



Diabetes mortality rates among African Americans: A descriptive analysis pre and post Medicaid expansion

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ABSTRACT

Background: Compared with other racial and ethnic groups, African Americans are disproportionately burdened by high rates of deaths due to diabetes. Insurance coverage and access to primary care are critical for prevention and chronic disease management.

Purpose: To examine the difference in age-adjusted diabetes mortality rates in African Americans before and after Medicaid expansion.

Methods: Using ICD-10 Cause List E10–E14, age-adjusted diabetes mortality rates among African Americans were extracted from the Centers for Disease Control and Prevention's Compressed Mortality File. Sufficient and reliable data were available for 36 states and the District of Columbia. With a 95% confidence interval, two periods were analyzed: pre-Medicaid expansion - years 2008, 2009, 2010 and post-Medicaid expansion - years 2014, 2015, 2016. Three-year means for both periods were calculated for each state. Differences for each state are presented and contextualized as a state that opted in or out of expanding Medicaid coverage.

Results: There was a slight reduction in diabetes mortality in African Americans (41.14/100,000 pre-expansion and 38.94/100,000 post-expansion). We found variability across states – regardless of expansion status. Differences in rates ranged from a decrease of 15.43/100,000 to an increase of 9.53/100,000. Out of all states that met our criteria, 24 states expanded coverage; age-adjusted diabetes death rates declined in 16 of those states. There were also reductions in eight states that did not expand coverage.

Conclusion: Future research is needed to explore if Medicaid expansion is associated with reductions in diabetes mortality in the African American community.

1. Introduction

Since the passage of the Affordable Care Act (ACA), there has been a downward trend in the incidence of diabetes in the United States and prevalence rates have been fairly stable. According to the most recent data, approximately 30.3 million individuals or 9.4% of the US population is living with the condition and it is the 7th leading cause of death in the general population (Anon, n.d.-a). African Americans continue to be disproportionately burdened; nearly 13% are living with the disease and it represents the 5th leading cause of death in the African American population (Anon, n.d.-a, n.d.-b). Compared with Whites, African Americans are two times more likely to die from diabetes (Anon, n.d.-c).

Treatment for the disease is a significant contributor to approximately 18% of the nation's GDP on healthcare expenses. Associated care is estimated to cost the country \$237 billion in direct medical costs

annually (Association AD, 2013). Due to late detection and other psychosocial barriers, African Americans are more likely to consume services during tertiary stages, which escalates costs and hinders productivity. They are 4.2 times more likely to develop end stage renal disease, 3.5 times more likely to be admitted to the hospital due to lower extremity amputation, and nearly 2 times more likely to be admitted and discharged from the hospital due to a diabetes related complication (Anon, n.d.-c).

Insurance coverage is a critical component for early detection and effective disease management. Routine clinical services such as HbA1c testing, complete foot exams, and comprehensive dilated eye exams are important for sustaining productivity, reducing diabetes complications, and associated mortality. As a result of the ACA federal mandate, more Americans are likely to benefit from preventive screenings and disease management services due to the expansion of Medicaid, and government subsidies offered through insurance marketplace plans. Nearly 20

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million nonelderly individuals became newly insured between 2010 and 2015 and insured rates have increased for every state since 2010 (Garrett and Gangopadhyaya, 2016). Non-Hispanic Blacks represent 2.8 million or 15% of the total number (Garrett and Gangopadhyaya, 2016).

While social, economic, and environmental factors outside of the healthcare delivery system influence health status and exacerbate racial differences in health outcomes, the significant gain in the number of African Americans with insurance coverage brings promise for reducing the aggregate number of individuals who die from diabetes. In this investigation, we conduct a descriptive analysis to explore age-adjusted diabetes mortality rates in the non-Hispanic Black population before and after Medicaid expansion. To the best of our knowledge, this is the first state-by-state examination of its kind. It contributes to the literature by offering baseline data to stimulate future research questions and subsequent investigations.

Although the true effects of Medicaid expansion on diabetes mortality may not be realized for some time, we hypothesize a reduction in diabetes mortality post the insurance expansion period – particularly in states that expanded Medicaid eligibility for childless adults (i.e. nonelderly adults with incomes up to 138% of the federal poverty level). Our reasoning is motivated by prior evidence, which suggests Medicaid expansion is linked to a reduction in premature mortality among non-Whites, residents of poorer counties, and older adults (Sommers and Epstein, 2010; Sommers et al., 2014; Wilper et al., 2009). In addition, researchers have found coverage is linked to increased receipt of preventive health services, earlier detection of chronic disease, and more timely access to medication (Wherry and Miller, 2016; Miller and Wherry, 2017; Sommers et al., 2017; Chen et al., 2016; Sommers et al., 2012). Furthermore, newly insured persons in tertiary stages of diabetes or those living with more advanced comorbid disease interactions are likely to benefit from lifesaving interventions via pharmacological therapies and comprehensive diabetes management education.

2. Methodology and data source

Data were extracted from the Compressed Mortality File of the Centers for Disease Control and Prevention (Anon, n.d.-d). The sample was restricted to non-Hispanic Blacks. The primary outcome was age-adjusted death rates due to Diabetes Mellitus during two periods: 2008, 2009, 2010 and 2014, 2015, 2016. Mean mortality rates were determined for years 2008, 2009, and 2010 because the time periods are pre-Medicaid expansion and pre-Affordable Care Act (ACA) legislation. Mean mortality rates for years 2014, 2015, and 2016 were selected because most states that expanded Medicaid did so after January 1, 2014. The sample is restricted to deaths due to diabetes as an underlying cause of death. We restricted our query to ICD-10 Cause List E10–E14, which includes insulin-dependent diabetes mellitus, non-insulin dependent diabetes mellitus, malnutrition related diabetes mellitus, and diabetes NOS. For each state and the District of Columbia, a mean age-adjusted death rate per 100,000 for the three years before the expansion period was calculated, as well as for the three years after expansion. We showcase the difference to explore directional changes in diabetes mortality rates across both periods. States that expanded Medicaid coverage and those that did not expand coverage are identified. Pennsylvania, Louisiana, and Indiana expanded coverage after various initiation periods post January 1, 2014. Those states are still classified as a state that “expanded coverage” in our analysis. AK, HI, IA, ID, ME, MT, ND, NH, NM, RI, SD, UT, VT, and WY were excluded from the sample due to insufficient samples or unreliable data.

3. Results

Overall, our findings were consistent with prior trends. Age-adjusted diabetes mortality rates in African Americans were almost two

Table 1
African American mean age-adjusted mortality rates before and after Medicaid expansion.

State	Mean pre-expansion (2008–2010)	Mean post-expansion (2014–2016)	Change	Medicaid expansion
Alabama	49.50	39.13	−10.37	Not adopted
Arizona	38.67	44.97	6.30	Adopted
Arkansas	47.53	45.30	−2.23	Adopted
California	39.57	40.40	0.83	Adopted
Colorado	39.07	31.23	−7.83	Adopted
Connecticut	29.60	27.90	−1.70	Adopted
Delaware	35.97	29.43	−6.53	Adopted
District of Columbia	35.87	32.50	−3.37	Adopted
Florida	41.97	37.50	−4.47	Not adopted
Georgia	33.40	35.03	1.63	Not adopted
Illinois	35.17	33.43	−1.73	Adopted
Indiana	38.77	48.30	9.53	Adopted
Kansas	40.53	47.17	6.63	Not adopted
Kentucky	51.20	41.33	−9.87	Adopted
Louisiana	46.17	39.43	−6.73	Adopted
Maryland	35.53	30.87	−4.67	Adopted
Massachusetts	23.37	27.97	4.60	Adopted
Michigan	37.67	37.57	−0.10	Adopted
Minnesota	31.57	34.60	3.03	Adopted
Mississippi	52.53	54.13	1.60	Not adopted
Missouri	38.80	34.67	−4.13	Not adopted
Nebraska	55.83	50.53	−5.30	Not adopted
Nevada	19.53	21.57	2.03	Adopted
New Jersey	41.40	33.13	−8.27	Adopted
New York	31.33	30.50	−0.83	Adopted
North Carolina	43.80	43.47	−0.33	Not adopted
Ohio	45.30	42.20	−3.10	Adopted
Oklahoma	53.60	56.37	2.77	Not adopted
Oregon	63.57	48.13	−15.43	Adopted
Pennsylvania	31.13	32.63	1.50	Adopted
South Carolina	44.50	41.53	−2.97	Not adopted
Tennessee	51.53	41.97	−9.57	Not adopted
Texas	39.60	32.63	−6.97	Not adopted
Virginia	36.90	37.13	0.23	Not adopted
Washington	49.63	47.57	−2.07	Adopted
West Virginia	58.47	49.63	−8.83	Adopted
Wisconsin	33.53	39.00	5.47	Not adopted
Total mean	41.140	38.94	−2.2	
General population	21.80	21.59	−0.21	

times higher than the general population across both measurement periods. The trend was fairly consistent across both measurement periods. In the general population, average rates for all states and the District of Columbia was 21.80/100,000 pre-expansion and 21.59/100,000 post-expansion (Table 1). Among African Americans, average rates for all states and the District of Columbia were 41.14/100,000 pre-ACA and 38.94/100,000 post-ACA (Table 1). Overall differences in age-adjusted diabetes mortality rates across all states between the periods 2008–2010 and 2014–2016 ranged from a 15.43/100,000 decrease to a 9.53/100,000 increase. Mortality rates dropped in 24 states; 16 expanded Medicaid (Fig. 1). Rates also dropped in the District of Columbia, which expanded Medicaid. While seven states that expanded coverage experienced worse mortality rates, there were improvements in eight states that did not expand coverage. Six states that did not expand coverage had higher mean mortality rates in the post expansion period. Among states that expanded coverage, Oregon (−15.43), Kentucky (−9.87), New Jersey (−8.27) and Colorado (−7.83) had the most noteworthy reductions. Among states that did not expand coverage, Alabama (−10.37), Tennessee (−9.57), Texas (−6.97) and Nebraska (−5.30) had the most noteworthy reductions (Table 1; Fig. 1). Although Arizona, California, Indiana, Massachusetts, Minnesota, Nevada, and Pennsylvania expanded coverage, rates were worse in those states during the post expansion period. For example, Indiana had a 9.53/100,000 increase. Mean rates also increased in six states that did

African American Age-Adjusted Diabetes Mortality Before and After Medicaid Expansion 3-Year Average Change 2008-2010 | 2014-2016

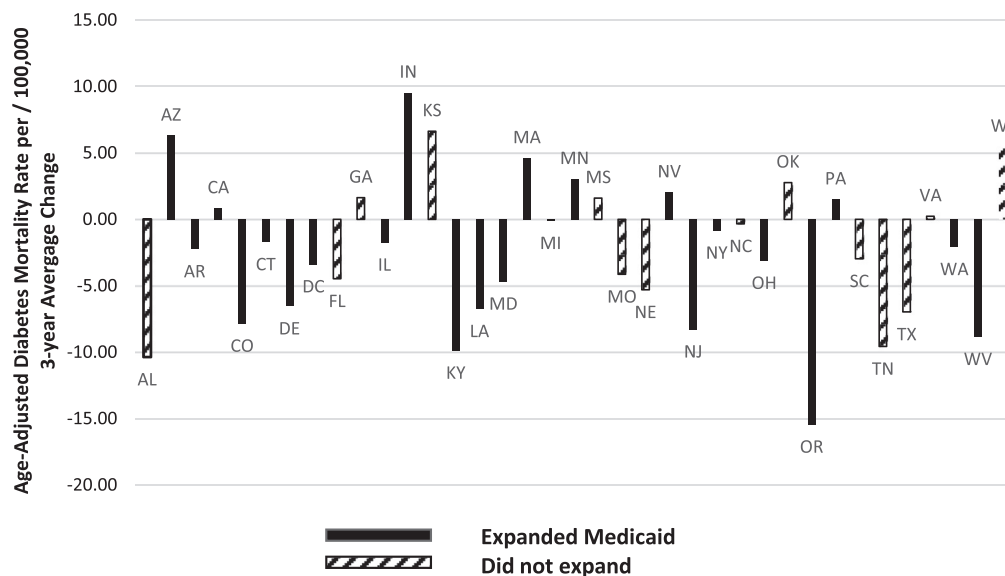


Fig. 1. Coverage under Medicaid expansion became effective January 1, 2014 in all states that adopted expansion except for the following: Michigan (4/1/2014), Pennsylvania (1/1/2015), Indiana (2/1/2015), and Louisiana (7/1/2016). Arizona, Arkansas, Indiana, Kentucky, and Michigan approved Section 1115 waivers for the Medicaid expansion (Anon, n.d.-h).

Call out Box or Infographic

Total Number of States Improved:	24 (plus DC)
Total Number of States the Expanded Medicaid and Improved:	16 (plus DC)
Total Number of States that Expanded Medicaid with Worse Outcomes:	7
Total Number of States that Did Not Expand but Improved:	8
Total Number of States that Did Not Expand with Worse Outcomes:	6
Excluded States: AK, HI, IA, ID, ME, MT, ND, NH, NM, RI, SD, UT, VT, WY	

not expand Medicaid coverage: Wisconsin, Virginia, Oklahoma, Mississippi, Kansas, and Georgia (Fig. 1).

4. Discussion

While socio-economic, structural and cultural factors significantly influence health status, access to timely medical care is paramount for preventing, diagnosing, and treating disease conditions. For most Americans, insurance coverage is a requisite for accessing a spectrum of medical services and effective diabetes management hinges upon patient engagement and timely access to both primary and specialty care. Therefore, increasing the number of Americans with health insurance may result in a reduction of diabetes mortality and improved long-term health outcomes for the general population.

Although we highlight states that expanded Medicaid, it should be noted that 11.6 million Americans secured coverage through the federal Health Insurance Marketplace or state based exchanges (Cohen and Martinez, 2009). Close to 3 million African Americans have benefitted from various insurance expansion options nationwide. Some preliminary findings post Medicaid expansion suggest the disease is being detected earlier among those who are newly insured. A national investigation conducted during the first year of Medicaid expansion found a 23% increase in newly diagnosed diabetes cases in states that expanded Medicaid and a 0.4% increase in states that did not expand (Kaufman et al., 2015). Consequently, persons in this newly diagnosed population (n = 3395) were likely to receive comprehensive diabetes education, counseling, and medical services in a more timely fashion – reducing risks of complications, disability, and mortality (Kaufman et al., 2015).

Regardless of their expansion status, our findings show diabetes death rate variability across states; however, the majority of states with lower mean rates post expansion are located in the southeastern corridor of the country where there are high volumes of African Americans and a higher prevalence of diabetes. Reduced mortality rates are observed in most states in the southeast, except Virginia, Georgia, and Mississippi. As the state with the largest percentage of African American residents in the country (37%), Medicaid was not expanded in Mississippi and there were no reductions in diabetes mortality between the two periods. This is especially noteworthy since Mississippi has one of the highest prevalence rates of diabetes in the country and the diabetes mortality rate of black Mississippians is two times higher than white Mississippians. Behind West Virginia (34.8/100,000), the state has the second highest diabetes mortality rate in the nation (31.9/100,000) (Anon, n.d.-e). Louisiana, a state with the second largest percentage of African American residents, did not expand coverage until 2016. However, diabetes mortality dropped during the post expansion period.

Mean mortality rates also dropped in 16 states that expanded coverage. Oregon, Kentucky and Colorado are most noteworthy. When compared with all states, Oregon improved most. During the pre-ACA period, the age-adjusted diabetes mortality rate in Oregon was 63.57/100,000 pre-ACA and 48.13/100,000 post-ACA - a difference of 15.43/100,000 (Table 1). Since the state was one of four states with more than a 57% change in the number of uninsured (+387,000) in the general population (Garrett and Gangopadhyaya, 2016), expanded coverage may be an explanatory factor. Two additional initiatives may contribute to Oregon's success. The 2008 Oregon experiment, which was based on a lottery, provided Medicaid to nearly 30,000 low-income residents.

Among those newly insured, findings of a randomized controlled study based on the first two years showed increase use of healthcare services, early diabetes detection and management, lower rates of depression, and reduced financial strain (Baicker et al., 2013). Another systemic change in Oregon was the launch of a unique, comprehensive statewide Medicaid reform initiative aimed at health equity and health disparities. Rolled out in 2012 and similar to the concept of an Accountable Care Organization, the state created six Coordinated Care Organizations (CCOs) to assume the care of 90% of Medicaid enrollees. By employing a health equity lens, the scope of the CCO includes physical, behavioral, and oral health (McConnell et al., 2018).

Kentucky has the 4th highest diabetes mortality rate in the nation (Anon, n.d.-e). With nearly 382,000 newly insured in the general population, the state had a 57% change in the number of uninsured (Garrett and Gangopadhyaya, 2016). A reduction in diabetes mortality ($-9.87/100,000$) is likely an outcome (Table 1). Through its Kentucky Diabetes Network, the state also established a robust network of stakeholders with a shared vision to prevent diabetes and improve the life of those living with the condition (Anon, n.d.-f). By expanding coverage, Colorado reduced its uninsured rate from 14.3% to 6.7% - impacting the lives of 407,000 residents. Despite low rates of diabetes and obesity, age-adjusted diabetes mortality rates decreased ($-7.83/100,000$) during the post-expansion period (Table 1).

Mean mortality rates due to diabetes declined in eight states that did not expand Medicaid. Expanded coverage through exchange programs and other statewide reform efforts may be attributable. As a state with one of the highest rates of diabetes in the country, Tennessee did not expand Medicaid, but 251,000 residents gained coverage through other insurance products. Through Project Diabetes - the state earmarks nearly \$3 million during each grant cycle for community based organizations that offer innovative approaches aimed at preventing or treating diabetes (Anon, n.d.-g).

This investigation focused on Medicaid insurance expansion as a proxy for early detection, diabetes education and counseling, and pharmacological intervention as a means of reducing diabetes related mortality. However, regardless of if a state expanded coverage or not, reductions in mortality may be associated with more exogenous reform efforts. Accountable Care Organizations coordinate care and engender a more seamless experience for patients (Rosenbaum and Burke, 2011). Value-based payment models challenge providers to meaningfully use electronic health records to test promising practices and employ evidence-based interventions to improve outcomes at the lowest costs (Rosenthal, 2008). The emergence of unconventional, community-based partnerships helps ensure patients' holistic needs are addressed in real time. Community health needs assessments require nearly 3000 not-for-profit hospitals to prioritize health needs, and consequently, develop implementation strategies to address leading priorities (King and Roach, 2015). Led by the Centers for Disease Control and Prevention, states participate in the National Diabetes Prevention Program - a public-private partnership that employs evidence-based lifestyle interventions as a means of preventing the onset of Type 2 diabetes (Albright, 2012). Collectively, these delivery system reform efforts evolved after the Affordable Care Act. They may help explain the decline in mean diabetes mortality rates in states that expanded coverage, as well as those that did not expand coverage.

4.1. Implications for future research and practice

With 20 million newly insured Americans, there are several opportunities for future investigation. Our post-ACA period commenced immediately after Medicaid expansion. The long-term effect of insurance expansion on diabetes mortality rates is not likely to be realized for some time. The descriptive research design in this study is intentionally aimed to offer directional insight after the first three years of Medicaid expansion. Prospective studies are needed to monitor trends in the African American population, as well as how the

population fares compared to other racial and ethnic populations.

The research design does not explore causality. For states with lower mean mortality rates in the post expansion period, research is needed to examine the role of Medicaid, coverage through state exchanges, and other exogenous factors. Analyses of states that did not expand coverage (i.e. Alabama, Tennessee, Texas) but improved are also needed. Were these improvements a result of expanded coverage through exchanges or broader systemic efforts to reform systems of care? Similar analyses that stratify outcomes by age, gender, and income will inform the creation of more targeted interventions.

Access to timely medical care is important for diabetes care; however, structural conditions of low income communities of color are likely to serve as barriers. Some communities may lack the capacity to offer the spectrum of services needed to accommodate a growth in the number of newly insured. Findings post-expansion suggest challenges with long wait times, the inability to offer necessary behavioral health and substance abuse services, and difficulty associated with care coordination (Miller and Wherry, 2017; Sommers et al., 2013). These systems of care limitations jeopardize timely receipt of primary and specialty care services. Furthermore, access to insurance as a driver of optimal health may be confounded by underlying characteristics of communities. Food deserts, scarce employment options, transportation barriers, and unsafe environmental conditions may be underlying contributors of poor health outcomes. Research is needed to explore how residents of geographically defined communities of color fare in the wake of Medicaid expansion and other reform efforts.

Section 1115 Waiver programs, which require Medicaid enrollees to work, may present coverage and access challenges - particularly for those living in economically depressed communities. As of March 2018, a Kentucky waiver has been approved and 9 states have submitted waiver proposals to the Centers for Medicare & Medicaid Services (AR, AZ, IN, KS, NH, UT, WI) (Foutz, 2018). As state-based waiver programs are implemented, research is needed to examine if they disproportionately impact racial or geographic segments of the population.

4.2. Limitations

Our investigation was based on persons who died from diabetes during the periods examined, regardless of insurance status. The statistical design does not explore causality, so we do not attribute Medicaid expansion with differences in mortality rates. The sample captured diabetes mortality in the African American population; regressions and stratified analyses (i.e. age, health status, income, insurance) were not conducted. Pennsylvania, Louisiana, and Indiana initiated expansion at various periods after January 1, 2014. These states were classified as states that expanded coverage. No statistical adjustments were made to account for delayed timing.

5. Conclusion

Findings from this descriptive analysis offer directional insight on diabetes death rates in the African American population post-Medicaid expansion. While there were mean reductions in the majority of states that expanded Medicaid, there were also mean reductions in states that did not expand Medicaid. Moreover, some states that expanded Medicaid had higher mean rates when compared with the pre-expansion period. These mixed findings offer opportunities for more robust investigations that offer clarity around the characteristics of states with lower diabetes mortality rates post expansion versus those with higher mortality rates post expansion.

Conflict of interest statement

The authors declare there is no conflict of interest.

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