05)	−0.04 (0.018) **	−0.04 (0.058)	0.498
Advised to quit smoking in the last 12 months	0.45	0.17 (0.063) **	−0.04 (0.03)	0.05 (0.074)	0.498
Needs Met and Quality					
Care is good, very good, or excellent	0.63	0.21 (0.052) ***	0.06 (0.022) **	−0.09 (0.060)	0.111
Needed medical care	0.77	0.01 (0.043)	−0.02 (−0.016)	0.00 (0.050)	0.952
Medical needs met	0.58	0.27 (0.043) ***	0.03 (0.016)	−0.04 (0.049)	0.394
Needs not met, cost	0.35	−0.30 (0.038) ***	−0.03 (0.015) *	0.04 (0.043)	0.361
Needs not met, couldn't get an appointment	0.03	−0.01 (0.013)	0.00 (0.005)	0.02 (0.016)	0.282
Needed prescription (Rx) in past 6 months	0.74	0.05 (0.044)	−0.03 (−0.016)	0.00 (0.051)	1.000
Any prescriptions filled	0.66	0.08 (0.053)	−0.05 (0.020) *	0.01 (0.062)	0.851
Rx needs met	0.69	0.22 (0.037) ***	0.02 (0.014)	−0.03 (0.043)	0.463

	Model Constant	LATE of Medicaid (SE), p-value	Urban/Rural (SE), p-value	LATE of Medicaid and Urban/Rural (SE) Interaction	p-value of Interaction
Rx needs not met, cost	0.26	−0.21 (0.033)***	−0.03 (0.013)*	0.02 (0.038)	0.571
Rx needs not met, no doctor	0.09	−0.10 (0.018)***	0.00 (0.008)	0.01 (0.022)	0.541
Needed dental in the past 6 months	0.76	−0.10 (0.046)*	0.01 (0.016)	0.01 (0.053)	0.834
Dental needs met	0.48	0.16 (0.049)**	0.01 (0.018)	−0.03 (0.056)	0.558
Health-related outcomes					
Happiness, not too happy	0.46	−0.20 (0.048)***	0.00 (0.018)	0.01 (0.056)	0.902
Health is good, very good, or excellent	0.48	0.15 (0.049)**	0.04 (0.018)*	−0.03 (0.056)	0.659
Health is poor	0.17	−0.08 (0.034)*	−0.01 (0.013)	−0.03 (0.039)	0.484
Health has gotten better or stayed the same	0.68	0.04 (0.044)	0.00 (0.016)	0.09 (0.051)	0.064
# of bad (not good) **days** of physical health	10.72	0.13 (1.164)	−0.58 (0.425)	−2.31 (1.342)	0.085
# of bad (not good) **days** of mental health	12.96	−1.28 (1.211)	−0.23 (0.448)	−1.09 (1.4)	0.436
# of **days** impaired in usual activities	9.51	−0.10 (1.073)	−0.29 (0.387)	−1.64 (1.24)	0.185
Physical or mental health limit ability to work	0.48	−0.06 (0.049)	−0.02 (0.018)	−0.02 (0.057)	0.763
More active or same activity level as peers	0.59	0.00 (0.048)	−0.02 (0.017)	0.10 (0.056)	0.075
Screened positive for depression PHQ-2	0.38	−0.02 (0.046)	0.00 (0.017)	−0.08 (0.054)	0.129
Financial outcomes					
Had out of pocket medical expenses	0.64	−0.22 (0.049)***	−0.05 (0.018)**	0.03 (0.057)	0.595
Currently owes $$ for health care costs	0.66	−0.12 (0.049)*	−0.02 (0.018)	−0.08 (0.057)	0.163
Borrowed $$ or skipped paying bills d/t medical debt	0.44	−0.20 (0.049)***	−0.05 (0.018)**	0.06 (0.056)	0.303
Was refused medical care due to existing medical debt	0.10	−0.02 (0.029)	−0.01 (0.010)	−0.03 (0.033)	0.409

Notes:

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Data are from the Oregon Health Insurance Experiment 12 month survey, available at: http://www.nber.org/oregon/data.html. Columns are in decimals, except where indicated in **bold ((# of visits or # of days).** The LATE is the Local Average Treatment Effect of the Medicaid using 2sls regression. The LATE of Medicaid and Urban/Rural Interaction is the parameter of interest. See Appendix A for survey questions and coding.