HHS Public Access

Author manuscript

J Diabetes Complications. Author manuscript; available in PMC 2023 April 28.

Published in final edited form as:

J Diabetes Complications. 2022 July ; 36(7): 108208. doi:10.1016/j.jdiacomp.2022.108208.

Trends in diagnosed hypertension prevalence by geographic region for older adults with and without diagnosed diabetes, 2005–2017

Jalal Uddin,
Department of Epidemiology, University of Alabama at Birmingham, Birmingham, USA

Sha Zhu,
Department of Epidemiology, University of Alabama at Birmingham, Birmingham, USA

Gargya Malla,
Department of Epidemiology, University of Alabama at Birmingham, Birmingham, USA

Emily B. Levitan,
Department of Epidemiology, University of Alabama at Birmingham, Birmingham, USA

Deborah B. Rolka,
Division of Diabetes Translation, Centers for Disease Control and Prevention, USA

D. Leann Long,
Department of Biostatistics, University of Alabama at Birmingham, Birmingham, USA

April P. Carson
Department of Medicine, University of Mississippi Medical Center, Jackson, MS, USA

Among adults ≥65 years of age in the US, 77% have hypertension and 27% have diabetes (1). The overall prevalence of hypertension has been stable nationally since 1999, however, it is unclear whether this applies to older adults and across different US geographic regions using contemporary data. Given that the prevalence of hypertension increases with age and is more common among adults with diabetes than those without diabetes (1), the objective of this study was to examine trends in hypertension prevalence by geographic region among older adults with and without diabetes.

This study was conducted as part of the Diabetes LEAD (Location, Environmental Attributes, and Disparities) Network, a research collaboration designed to examine community determinants of diabetes and cardiometabolic conditions. This serial cross-sectional analysis used the 5% national sample of Medicare administrative claims data (2005–2017) to examine trends in hypertension prevalence by US census regions (Northeast, Midwest, South, West). Medicare is a government-sponsored health insurance program based on age-eligibility (adults ≥65 years) or health condition-eligibility (disability or end-

Corresponding author: jalal@uab.edu.

Author Contributions: A.P.C. J.U. & G.M. conceptualized the study, assisted in statistical analysis. J.U. interpreted the data and drafted the manuscript. A.P.C. critically revised the manuscript. S.Z. performed statistical analysis and interpreted the data. E.L., L.L. D.R. interpreted the data and critically revised the manuscript. A.P.C. is the guarantor of this work and, as such, had full access to all the data and takes responsibility for the integrity of the data and the accuracy of the data analysis.

stage kidney disease). For this analysis, the inclusion criteria were all Medicare beneficiaries aged ≥66 years with 12 months of continuous coverage of Part A and Part B to allow for a sufficient time window to identify administrative claims for diagnoses codes. Hypertension and diabetes were defined using ICD-9 or ICD-10 codes from inpatient or outpatient claims in each calendar year. Joinpoint regression was used to estimate the annual percentage change (APC) in hypertension prevalence by region. Estimates were age-standardized to the 2010 US census.

Hypertension prevalence was higher among those with diabetes than those without diabetes across all geographic regions (Figure 1). Overall, the South region generally had the highest prevalence of hypertension whereas the West region generally had the lowest prevalence among those with and without diabetes. Among older adults with diabetes, hypertension prevalence generally increased from 2005 to 2017 across all regions, although the APC was lower from 2011–2017 than 2005–2011 for all regions. The APC in hypertension prevalence was +1.4% in the Northeast and +1.7% in the Midwest from 2005–2008 and +1.3% in the South and West regions from 2005–2011. From 2011–2017, the APC in hypertension prevalence continued to significantly increase in the Northeast (+0.3%), Midwest (+0.4%), and South (+0.5%). Among older adults without diabetes, the APC in hypertension prevalence was +1.7% in the Northeast, 1.9% in the Midwest, and 2.4% in the South from 2005–2009 and +1.5% in the West from 2005–2011. From 2009–2017, the APC in hypertension prevalence declined in the Northeast (-0.2%) but increased in the Midwest (+0.3%) and South (+0.6%).

The higher hypertension prevalence in the Southeast region observed in the current study is consistent with findings from prior studies reporting a higher cardiovascular disease burden in the South. For example, using data from the Behavioral Risk Factor Surveillance System, the highest prevalence of self-reported hypertension was observed in Southeastern states, although there was significant variation across states (2). Another study investigating trends in county-level heart disease mortality rates also reported an increase from 2010 to 2015 among older adults and noted that the observed increase was not confined to the South region (3). In the current study, a greater burden of hypertension prevalence was generally present for older adults with and without diabetes in the South region, although the annual change in hypertension prevalence was smaller in more recent years across all geographic regions.

Identifying factors that contribute to regional differences in hypertension prevalence is important for the prevention and management of cardiovascular disease. For example, results from an ecological study in the US showed that disadvantaged economic context (e.g., persistent poverty and unemployed labor force) had a stronger positive association with diabetes prevalence in counties located outside the South, whereas the density of recreational facilities and natural amenities had a stronger inverse association with diabetes prevalence in counties inside the South (4). Given that the influence of lifestyle, economic, and environmental factors may differ across geographic regions, understanding how these community-level factors may affect cardiovascular disease burden is important, particularly for older adults. Limitations of the current study include the use of broad geographic regions, which could mask different prevalence patterns at smaller geographic levels;

the use of administrative claims data to identify diagnosed hypertension, which would not capture undiagnosed hypertension; inability to assess how changes to hypertension diagnostic criteria during the study period influenced trends in prevalence; use of and lack of adjustment for region-specific factors such as race/ethnicity and level of urbanicity that could potentially account for the regional differences in hypertension. In summary, the increase in hypertension prevalence among older adults with and without diabetes slowed considerably across all regions between 2005 and 2017. The continued increase in hypertension prevalence in recent years in some geographic regions but not others underscores the value of characterizing the burden and determinants of hypertension among older adults with and without diabetes across different age groups and geographic regions.

Funding Source:

This research was conducted by the Diabetes LEAD (Location, Environmental Attributes, and Disparities) Network, funded by the CDC cooperative agreements U01DP006302 (University of Alabama at Birmingham) with collaboration with the Drexel University, Geisinger-Johns Hopkins University, New York University School of Medicine, and the US CDC Division of Diabetes Translation. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Disclosures:

A.P.C receives investigator-initiated research support from Amgen, Inc. No other potential conflicts of interest relevant to this article were reported.

References

1. Virani SS, Alonso A, Aparicio HJ, Benjamin EJ, Bittencourt MS, Callaway CW, et al. Heart disease and stroke statistics—2021 update: a report from the American Heart Association. Circulation. 2021;143(8):e254–e743. [PubMed: 33501848]
2. Samanic CM, Barbour KE, Liu Y, Fang J, Lu H, Schieb L, et al. Prevalence of self-reported hypertension and antihypertensive medication use among adults—United States, 2017. Morbidity and Mortality Weekly Report. 2020;69(14):393. [PubMed: 32271727]
3. Vaughan AS, Ritchey MD, Hannan J, Kramer MR, & Casper M Widespread recent increases in county-level heart disease mortality across age groups. Annals of Epidemiology, 2017;27(12):796–800. [PubMed: 29122432]
4. Myers CA, Slack T, Broyles ST, Heymsfield SB, Church TS, Martin CK. Diabetes prevalence is associated with different community factors in the diabetes belt versus the rest of the United States. Obesity. 2017;25(2):452–9. [PubMed: 28009108]

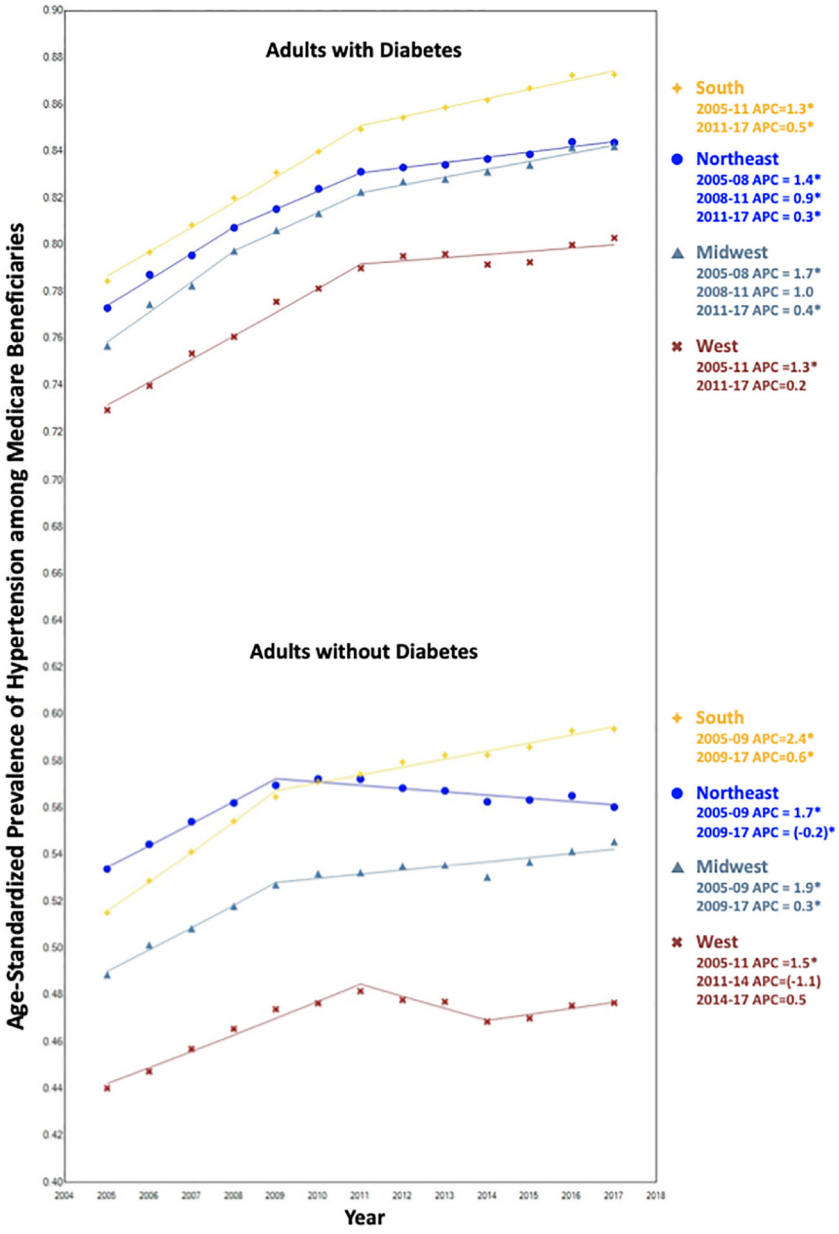

Figure 1.

Hypertension prevalence by census region among older adults with and without diabetes, 2005–2017