5-1-2014

Implications of rurality and psychiatric status for diabetic care use among adults with diabetes

Jean A. Talbot PhD
University of Southern Maine, Muskie School of Public Service, Maine Rural Health Research Center

Erika C. Ziller PhD
University of Southern Maine, Muskie School of Public Service, Maine Rural Health Research Center

Jennifer D. Lenardson MHS
University of Southern Maine, Muskie School of Public Service, Maine Rural Health Research Center

David Hartley PhD, MHA
University of Southern Maine, Muskie School of Public Service, Maine Rural Health Research Center

Maine Rural Health Research Center **Research & Policy Brief**

PB-56 May 2014

Implications of Rurality and Psychiatric Status for Diabetic Preventive Care Use among Adults with Diabetes

Jean A. Talbot, PhD, MPH • Erika C. Ziller, PhD • Jennifer Lenardson, MHS • David Hartley, PhD, MHA

Background

Diabetes and mental health conditions co-occur frequently in the United States[1,2] and each is a risk factor for the other.[3,4] Moreover, individuals with comorbid diabetes and psychiatric disorders are at greater risk for poor health outcomes than the general population or than their peers with diabetes.[5,6]

One step toward understanding and potentially reducing the health disparities faced by people with comorbid diabetes and mental health conditions is to monitor their receipt of diabetic preventive services, to ensure that these services conform to established standards.[7] Previous investigations on this topic have indicated that after controlling for covariates of diabetes and psychiatric status, the presence of any mental health condition was associated with decreased quality of diabetic care, as measured by patients' appropriate use of preventive services.[8,9] Existing research does not clarify how rural residence and related factors might be connected to preventive care use among diabetic people with mental health needs. This question warrants attention, given that rural populations generally have poorer health,[10] and higher rates of diabetes,[11] while at the same time confronting multiple access barriers such as poverty, inadequate insurance coverage, provider supply shortages, and limited area resources.[12] As a result of these barriers, people with diabetes may access recommended preventive care at lower rates in rural than in urban settings. Moreover, rural residents with co-occurring diabetes and psychiatric diagnoses might be less likely than either their urban counterparts or rural peers without mental health needs to obtain diabetic preventive care in accordance with standards.

Approach

This research examined patterns of diabetic preventive care use among adults with diabetes, to determine whether these patterns varied according to respondents' rural/urban residence or psychiatric status (i.e., the presence/absence of a mental health diagnosis). Specifically, we considered whether rural people with diabetes are less likely than urban peers to use diabetic preventive services; whether having a mental health diagnosis affects preventive service use among diabetics; and, whether rural/urban differences in service use vary depending on the presence or absence of a mental health diagnosis.

Data Source: Past research in this area has been limited by its almost exclusive reliance on clinical samples. Because participants recruited in clinical settings have greater access to care and

Key Findings

Rural residents with diabetes are generally less likely than their urban peers to use diabetic preventive services.

Rural residents with diabetes and mental health diagnoses used some preventive services at about the same rates as urban people with diabetes, and at higher rates than rural diabetics without mental health diagnoses.

Although rural residents with diabetes and mental health diagnoses used preventive care about as often as other groups studied, they had more diabetes complications than their rural peers without mental health diagnoses.

The health home model is a promising approach for improving diabetes care delivered to rural people with diabetes and mental health conditions, but further research is needed on the feasibility and effectiveness of rural health homes for this population.

For more information about this study, contact Jean Talbot at jatalbot@usm.maine.edu

bear a higher disease burden than the overall population, studies based on clinical samples may lack generalizability.[13] In contrast to prior studies, this investigation used nationally representative data from the 2004-2010 Medical Expenditure Panel Survey (MEPS), a national survey of community-dwelling, non-institutionalized US residents.[14] The MEPS collects detailed information on health status, health care use, demographics, and health insurance coverage. All data were self-reported.

Variables: To assess *diabetic preventive care use*, this study measured whether adults with diabetes received three diabetic preventive services recommended by the American Diabetes Association:[7] cholesterol screenings, comprehensive foot examinations, and retinal eye examinations.

Major explanatory variables were rurality and diagnosed psychiatric status. Rural/urban residence was defined based on county-level, Metropolitan Statistical Area (MSA) or non-MSA status.[15] We identified respondents as having a psychiatric diagnosis if they reported receiving any mental health or substance use diagnosis within the International Statistical Classification of Diseases—version 9 (ICD 9),[16] with the exception of developmental disorders and organically based conditions (e.g. dementias).

We included 14 *covariates* with demonstrated or hypothesized linkages to preventive care use, rurality, or diagnosed psychiatric status. Among these covariates were age, sex, race, marital status, education level, income, insurance source, travel time to usual source of care, functional limitations, comorbidities unrelated to diabetes, and both macrovascular and microvascular diabetes complications.*

Because previous studies on this topic have controlled for visit volume[8,10,17,18] we also used office-based visits with non-specialty providers as a covariate. Further, we wished to account for the facts that psychiatric diagnoses, being qualitative, do not necessarily reflect severity of mental illness, and that individuals with significant mental health problems might not be identified as suffering from psychiatric disorders. Therefore, we controlled for the probable presence or absence of serious mental illness (SMI).

To determine respondents' probable SMI status, we used their results on the Kessler-6,[19] a validated screen for SMI that is administered as part of the MEPS. We classified respondents as having a probable SMI—whether or not they carried a psychiatric diagnosis—if their Kessler-6 screen was positive.

Analyses: At the bivariate level, we conducted chi-square tests and t-tests to detect differences by residence and by psychiatric status on covariates and on measures of preventive service use. We also examined the bivariate-level interaction between rurality and psychiatric status, to determine whether rural residence relates differently to service use for those with and without mental health diagnoses. At the multivariate level, we constructed logistic regression models to examine relationships among explanatory variables, covariates, and preventive care measures.

Limitations: The study's cross-sectional design precluded examination of temporal and causal relationships, and its small sample size for the subpopulation of interest (approximately 650 rural respondents with both diabetes and a mental health diagnosis) restricted the power of its statistical analyses. In addition, all measures were self-reported, and may therefore have been less accurate than in cases where researchers were able to cross-verify responses. Finally, local workforce and healthcare resource indicators were not available in the MEPS public access file, and were therefore not included in analyses, although they may be associated with study outcomes.

Findings

Characteristics of Adults with Diabetes: Highlights

Consistent with findings from earlier rural studies,[20-23] chi-square tests showed that rural residents with diabetes had lower education levels, lower incomes, and higher rates of public insurance and uninsurance than their urban counterparts.

T-tests indicated that overall, people with diagnosed mental health conditions had, on average, 11 non-specialty, office-based medical visits per year, as compared to eight for those without such diagnoses ($p < 0.001$). Further, those with psychiatric diagnoses had higher average numbers of diabetes complications, both macrovascular (1.68 vs. 1.36, $p < 0.001$) and microvascular (0.37 vs. 0.31, $p < 0.001$). Crossed chi-square tests were conducted to compare people with and without psychiatric diagnoses in urban and in rural settings. Within the rural subgroup, respondents with psychiatric diagnoses used more visits on average (10 vs. 7, $p < 0.001$) and had higher mean numbers of macrovascular complications (1.73 vs. 1.39, $p < 0.001$).

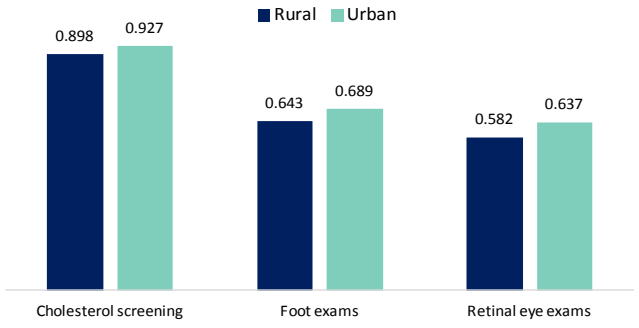
Are Rural People with Diabetes Less Likely than Urban Peers to Use Diabetic Preventive Services?

Chi-square tests revealed that, compared to their urban peers, rural people with diabetes were less

* Macrovascular conditions included: coronary heart disease, angina, heart attack/myocardial infarction, other heart disease, stroke, and hypertension. Microvascular conditions included diabetes-related kidney and eye problems.

likely to receive cholesterol screening (89.8% vs. 92.7%, $p < 0.01$), foot checks (64.3% vs. 68.9%, $p < 0.01$), and retinal eye examinations (58.2% vs. 63.6, $p < 0.001$). (See Figure 1.)

Figure 1: Receipt of Diabetic Preventive Services by Residence

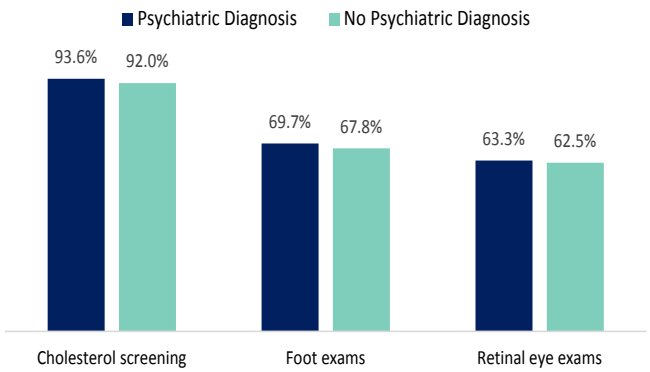


Data: Medical Panel Expenditure Survey, 2004-10
Differences significant at p<0.01

Multivariate models (see Appendix) showed that health care access barriers associated with rurality—i.e., lower education levels, lower incomes, and uninsurance—were linked with significantly reduced odds of receiving some of the services under consideration. In comparison to college graduates, those with less education had lower odds of obtaining retinal eye examinations, and those without high school diplomas had lower odds of having foot checks. Respondents with incomes less than 200% FPL and those who were uninsured were less likely than their higher income and insured counterparts to receive cholesterol screening or retinal eye examinations. The uninsured were also less likely than peers with Medicare or private insurance to obtain foot examinations.

Even after controlling for the effects of certain access barriers prevalent in rural areas, rurality was associated with reduced odds of receiving

Figure 2: Use of Preventive Services Among People with Diabetes by Psychiatric Diagnosis



Data: Medical Panel Expenditure Survey, 2004-10
Differences for cholesterol screening significant at p<0.05

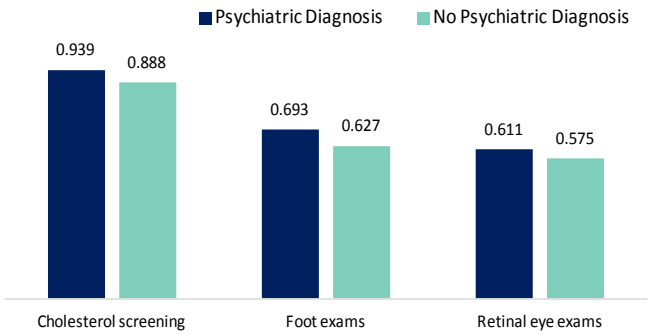
all three preventive services under consideration. Specifically, in contrast to urban counterparts, rural inhabitants with diabetes had 23% lower odds of receiving cholesterol screening, ($p < 0.05$), 20% lower odds of undergoing foot examinations ($p < 0.01$), and 22% lower odds of receiving retinal eye exams ($p < 0.01$).

Are People with Diabetes and Mental Health Diagnoses Less Likely to Use Diabetic Preventive Services than Peers without Mental Health Diagnoses?

Bivariate analyses showed that diabetic people with comorbid psychiatric diagnoses were in fact slightly more likely than those without (93.6% vs. 92.0%, $p < 0.05$) to obtain cholesterol screening, and that there were no differences between respondents with and without psychiatric diagnoses with respect to their use of foot checks or retinal eye exams (Figure 2).

In logistic regression main-effects models adjusted for the effects of covariates (Appendix), the presence or absence of a mental health diagnosis was not significantly related to any of the three preventive care measures. However, probable SMI status was associated with 32% lower odds of receiving cholesterol checks ($p < 0.05$), and 22% lower odds of undergoing retinal eye exams ($p < 0.05$).

Figure 3: Use of Preventive Services Among Rural People with Diabetes by Psychiatric Diagnosis

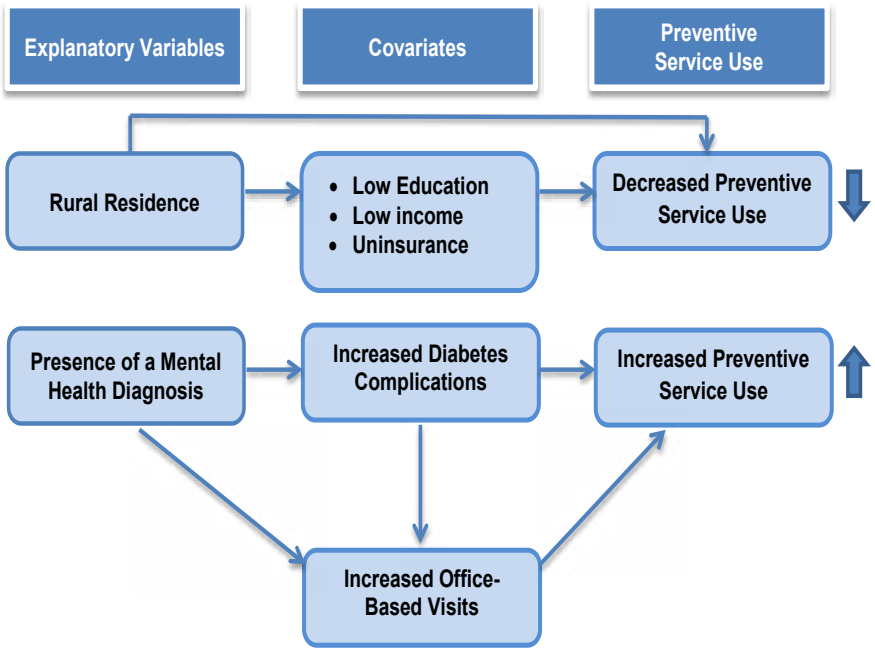


Data: Medical Panel Expenditure Survey, 2004-10
Differences for cholesterol screening and foot exams significant at p<0.05

Do Associations between the Use Of Diabetic Preventive Services and Rural/Urban Residence Vary Depending on the Presence or Absence of a Psychiatric Diagnosis?

Crossed chi-square tests indicated that among diabetic respondents without psychiatric diagnoses, rural residents were less likely than those in urban settings to receive cholesterol screening (88.8% vs. 92.9%, $p < 0.001$), foot examinations (62.7% vs. 69.0%, $p < 0.001$), and retinal eye examinations (57.5% vs. 63.7%, $p < 0.001$). On the other hand, among those with comorbid mental health

Figure 4: Relationships among Explanatory Variables, Selected Covariates, and Preventive Service Use



diagnoses, rural residents were just as likely as urban dwellers to obtain each service. Contrary to expectation, rural residence appeared linked to a decreased likelihood of receiving preventive services, but only for those *without* diagnosed mental health conditions. Moreover, among rural people with diabetes, those with psychiatric diagnoses were *more* likely than those without to receive cholesterol screening (93.9% vs. 88.8%, $p < 0.001$), and foot checks (69.3% vs. 62.7%, $p < 0.05$). (See Figure 3.) Among respondents in urban settings, however, preventive care use did not vary by psychiatric status.

Multivariate analyses (See Appendix and Figure 4) provided a possible explanation for this pattern of bivariate-level findings. On the one hand, rural residence and covariates associated with rurality (lower education, lower income, and uninsurance) were related to decreased use of preventive services. At the same time, having a mental health diagnosis was associated with increased office-based visits and diabetes complications, both of which predicted increased preventive care use. Thus, these factors might be overpowering the tendency of rural residents to use fewer services.

Discussion

This study used data from a nationally representative survey to explore how preventive service use among people with diabetes varied as a function of residence and mental health status. We anticipated that rural residence and the presence of a psychiatric diagnosis would each be related to decreased preventive care use, and further, that rural diabetics with a mental health diagnosis would be less likely to access preventive care than either their urban peers or than rural counterparts without mental health problems.

As expected, we documented rural disparities on diabetic preventive care measures and these differences persisted after controlling for characteristics known to influence use (i.e., lower education levels, incomes, and insurance coverage rates). Results regarding the relationship of mental health to preventive care use were less straightforward. We found that, across rural and urban settings, people with co-occurring diabetes and diagnosed mental health conditions did not use preventive services at lower rates than their peers without psychiatric diagnoses. However, respondents who tested positive on the Kessler-6 SMI screen (a covariate) had decreased odds of receiving two of the three preventive services assessed. Thus, rurality and SMI each appear to be risk factors for lower diabetic preventive care use, and rural diabetics with SMI, therefore, may be doubly vulnerable. This interpretation must be advanced with caution, given that 42% of respondents with positive SMI screens did not report that they carried a psychiatric diagnosis. Thus, the effect of SMI *per se* on preventive care

use may have been confounded with the impact of having an unrecognized, untreated mental illness.

In contrast to our predictions, unadjusted analyses showed that rural inhabitants with diabetes and diagnosed mental health conditions received some services at rates comparable to those seen among urban people with diabetes, and greater than those found among rural diabetics without psychiatric diagnoses. As noted above, these observations might have been attributable to the fact that certain covariates positively correlated with the presence of a psychiatric diagnosis increased the odds of preventive care use, and thus counterbalanced rural access barriers for this group. Perhaps respondents with diagnosed psychiatric disorders were more likely than those without such diagnoses to regard themselves as unwell and to seek intervention for their health problems. This tendency might have accounted for the increased frequency of their medical visits, which afforded providers more opportunities to provide recommended preventive care. In addition, their higher levels of diabetes complications might have made them the focus of heightened clinical attention and prompted their providers to monitor them more closely.

Even though rural diabetics with diagnosed mental health problems showed higher rates of preventive care use than those without psychiatric diagnoses, they nonetheless experienced higher levels of diabetes complications. Although the cross-sectional design of this study precludes definitive conclusions as to the reasons underlying these observed health disparities, several explanations are possible. Perhaps rural respondents with psychiatric diagnoses received preventive services at elevated levels from the onset of their diabetes, but experienced worse outcomes because they were physiologically more vulnerable than those without diagnosed mental health conditions. Alternatively, perhaps clinical data from screening were not effectively used to inform a comprehensive program of disease management that addressed the special challenges to self-care associated with mental health problems. Finally, it is possible that rural study participants with psychiatric diagnoses failed to obtain preventive care early in the course of their diabetes, and began to receive services at increased rates only *after* their disease had clearly worsened.

Implications for Future Research and Policy

Although rural inhabitants with diabetes and psychiatric diagnoses used preventive care services about as frequently as other groups studied, they suffered more diabetes-related illness. To fully understand the reason for this finding, it will be important to conduct longitudinal research, in which people with and without psychiatric diagnoses are followed over time, beginning with the identification of their diabetes.

Regardless of the reasons why rural people with diabetes and psychiatric comorbidities experience more complications, integrated primary care delivery programs, or health homes, may help to improve their health status. Health homes, which offer disease management, comprehensive care coordination, and mental health services in primary care settings, have been shown to improve health outcomes for complex patients with comorbid chronic disease and mental illness.[24,25]

In light of this evidence base, the Affordable Care Act (ACA) introduced incentives to promote the development of health homes for vulnerable Medicaid and Medicare enrollees, including those with diabetes and mental health needs. Rural health researchers have commented that workforce and infrastructure limitations may complicate the implementation of integrated care approaches in rural settings.[26,27] Nevertheless, some states with significant rural constituencies (e.g., Maine and Missouri) are using support available through the ACA to develop health homes for segments of their Medicaid populations, including those with SMI.[28,29]

In addition to offering potential benefits to their own enrollees, initiatives like these can generate valuable information for other rural health systems hoping to reduce health disparities for their diabetic patients with mental health issues. Evaluations of these programs could clarify how best to adapt the health home model to conform to specific rural needs and resource constraints. Evaluations could also be designed to show whether rural individuals with comorbid diabetes and mental illness actually achieve better outcomes in health homes than in traditional rural delivery systems. In addressing this general question, it may be especially helpful to incorporate patient-centered outcome measures to ascertain whether diabetic, mentally ill patients in each type of rural system receive self-management support appropriately tailored to their needs.

Endnotes

1. Centers for Disease Control and Prevention (CDC). *Mental Health and Chronic Diseases: Issue Brief #2*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention;2012.
2. Kessler RC, Chiu WT, Demler O, Merikangas KR, Walters EE. Prevalence, Severity, and Comorbidity of 12-Month DSM-IV Disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry*. 2005;62(6):617-627.
3. Golden SH, Williams JE, Ford DE, et al. Depressive Symptoms and the Risk of Type 2 Diabetes: The Atherosclerosis Risk in Communities Study. *Diabetes Care*. 2004;27(2):429-435.
4. Lin EH, Korff MV, Alonso J, et al. Mental Disorders among Persons with Diabetes—Results from the World Mental Health Surveys. *J Psychosom Res*. Dec 2008;65(6):571-580.
5. Simon GE, Katon WJ, Lin EH, et al. Diabetes Complications and Depression as Predictors of Health Service Costs. *Gen Hosp Psychiatry*. Sep-Oct 2005;27(5):344-351.
6. Zhang X, Norris SL, Gregg EW, Cheng YJ, Beckles G, Kahn HS. Depressive Symptoms and Mortality among Persons with and without Diabetes. *Am J Epidemiol*. Apr 1 2005;161(7):652-660.
7. American Diabetes Association. Standards of Medical Care in Diabetes--2013. *Diabetes Care*. Jan 2013;36 Suppl 1:S11-66.
8. Desai MM, Rosenheck RA, Druss BG, Perlin JB. Mental Disorders and Quality of Diabetes Care in the Veterans Health Administration. *Am J Psychiatry*. 2002;159(9):1584-1590.
9. Druss BG, Zhao L, Cummings JR, Shim RS, Rust GS, Marcus SC. Mental Comorbidity and Quality of Diabetes Care under Medicaid: A 50-State Analysis. *Med Care*. 2012;50(5):428-433.
10. Jones CA, Parker TS, Ahearn M, Mishra AK, Variyan JN. *Health Status and Health Care Access of Farm and Rural Populations: Economic Information Bulletin Number 57*. Washington, DC: United States Department of Agriculture Economic Research Service;2009.
11. O'Connor A, Wellenius G. Rural-Urban Disparities in the Prevalence of Diabetes and Coronary Heart Disease. *Public Health*. 2012;126(10):813-820.
12. Seshamani M, Van Nostrand J, Kennedy J, Cochran C. *Hard Times in the Heartland: Health Care in Rural America*. Rockville, MD: Office of Rural Health Policy;2009.
13. Druss BG, Zhao L, Von Esenwein S, Morrato EH, Marcus SC. Understanding Excess Mortality in Persons with Mental Illness: 17-Year Follow up of a Nationally Representative US Survey. *Med Care.* 2011;49(6):599-604.
14. Agency for Healthcare Research and Quality. *Medical Expenditure Panel Survey* (MEPS). n.d. Available at: http://meps.arhq.gov/mepsweb. Accessed May 1, 2013.
15. Office of Management and Budget. 2010 Standards for Delineating Metropolitan and Micropolitan Statistical Areas. *Fed Regist*. 2010;75 37246-37252.
16. National Center for Health Statistics. *International Classification of Diseases,Ninth Revision, Clinical Modification* (ICD-9-CM). 2011. Available at: http://www.cdc.gov/nchs/icd/icd9cm.htm#ftp. Accessed August 28, 2013.
17. Frayne SM, Halanych JH, Miller DR, et al. Disparities in Diabetes Care: Impact of Mental Illness. *Arch Intern Med*. Dec 12-26 2005;165(22):2631-2638.
18. Leung GY, Zhang J, Lin WC, Clark RE. Behavioral Health Disorders and Adherence to Measures of Diabetes Care Quality. *Am J Manag Care*. 2011;17(2):144-150.
19. Kessler RC, Green JG, Gruber MJ, et al. Screening for Serious Mental Illness in the General Population with the K6 Screening Scale: Results from the WHO World Mental Health (WMH) Survey Initiative. *Int J Methods Psychiatr Res.* Jun 2010;19 Suppl 1:4-22.
20. Mohatt DF, Bradley MM, Adams SJ, Morris CD. Rural America Today. In: Mohatt D, Bradley MM, Adams SJ, Morris CD, eds. *Mental Health and Rural America: 1994-2005. An Overview and Annotated Bibliography.* Washington, DC: US Department of Health and Human Services, Health Resources and Services Administration, Office of Rural Health Policy; 2005:1-19.

21. Housing Assistance Council. *Poverty in Rural America*. [Rural Research Note]. 2012. Available at: http://www.ruralhome.org/storage/research_notes/rrn_poverty.pdf. Accessed December 14, 2013.
22. Lenardson JD, Ziller EC, Coburn AF, Anderson NJ. *Profile of Rural Health Insurance Coverage: A Chartbook*. Portland, ME: University of Southern Maine, Muskie School of Public Service, Maine Rural Health Research Center;2009.
23. Ziller EC, Coburn AF. *Rural Coverage Gaps Decline Following Public Health Insurance Expansions*. Portland, ME: University of Southern Maine, Maine Rural Heath Research Center; February, 2009. Research & Policy Brief.
24. Butler M, Kane RL, McAlpine D, et al. *Integration of Mental Health/Substance Abuse and Primary Care*. Rockville, MD: Agency for Health Research and Quality;2008. Evidence Report/Technology Assessment Number 173.
25. Hunkeler EM, Katon W, Tang L, et al. Long Term Outcomes from the Impact Randomised Trial for Depressed Elderly Patients in Primary Care. *BMJ*. Feb 4 2006;332(7536):259-263.
26. Hauenstein EJ. Building the Rural Mental Health System: From De Facto System to Quality Care. *Annu Rev Nurs Res.* 2008;26:143-173.
27. Semansky R, Willging C, Ley DJ, Rylko-Bauer B. Lost in the Rush to National Reform: Recommendations to Improve Impact on Behavioral Health Providers in Rural Areas. *J Health Care Poor Underserved*. May 2012;23(2):842-856.
28. State Innovation Model (SIM) Steering Committee. Maine State Innovation Model (SIM) Summary. 2013. Available at: http://www.maine.gov/dhhs/oms/sim/steering/index.shtml. Accessed September 3, 2013.
29. Commonwealth Fund. Missouri: Pioneering Integrated Mental and Medical Health Care in Community Mental Health Centers. *States in Action Archive*. 2011. Available at: http://www.commonwealthfund.org/Newsletters/States-in-Action/2011/Jan/December-2010-January-2011/Snapshots/Missouri.aspx. Accessed January 29, 2013.

Appendix. Adjusted Odds of Using Selected Preventive Health Services among Adults with Diabetes†

	Cholesterol Check		Foot Check		Retinal Eye Exam	
	OR	95% CI	OR	95% CI	OR	95% CI
Characteristic (Referent)						
Residence (Urban)	0.77*	0.60-1.00	0.80**	0.69-0.93	0.80**	0.69-0.92
Psychiatric status (No diagnosis)	1.20	0.94-1.53	0.98	0.85-1.13	1.01	0.88-1.16
Age (18-34)						
35-64	3.13***	2.14-4.58	1.44*	1.06-1.94	1.32	0.97-1.79
>=65	4.90***	2.89-8.32	1.18	0.82-1.70	2.37***	1.64-3.44
Sex (Male)	0.83	0.68-1.01	0.92	0.82-1.03	1.08	0.96-1.21
Race (White, non-Hispanic)						
Hispanic, any race	1.08	0.81-1.44	0.85	0.72-1.00	0.79**	0.69-0.91
Non-White, non-Hispanic	1.35*	1.04-1.75	0.98	0.84-1.13	0.91	0.79-1.04
Marital status (Married)	0.92	0.74-1.13	1.05	0.92-1.20	0.85**	0.76-0.95
Education (College or above)						
Less than high school or GED	0.73	0.54-1.00	0.81*	0.67-0.97	0.67***	0.57-0.80
High school	0.86	0.64-1.15	0.87	0.73-1.02	0.82**	0.71-0.94
Income (>=200% FPL)						
< 100% FPL	0.77**	0.60-0.99	0.86	0.72-1.02	0.75***	0.64-0.87
100-199% FPL	0.69*	0.53-0.90	0.88	0.77-1.01	0.87*	0.76-0.99
Insurance source (Uninsured)						
Public only, non-Medicare	2.04***	1.39-3.00	1.17	0.92-1.49	2.01***	1.61-2.51
Any Medicare	1.78**	1.18-2.61	1.65***	1.27-2.15	1.50**	1.17-1.92
Private only	2.33***	1.69-3.21	1.31*	1.07-1.60	1.67***	1.39-2.01
Time to usual source of care (<=30 min.)	0.90	0.69-1.19	1.19	1.00-1.41	1.04	0.90-1.21
Functional limitations (No)	1.03	0.79-1.32	0.97	0.85-1.11	0.92	0.80-1.05
Probable Serious Mental Illness (None)	0.68*	0.49-0.93	0.96	0.80-1.16	0.78**	0.66-0.92
Comorbidities unrelated to diabetes (No comorbidities)						
Any non-cancer comorbidity	1.25	0.94-1.65	0.92	0.81-1.04	1.09	0.97-1.23
Any cancer	1.51	0.97-2.35	0.93	0.77-1.13	1.22	0.99-1.49
Office-based visits with MDs, PAs, nurses, and NPs	1.09***	1.05-1.12	1.02***	1.01-1.03	1.03***	1.01-1.04
Macrovascular complications	1.34***	1.21-1.49	1.03	0.98-1.08	0.99	0.94-1.04
Microvascular complications	1.00	0.83-1.19	1.29***	1.17-1.42	1.37***	1.22-1.52
	N	10,383	N	10,322	N	10,449
	Df	23	Df	23	Df	23
	-2LogL	39254352	-2LogL	113739703	-2LogL	118211036

†Data: Medical Expenditure Panel Survey, 2004-2010

*p < 0.05, **p < 0.01, ***p < 0.001