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## Health Professional Shortage Areas, Insurance Status, and Cardiovascular Disease Prevention in the Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study

**Dr. Todd M. Brown, MD, MSPH,**

Assistant Professor of Medicine in the University of Alabama at Birmingham (UAB) Division of Cardiovascular Diseases, LHRB 313, 701 19<sup>th</sup> Street South, Birmingham, AL 35294, 205-934-9630

**Dr. Gaurav Parmar, MD, MPH,**

Clinical Data Base Manager in the UAB Department of Surgery

**Dr. Raegan W. Durant, MD, MPH,**

Assistant Professor of Medicine in the UAB Division of Preventive Medicine

**Dr. Jewell H. Halanych, MD, MPH,**

Assistant Professor of Medicine in the UAB Division of Preventive Medicine

**Mrs Martha Hovater, MS,**

Statistician in the UAB Department of Biostatistics

**Dr. Paul Muntner, PhD,**

Professor of Public Health in the UAB Department of Epidemiology

**Dr. Ronald J. Prineas, MD, PhD,**

Professor Emeritus of Public Health Sciences in the Wake Forest University School of Medicine

**Dr. David L. Roth, PhD,**

Professor of Public Health in the UAB Department of Biostatistics

**Dr. Tandaw E. Samdarshi, MD, MPH, and**

Assistant Professor of Medicine at the University of Mississippi Medical Center in Jackson

**Dr. Monika M. Safford, MD**

Associate Professor of Medicine in the UAB Division of Preventive Medicine

Todd M. Brown: [tmbrown@uab.edu](mailto:tmbrown@uab.edu)

### Abstract

Individuals with cardiovascular disease (CVD) living in Health Professional Shortage Areas (HPSA) may receive less preventive care than others. The Reasons for Geographic And Racial Differences in Stroke Study (REGARDS) surveyed 30,221 African American (AA) and White individuals older than 45 years of age between 2003–2007. We compared medication use for CVD prevention by HPSA and insurance status, adjusting for sociodemographic factors, health behaviors, and health status. Individuals residing in partial HPSA counties were excluded. Mean age was 64±9 years, 42% were AA, 55% were women, and 93% had health insurance; 2,545 resided in 340 complete HPSA counties and 17,427 in 1,145 non-HPSA counties. Aspirin, beta-blocker, and ACE-inhibitor use were similar by HPSA and insurance status. Compared with insured individuals living in non-HPSA counties, statin use was lower among uninsured

participants living in non-HPSA and HPSA counties. Less medication use for CVD prevention was not associated with HPSA status, but less statin use was associated with lack of insurance.

## Keywords

Health Professional Shortage Areas; cardiovascular disease; prevention; insurance status

Mortality from cardiovascular disease (CVD) in the U.S. has declined over the last several decades.<sup>1,2</sup> A large percentage of this decline may be attributed to reductions in risk factor levels as well as improved therapies for secondary prevention in individuals with established CVD.<sup>2</sup> However, individuals with CVD who live in areas with limited access to primary care services may not be able to take full advantage of CVD preventive care. Consistent with this hypothesis, individuals in these areas are reported to have lower health status and increased mortality.<sup>3-8</sup>

In an attempt to improve access to primary care physicians in geographic areas or in population groups that lack sufficient access to primary care services, the Health Resource Services Administration (HRSA) designates geographic areas and population groups with insufficient access to primary care services as Health Professional Shortage Areas (HPSAs).<sup>9</sup> This designation results in the prioritization of physician placement in the National Health Services Corps and additional Medicare reimbursement in an attempt to increase the number of primary care providers in these areas.<sup>9,10</sup> A HPSA can consist of an urban or rural geographic area, a population group, or a public or non-profit private medical facility. In order for a geographic area to obtain this HPSA designation, it must demonstrate that it: (1) is a rational area for the delivery of primary care services, (2) has a population to primary care provider ratio greater than 3500:1 or greater than 3000:1 with increased primary care needs, and (3) has insufficient access to primary care in neighboring areas.<sup>9</sup>

There is well described geographic variation in the delivery of CVD-related services, including preventive care, in the U.S.<sup>11-16</sup> However, these studies have not examined how residence in a federally-designated primary care HPSA affects CVD-related care. We examined the use of medications for CVD prevention by HPSA classification among individuals with CVD or diabetes, a coronary artery disease risk equivalent, in the the REasons for Geographic And Racial Differences in Stroke (REGARDS) study, a nationwide, community-based cohort of 30,221 White and African American (AA) men and women. We hypothesized that REGARDS participants living in HPSA designated areas would be less likely to receive medications for CVD prevention than those living in non-HPSA areas.

## Methods

### Study population

The REGARDS study has been described in detail previously.<sup>17</sup> Briefly, REGARDS is a prospective study of 30,221 community-dwelling individuals recruited between 2003 and 2007. By design, the cohort is 42% AA and 55% female. Because the primary goals of REGARDS are to elucidate regional and racial differences in stroke, the Stroke Belt, located in the southeastern U.S., was over-sampled such that 20% of the overall cohort was selected from the so-called buckle of the Stroke Belt (the coastal plain region of North Carolina, South Carolina, and Georgia); 30% from the rest of the Stroke Belt (the remaining parts of North Carolina, South Carolina, and Georgia plus Alabama, Mississippi, Louisiana, Arkansas, and Tennessee); and 50% from the remaining 40 contiguous states. Individuals were identified from commercially available lists and contacted by mail and telephone.

Upon enrollment, participants underwent a computer-assisted telephone interview followed by an in-home examination. During the telephone interview, demographic and self-reported medical information was obtained, including insurance status. During the in-home examination, the participant's blood pressure was measured, blood samples were collected, and a medication inventory was obtained.

### **HPSA classification**

Using data from HRSA,<sup>9</sup> we classified counties as complete, partial, or non-HPSA counties. We classified a county as a complete HPSA county if the entire county had the HPSA designation, a non-HPSA county if none of the county had the HPSA designation, and a partial HPSA county if only portions of the county had the HPSA designation. Partial HPSA status occurs when an entity such as a health care facility obtains HPSA status, but the county as a whole does not or some, but not all, census tracts are declared geographic HPSAs within that county. Similar to previous researchers,<sup>5,7</sup> we excluded participants living in partial HPSA counties since results are difficult to interpret. This resulted in a final sample of 19,972 REGARDS participants.

### **Cardiovascular disease prevention**

Based on national guidelines,<sup>18,19</sup> we examined the use of aspirin, beta-blockers, angiotensin converting enzyme inhibitors (ACEI) or angiotensin receptor blockers, statins, and warfarin at baseline in REGARDS by HPSA classification for the clinical indications defined in Table 1. We defined baseline prevalent CVD as a self-reported history of myocardial infarction, stroke, coronary artery bypass surgery, percutaneous coronary intervention, carotid artery surgery or stenting, or surgery for peripheral arterial disease or abdominal aortic aneurysm. Diabetes was defined as a self-reported history of diabetes or the use of medications for the treatment of diabetes. Hypertension was defined as a self-reported history of hypertension or high blood pressure or the use of medications to treat high blood pressure. Chronic kidney disease was defined as an estimated glomerular filtration rate of  $<60$  mL/min/1.73m<sup>2</sup> as assessed by the Modification of Diet in Renal Disease equation<sup>20</sup> or being on dialysis. We lacked sufficient data on indications and contraindications for anticoagulation in individuals with a self-reported history of atrial fibrillation, thus, for this analysis, we considered all individuals with a self-reported history of atrial fibrillation as being eligible for warfarin anticoagulation.

### **Definition of covariates**

In order to estimate the amount of poverty within each county, we used data from the U.S. Census Bureau. These data provide estimates of the proportion of individuals living below the poverty within each county in the United States.<sup>21</sup> Medication adherence was defined using the four-item Morisky scale where a *yes* answer to any question was categorized as non-adherent.<sup>22</sup> Functional status was assessed by the physical component summary score of the Short Form-12.<sup>23</sup> The presence of depressive symptoms was defined as a score of  $>4$  on the Centers for Epidemiologic Study Depressive Scale.<sup>24</sup>

### **Statistical analysis**

We analyzed the cross-sectional association between county-level HPSA designation and the use of medications for CVD prevention at the baseline REGARDS study visit. We analyzed variations in socio-demographic characteristics (age, race, gender, education, income, and the proportion of the county population below poverty), health behaviors (medication adherence), and health status (functional capacity and depressive symptoms) by HPSA designation using analysis of variance for continuous variables and chi-squared for categorical data. Then, we constructed separate multivariable logistic regression models for

each indication in Table 1 for individuals living in complete HPSA counties compared with those living in non-HPSA counties, adjusting for socio-demographic characteristics, health behaviors, health status, and insurance status. Because we were interested in how insurance status might modify the relationship between HPSA designation and the use of medications for CVD prevention, we conducted an additional series of analyses by dividing participants into four groups: (1) insured individuals who lived in non-HPSA counties (Insured/non-HPSA), (2) insured individuals who lived in complete HPSA counties (Insured/HPSA), (3) uninsured individuals who lived in non-HPSA counties (Uninsured/non-HPSA), and (4) uninsured individuals who lived in complete HPSA counties (Uninsured/HPSA). To compare the odds of receiving each medication for CVD prevention at baseline by HPSA and insurance status we performed multivariable logistic regression using the Insured/non-HPSA participants as the referent group, adjusting for socio-demographic characteristics, health behaviors, and health status.

## Results

Overall, 340 of 842 (40.4%) complete HPSA counties and 1,145 of 1,792 (63.9%) non-HPSA counties in the U.S. were represented in this analysis. Of the 19,972 REGARDS participants included in the current analysis, 16,323 (81.7%) were classified as Insured/non-HPSA, 2,319 (11.6%) as Insured/HPSA, 1,104 (5.5%) as Uninsured/non-HPSA, and 226 (1.1%) as Uninsured/HPSA.

The mean age of our participants was 64±9 years. Overall, 42% were AA, 55% were women, and 93% had health insurance. Insured individuals were older, more likely to be White and male, more educated, had higher incomes, and had higher medication adherence than their uninsured counterparts (Table 2). Individuals living in complete HPSA counties were more often White, less educated, had lower incomes, and lived in counties with a higher proportion of poverty than individuals living in non-HPSA counties.

The use of aspirin, beta-blockers, and ACEI or angiotensin receptor blockers did not vary by insurance status or HPSA classification (Table 2). However, uninsured individuals were less often taking statins or warfarin than their insured counterparts.

In multivariable analyses, the odds of medication use did not differ according to HPSA status; aspirin (adjusted odds ratio 1.15 {95% confidence interval 0.78–1.72}), beta blocker (1.03 {0.74–1.43}), ACEI or angiotensin receptor blocker (1.07 {0.90–1.28}), statin (0.98 {0.82–1.17}), and warfarin (1.16 {0.73–1.82}) use was similar for residents of complete HPSA and non-HPSA counties. However, compared with insured participants living in non-HPSA counties, the uninsured, regardless of the HPSA status of their county of residence, had lower odds for the use of statins after adjustment for socio-demographic characteristics, health behaviors, and health status (Table 3). Compared with insured/non-HPSA county residents, the odds for use of statins was 26% lower for the uninsured living in non-HPSA counties and 46% lower for uninsured residents of HPSA counties. There were too few uninsured participants living in HPSA counties with a self-reported history of atrial fibrillation to conduct multivariable analyses on warfarin use.

## Discussion

Numerous previous studies have described significant geographic variation in the provision of CVD-related services, including preventive care.<sup>11–16</sup> However, to our knowledge, the role of HPSA status in regional variations in CVD preventive services has not been reported. We demonstrated that lack of access to primary care as defined by HPSA classification alone was not associated with a decreased use of medications for CVD secondary prevention

among REGARDS participants. However, uninsured participants were less likely to receive statins or warfarin than their insured counterparts. Descriptively, these insurance status effects were strongest among those living in complete HPSA counties. These results suggest that living in HPSA counties alone is not a barrier to obtaining CVD preventive medications as long as insurance coverage is available. However, the lack of insurance, especially for those living in complete HPSA counties, was associated with a decreased likelihood of treatment with statins and warfarin. These findings support the importance of insurance coverage in assuring that proven preventive services are received by all individuals at risk, and also suggest that the uninsured living in complete HPSA counties are particularly vulnerable.

Previous studies have reported an association between HPSA designations and decreased health status.<sup>5,7</sup> The results of our study suggest that this association may not be mediated by variations in CVD preventive services, as there was no association between HPSA status and decreased use of medications for CVD prevention. The HPSA designation is intended to motivate physicians to practice in areas with insufficient primary care physicians. Therefore, one interpretation of our findings is that this designation has been successful in improving access to primary care. However, it is also possible that the current HPSA designation may not be reliably identifying those most in need of preventive care services. This possibility is supported by the fact that HPSA designation is only granted after a somewhat complex application process; concerns have been voiced that some areas at great need may not be able to apply for the designation successfully.<sup>25,26</sup> Therefore, our results may have underestimated the degree to which lack of access to primary care services affects the use of medications for CVD prevention. Additional research is required to understand which of these possibilities is most likely.

There are significant implications for the observed lower use of statins. Among individuals with CVD risk factors who do not have a history of coronary heart disease, statin use is associated with reductions in all-cause mortality (OR 0.88 {95% CI 0.81–0.96}), major coronary events (OR 0.70 {0.61–0.81}), and major cerebrovascular events (OR 0.81 {0.71–0.93}).<sup>27</sup> The benefit in those with a history of coronary heart disease is even greater. In these individuals, statin therapy is associated with a 16% reduction in all-cause mortality (RR 0.84 {0.79–0.89}) and a 25% reduction in coronary heart disease mortality or non-fatal myocardial infarction (RR 0.75 {CI 0.71–0.79}).<sup>28</sup> The lower use of these medications among uninsured individuals, particularly those living in complete HPSA counties, places them at increased CVD risk.

As with the use of statins, we observed a significantly lower use of warfarin in the uninsured, particularly among those living in complete HPSA counties. These findings were limited by the small numbers of participants living in complete HPSA counties with atrial fibrillation, and should be confirmed in larger samples. Additionally, we are unable to adequately access each participant's indications and contraindications to the use of warfarin beyond their self-reported history of atrial fibrillation, although we do not suspect that these indications or contraindications vary by HPSA classification. It is possible that although warfarin is available as a generic and is relatively inexpensive, the additional monitoring and follow-up that is required may be a significant barrier to the use of warfarin in the uninsured, particularly among those living in complete HPSA counties who also may have difficulty accessing primary care physicians. While additional monitoring for statin therapy is not as cumbersome as for warfarin, we note that simvastatin only became generic in 2006, near the end of our study period, whereas the other drugs studied were available in generic form at the time of our study. Although our study was not designed directly to assess reasons for the utilization patterns we observed, it is possible that the additional monitoring required for warfarin therapy and to some extent statin therapy as well as the additional expense of

statins may have been reflected in their lower utilization among the uninsured, particularly among those living in complete HPSA counties.

Our study has a number of additional limitations. Although REGARDS involves a nationwide community-based cohort, it may not be representative of the entire U.S. population. REGARDS includes a relatively older population of Whites and African Americans with a mean age of approximately 65 years, and >90% of the participants had some form of health insurance. In complete HPSA counties, 91% of our participants had some form of health insurance, which is greater than what has been estimated in other studies, where as many as 18% of individuals living in HPSA designated areas are uninsured.<sup>5</sup> Extrapolation to younger individuals or those of other ethnicities may not be appropriate. Additionally, the HPSA designation changes over time. In this analysis, we were unable to examine how changes in a county's HPSA designation or the length of time that a county had the HPSA designation might change our findings. We also lack sufficient data on indications and contraindications for the use of warfarin for stroke prevention in atrial fibrillation. The lack of these data may bias our findings. In this study, we only examined a narrow range of primary care services for CVD prevention. Other primary care services may not have similar findings. Last, we are unable to determine how the increased availability of simvastatin as a generic after 2006 would change our findings.

In conclusion, we observed a lower use of statins and warfarin among uninsured REGARDS participants, an effect that was more pronounced among those residing in complete HPSA counties, as compared to insured participants. These findings suggest that uninsured individuals who live in areas with decreased geographic access to primary care services are particularly vulnerable to CVD events. Whether recent health care reforms will remedy this disparity remains to be seen.

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## References

1. Lloyd-Jones D, Adams RJ, Brown TM, et al. Heart disease and stroke statistics—2010 update: a report from the American Heart Association. *Circulation*. 2010; 121(12):e1–e170. [PubMed: 20048228]
2. Ford ES, Ajani UA, Croft JB, et al. Explaining the decrease in U.S. deaths from coronary disease, 1980–2000. *N Engl J Med*. 2007; 356(23):2388–2398. [PubMed: 17554120]
3. Gold R, DeVoe J, Shah A, et al. Insurance continuity and receipt of diabetes preventive care in a network of federally qualified health centers. *Med Care*. 2009; 47(4):431–439. [PubMed: 19330890]
4. Hoffman C, Paradise J. Health insurance and access to health care in the United States. *Ann N Y Acad Sci*. 2008; 1136:149–160. [PubMed: 17954671]
5. Liu J. Health professional shortage and health status and health care access. *J Health Care Poor Underserved*. 2007; 18(3):590–598. [PubMed: 17675715]

6. Asch SM, Sloss EM, Hogan C, et al. Measuring underuse of necessary care among elderly Medicare beneficiaries using inpatient and outpatient claims. *JAMA*. 2000; 284(18):2325–2333. [PubMed: 11066182]
7. Kohrs FP, Mainous AG. The relationship of health professional shortage areas to health status. Implications for health and manpower policy. *Arch Fam Med*. 1995; 4(8):681–685. [PubMed: 7620597]
8. Wilper AP, Woolhandler S, Lasser KE, et al. Health insurance and mortality in US adults. *Am J Public Health*. 2009; 99(12):2289–2295. [PubMed: 19762659]
9. US Department of Health and Human Services Health Resources and Services Administration. [Accessed June 12, 2011] Shortage Designation: Health Professional Shortage Areas (HPSAs). Available at <http://bhpr.hrsa.gov/shortage/hpsas/designationcriteria/designationcriteria.html>
10. Chan L, Hart LG, Ricketts TC, et al. An analysis of Medicare's incentive payment program for physicians in Health Professional Shortage Areas. *J Rural Health*. 2004; 20(2):109–117. [PubMed: 15085623]
11. Garg PP, Landrum MB, Normand SL, et al. Understanding individual and small area variation in the underuse of coronary angiography following acute myocardial infarction. *Med Care*. 2002; 40(7):614–626. [PubMed: 12142777]
12. Krumholz HM, Chen J, Rathore SS, et al. Regional variation in the treatment and outcomes of myocardial infarction: Investigating New England's advantage. *Am Heart J*. 2003; 146(2):242–249. [PubMed: 12891191]
13. Mukherjee D, Wainess RM, Dimick JB, et al. Variation in outcomes after percutaneous coronary intervention in the United States and predictors of periprocedural mortality. *Cardiology*. 2005; 103(3):143–147. [PubMed: 15722631]
14. O'Connor GT, Quinton HB, Traven ND, et al. Geographic variation in the treatment of acute myocardial infarction: The Cooperative Cardiovascular Project. *JAMA*. 1999; 281(7):627–633. [PubMed: 10029124]
15. Kumar A, Fonarow GC, Eagle KA, et al. Regional and practice variation in adherence to guideline recommendations for secondary and primary prevention among outpatients with atherosclerosis or risk factors in the United States: A report from the REACH registry. *Crit Pathways in Cardiol*. 2009; 8(3):104–111.
16. Pambianco G, Lombardero M, Bittner V, et al. Control of lipids at baseline in the Bypass Angioplasty Revascularization Investigation 2 Diabetes (BARI 2D) trial. *Prev Cardiol*. 2009; 12(1):9–18. [PubMed: 19301686]
17. Howard VJ, Cushman M, Pulley LV, et al. The reasons for geographic and racial differences in stroke study: objectives and design. *Neuroepidemiology*. 2005; 25(3):135–143. [PubMed: 15990444]
18. Smith SC, Allen J, Blair SN, et al. AHA/ACC guidelines for secondary prevention for patients with coronary and other atherosclerotic vascular disease: 2006 update. *J Am Coll Cardiol*. 2006; 47(10):2130–2139. [PubMed: 16697342]
19. Fuster V, Rydén LE, Cannom DS, et al. ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Revise the 2001 Guidelines for the Management of Patients With Atrial Fibrillation). *J Am Coll Cardiol*. 2006; 48(4):e149–246.
20. Levey AS, Bosch JP, Lewis JB, Greene T, Rogers N, Roth D. for the Modification in Renal Disease Study Group. A more accurate method to estimate glomerular filtration rate from serum creatinine: A new prediction equation. *Ann Intern Med*. 1999; 130:461–470. [PubMed: 10075613]
21. U.S. Census Bureau. [Accessed June 12, 2011] Small area income and poverty estimates. Available at <http://www.census.gov/did/www/saife/methods/statecounty/20062009county.html>
22. Morisky DE, Green LW, Levine DM. Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care*. 1986; 24(1):67–74. [PubMed: 3945130]
23. Ware J, Kosinski M, Keller SD. A 12-Item Short-Form health survey: construction of scales and preliminary tests of reliability and validity. *Med Care*. 1996; 34(3):220–233. [PubMed: 8628042]

24. Radloff LS. The CES-D scale: A self report depression scale for research in the general population. *Applied Psychological Measurement*. 1977; 1(3):385–401.
25. GAO US Government Accountability Office. *Health Professional Shortage Areas*. Washington DC: United States Government Accountability Office; 2006. report
26. Ricketts TC, Goldsmith LJ, Holmes GM, et al. Designating places and populations as medically underserved: A proposal for a new approach. *Journal of Healthcare for the Poor and Underserved*. 2007; 18:567–589.
27. Brugs JJ, Yetgin T, Hoeks SE, et al. The benefits of statins in people without established cardiovascular disease but with cardiovascular risk factors: meta-analysis of randomized controlled trials. *BMJ*. 2009 Jun 30.338:b2376.10.1136/bmj.b2376 [PubMed: 19567909]
28. Wilt TJ, Bloomfield HE, MacDonald R, et al. Effectiveness of statin therapy in adults with coronary heart disease. *Arch Int Med*. 2004; 164(13):1427–1436. [PubMed: 15249352]



**Table 1****Clinical Indications for the use of Medications for Cardiovascular Disease Prevention Included in this Analysis**

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1	Aspirin or clopidogrel use in those with cardiovascular disease
2	Beta-blocker use in those with a self-reported history of myocardial infarction
3	ACE-I or ARB use in those with either a) diabetes or b) cardiovascular disease and either HTN or CKD
4	Statin use in those with a) cardiovascular disease or diabetes and b) LDL-C >100 mg/dL
5	Warfarin use in those with a self-reported history of atrial fibrillation

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ACE-I = ace inhibitor, ARB = angiotensin receptor blocker, CKD = chronic kidney disease, HTN = hypertension, LDL-C = low density lipoprotein cholesterol

Cardiovascular disease defined as a self-reported history of myocardial infarction, stroke, coronary artery bypass surgery, percutaneous coronary intervention, carotid artery surgery or stenting, or surgery for peripheral arterial disease or abdominal aortic aneurysm.

Table 2

Demographic Characteristics and Use of Medications for Cardiovascular Disease Prevention by Insurance Status and HPSA Classification at Baseline in the REasons for Geographic And Racial Differences in Stroke (REGARDS) Study, 2003–2007

	Insured/non-HPSA (n=16,323)	Insured/HPSA (n=2,319)	Uninsured/non-HPSA (n=1,104)	Uninsured/HPSA (n=226)	P
Age (years)	65±9	64±9	58±7	58±7	<0.01
African American (%)	35	33	59	49	<0.01
Female (%)	54	53	62	62	<0.01
Education (%)					
<High school	12	16	19	22	<0.01
High school	25	28	34	42	
Some college	27	23	29	27	
College +	36	32	19	9	
Annual Income (%)					
<\$25,000	29	34	60	68	<0.01
\$25–50,000	35	37	28	26	
>\$50,000	37	29	11	5	
County Percent Poverty	15±5	22±7	17±6	23±7	<0.01
Medication Adherence (%)	65	68	59	60	<0.01
SF-12 PCS	46±11	45±11	46±11	45±11	<0.01
CESD Score	1±2	1±2	2±3	3±3	<0.01
CVD Prevention Medications* (%)					
Aspirin	92	92	90	88	NS
Beta-Blockers	56	56	60	54	NS
ACE-I/ARB	61	61	56	57	NS
Statins	70	68	57	52	<0.01
Warfarin	24	24	11	4	<0.01

ACE-I = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blocker; CESD = Centers for Epidemiology Study Depression; HPSA = Health Professional Shortage Area; PCS = Physical Component Score; SF-12 = Short Form-12

\* Among those with a qualifying condition as defined in Table 1.

**Table 3**  
Adjusted Odds Ratios\* and 95% Confidence Intervals for Use of Medications for Cardiovascular Disease Prevention\*\* by Insurance Status and HPSA Classification at Baseline in the REasons for Geographic And Racial Differences in Stroke (REGARDS) Study, 2003–2007

	Aspirin		BB		ACE-I/ARB		Statins		Warfarin	
	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
<b>Insured/non-HPSA</b>	1.19 (0.79–1.80)	1.05 (0.75–1.47)	1.08 (0.90–1.30)	1.01 (0.84–1.21)	1.42 (0.93–2.17)					
<b>Insured/HPSA</b>	1.33 (0.66–2.64)	1.47 (0.78–2.74)	0.98 (0.75–1.28)	0.74 (0.57–0.96)	1.44 (0.65–3.21)					
<b>Uninsured/non-HPSA</b>	0.92 (0.26–3.24)	1.01 (0.31–3.25)	0.98 (0.58–1.65)	0.54 (0.33–0.90)						***

ACE-I = angiotensin converting enzyme inhibitor, ARB = angiotensin receptor blocker, BB = Beta Blockers, HPSA = Health Professional Shortage Area

\* Adjusted for age, race, gender, education, income, percent of county population below poverty, medication adherence, functional capacity, and depressive symptoms.

\*\* Among those with a qualifying condition as defined in Table 1.

\*\*\* Adjusted odds ratio not available due to an insufficient number of individuals to conduct multivariable analyses; unadjusted odds ratio = 0.14 (0.02–1.08).