

Use of a Population-Based Health Survey to Project Trends Among Medicaid-Eligible Adults in South Carolina

Developed by the
Institute for Families in Society
at the University of South Carolina

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**Institute for Families
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*Improving Policy. Advancing Practice.
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SOUTH CAROLINA DEPARTMENT OF HEALTH AND HUMAN SERVICES

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SUMMARY

Population and projected estimates of Medicaid-eligible adults less than 65 years old in South Carolina were generated using data from the Behavioral Risk Factor Surveillance System (BRFSS), supported by the U.S. Centers for Disease Control and Prevention.

Compared to the general population of South Carolina in year 2017, the population of Medicaid-eligible adults reported:

- Significantly more disabilities, including sight, ambulation, cognitive function, and self-care functions;
- Significantly more diabetes, chronic obstructive pulmonary disease (COPD), depression, asthma, and arthritis; and
- Significantly less Low Severity,* and significantly more Medium-High Severity* or High Severity* chronic conditions.

In year 2020, the projected population of Medicaid-eligible adults in South Carolina is expected to be stable, consisting of stable numbers of adults with Low Severity* and Medium-Low Severity* chronic conditions. The population of adults with Medium-High Severity* or High Severity* chronic conditions, however, is expected to increase.

THE PROJECTED 2020 ESTIMATES OF SOUTH CAROLINA MEDICAID-ELIGIBLE ADULTS ARE EXPECTED BE:

Low Severity: 150,000 to 205,000 adults

Medium-Low Severity: 35,000 to 60,000 adults

Medium-High Severity: 30,000 to 60,000 adults

High Severity: 15,000 to 50,000 adults

These results have implications for the possible new change to Medicaid Waiver 1115 to institute work requirements in South Carolina, as well as for general state Medicaid planning.

Usefulness of the BRFSS for Medicaid population planning in South Carolina could be enhanced with: 1) A higher cell phone sampling strategy to reduce selection bias among younger adult residents, those of low income, and those of minority race/ethnicity; and 2) Addition of health-care access questions.

* Severity of chronic condition was calculated as a weighted function of the self-reported number of co-occurring chronic conditions reported in the BRFSS, and the cost of hospitalization for each reported chronic condition (see **Methods** section).



INTRODUCTION

This report describes trends from calendar year 2011 through 2017, with projections to year 2020, in the estimated number and percent of Medicaid-eligible adults less than 65 years old in South Carolina, using a population-based health survey called the Behavioral Risk Factor Surveillance System (BRFSS).¹ This survey is supported by the U.S. Centers for Disease Control and Prevention, was first implemented in 1984, and is now conducted in all U.S. states and territories. The BRFSS is a phone survey, and survey responses by randomly selected citizen volunteers are weighted in each state to produce state-specific population-based estimates. Estimates can be generated for a variety of health behaviors, health risk factors, health outcomes, and emerging issues of public health significance. Estimates can also be generated by demographics, socio-economic status, and other characteristics.

The BRFSS was used to create annual population-based estimates of Medicaid-eligible adults in South Carolina. Estimates were produced for those who self-reported one or more disabilities, including sight, hearing, cognitive function, ambulatory conditions, and self-care functions. Estimates were also generated of Medicaid-eligible adults who reported being diagnosed with one or more of the following chronic conditions: coronary heart disease or heart attack, cancer, cardiovascular disease or stroke, diabetes, kidney disease, chronic obstructive pulmonary disease (COPD), asthma, and/or depression. Respondents with one or more of these chronic conditions were categorized as Low (including no reported chronic conditions), Medium-Low, Medium-High, and High Severity based on overall hospitalization costs per event in South Carolina during 2016. For details about the methodology, please see the **Methods** section.

RESULTS AND DISCUSSION

■ DISABILITIES DURING 2017

Compared to all adults less than 65 years old in South Carolina during 2017, the subpopulation of Medicaid-eligible adults had a significantly greater prevalence of disability (**Table I**). Whereas 23.8% (SE=0.7%) of all adults reported at least one disability condition, a significantly higher percent (40.5%, SE=2.6%) of Medicaid-eligible adults reported having a disability ($p < 0.05$). A significantly higher prevalence of Medicaid-eligible adults reported specific disabilities related to sight, cognitive function, ambulation, and self-care functions. For instance, whereas 7.0% (SE=0.4%) of all adults reported having difficulty doing errands alone, 18.6% (SE=2.1%) of Medicaid-eligible adults reported this disability.

The total estimated number of all adults less than 65 years old in South Carolina during 2017 was 3.06 million (95% CI: 3.01 million - 3.12 million adults; **Table I**), and among this number, approximately 700,000 (95% CI: 660,000 - 740,000 adults) reported having a disability. The remaining 2.36 million were able-bodied adults. The total estimated number of Medicaid-eligible adults in the state during 2017 was 290,000 adults (95% CI: 275,000 - 305,000), of which 110,000 adults reported at least one disability, with the remaining 180,000 being able-bodied adults. Estimates of disability with the BRFSS are likely to be under-reported, since they are based on adults with disabilities who are not hampered from participating in the phone survey.

The estimate of all adults 18-64 years old in South Carolina produced in this report compares well to the estimate produced by the U.S. Census Bureau (3.06 million),² because the weights used for the BRFSS are based on the most current population estimates available. The 2017 estimate of Medicaid-eligible adults 18-64 years old in South Carolina obtained from the BRFSS, however, cannot be compared to an independent measure for the state.

Table I
Prevalence of Disability Among All Adults and Medicaid-Eligible Adults (18-64 Years Old) in South Carolina
Behavioral Risk Factor Surveillance System, 2017

| Condition | All Adults 18-64 Years Old | | | Medicaid-Eligible Adults ¹ 18-64 Years Old | | | Significance (p<0.05) ² |
|--|-------------------------------|-------------|-------|--|-------------|-------|---------------------------------------|
| | Prevalence | Percent (%) | (SE) | Prevalence | Percent (%) | (SE) | |
| Disabilities | | | | | | | |
| Difficulty doing errands alone (i.e., visiting a doctor's office or shopping). | 210,000 | 7.0 | (0.4) | 55,000 | 18.6 | (2.1) | Higher |
| Blind or serious difficulty seeing, even when wearing glasses. | 125,000 | 4.2 | (0.3) | 30,000 | 10.5 | (1.7) | Higher |
| Serious difficulty concentrating, remembering, or making decisions. | 375,000 | 12.7 | (0.6) | 75,000 | 27.2 | (2.4) | Higher |
| Serious difficulty dressing or bathing. | 125,000 | 4.2 | (0.3) | 25,000 | 9.2 | (1.4) | Higher |
| Serious difficulty walking or climbing stairs. | 380,000 | 12.9 | (0.5) | 70,000 | 24.0 | (2.2) | Higher |
| Deaf or serious difficulty hearing. | 120,000 | 4.0 | (0.3) | na | na | | |
| Adults with at least one disability (18-64 years old) | 700,000 | 23.8 | (0.7) | 110,000 | 40.5 | (2.6) | Higher |
| Total able-bodied adults (18-64 years old) | 2,365,000 | | | 180,000 | | | |
| Total adults (18-64 years old) | 3,065,000 (SE=25,000) | | | 290,000 (SE=10,000) | | | |

SE - Standard error of the percent prevalence.

na - Percent prevalence not available due to a low number of survey responses and poor statistical validity.

¹ - Medicaid-eligibility was based on household size and annual income; see **Methods** section.

² - Significance test among Medicaid-eligible adults, compared to all adults, 18-64; see **Methods** section.

Source: Behavioral Risk Factor Surveillance System, U.S. Centers for Disease Control and Prevention, (<https://www.cdc.gov/brfss/index.html>), accessed on November 6, 2018.

The estimates of Medicaid-eligible adults in this report are based only on family size and a range of household income, and cannot discern the number of Medicaid-eligible adults who actually enrolled in the program. Medicaid enrollment by the U.S. Census Bureau in South Carolina during 2017 were estimated to be 220,320 adults 19-64 years old.³ This value agrees well with the estimated population of Medicaid-eligible adults produced in this report, which would be expected to be at least as high as adults who were enrolled in the program.

Estimates of actual Medicaid enrollment are possible with the BRFSS, but questions about Medicaid enrollment were only offered in South Carolina during survey years 2014 and 2015. Other field-tested and validated questions related to healthcare access are also possible in the survey, and include other sources of health insurance (including no insurance), the length of time without insurance, and reasons for delayed medical care. Use of the BRFSS for Medicaid planning in the state would be enhanced if these questions were offered. If space on the survey is limited due to time constraints, the survey could be offered as a post-BRFSS survey, using a methodology similar to that offered in Connecticut during the 2015 BRFSS survey year.⁴

CHRONIC CONDITIONS DURING 2017

Compared to all adults less than 65 years old in South Carolina during year 2017, Medicaid-eligible adults had a significantly higher prevalence of diagnosed diabetes, chronic obstructive pulmonary disease (COPD), depression, and asthma, as well as arthritis, and significantly lower prevalence of skin cancer ($p < 0.05$) (**Table II**). For instance, whereas 10.0% (SE=0.4%) of all adults reported being diagnosed with diabetes, 15.1% (SE=1.7%) of Medicaid-eligible adults reported being diagnosed with this chronic condition. The prevalence of COPD among all adults in South Carolina was 6.0% (SE=0.4), while that among Medicaid-eligible adults was significantly higher (11.1%, SE=1.7%).

Table II
Prevalence of Chronic Conditions Among All Adults and Medicaid-Eligible Adults (18-64 Years Old) in South Carolina Behavioral Risk Factor Surveillance System, 2017

| Condition | All Adults 18-64 Years Old | | | Medicaid-Eligible Adults ¹ 18-64 Years Old | | | Significance ($p < 0.05$) ² |
|---|-------------------------------|-------------|-------|--|-------------|-------|---|
| | Prevalence | Percent (%) | (SE) | Prevalence | Percent (%) | (SE) | |
| Coronary heart disease or heart attack | 130,000 | 4.3 | (0.3) | 10,000 | 3.4 | (0.7) | Not significant |
| Skin cancer | 105,000 | 3.5 | (0.2) | 6,000 | 1.9 | (0.5) | Lower |
| Other cancers | 130,000 | 4.3 | (0.3) | 20,000 | 6.1 | (1.2) | Not significant |
| Cardiovascular disease or stroke | 80,000 | 2.6 | (0.2) | 10,000 | 3.7 | (1.0) | Not significant |
| Diabetes | 305,000 | 10.0 | (0.4) | 45,000 | 15.1 | (1.7) | Higher |
| Kidney disease | 70,000 | 2.3 | (0.2) | 10,000 | 3.6 | (0.8) | Not significant |
| Chronic obstructive pulmonary disease (COPD) | 185,000 | 6.0 | (0.4) | 32,000 | 11.1 | (1.7) | Higher |
| Depression | 655,000 | 21.4 | (0.7) | 100,000 | 35.1 | (2.6) | Higher |
| Asthma | 445,000 | 14.6 | (0.6) | 60,000 | 20.3 | (2.3) | Higher |
| Arthritis | 625,000 | 20.6 | (0.6) | 85,000 | 28.8 | (2.3) | Higher |
| Severity of Diagnosed Chronic Condition(s)³ | | | | | | | |
| 1. Low (includes no chronic conditions) | 2,285,000 | 74.6 | (0.7) | 190,000 | 65.7 | (2.5) | Lower |
| 2. Medium-Low | 465,000 | 15.2 | (0.6) | 50,000 | 17.5 | (2.0) | Not significant |
| 3. Medium-High | 200,000 | 6.5 | (0.4) | 30,000 | 10.3 | (1.5) | Higher |
| 4. High | 115,000 | 3.8 | (0.3) | 20,000 | 6.5 | (1.2) | Higher |
| Severity levels 2 through 4 | 780,000 (SE=20,000) | | | 100,000 (SE=10,000) | | | |

SE - Standard error of the percent prevalence.

¹ - Medicaid-eligibility was based on household size and annual income; see **Methods** section.

² - Significance test among Medicaid-eligible adults, compared to all adults, 18-64 years old; see **Methods** section.

³ - Severity of chronic conditions was calculated as described in the **Methods** section.

Source: Behavioral Risk Factor Surveillance System, U.S. Centers for Disease Control and Prevention, (<https://www.cdc.gov/brfss/index.html>), accessed on November 6, 2018.

When self-reported responses of one or more diagnosed chronic conditions were grouped into categories of chronic disease severity (Low, Medium-Low, Medium-High, or High), the prevalence of Low Severity chronic conditions was significantly lower among Medicaid-eligible adults, while Medium-High Severity and High Severity conditions were significantly higher in prevalence (**Table II**). For instance, the prevalence of all adults with Low Severity chronic conditions was 74.6% (SE=0.7%), compared to a prevalence of 65.7% (SE=2.5%) among Medicaid-eligible adults. In sharp contrast, the prevalence of all adults with High Severity chronic

conditions was 3.8% (SE=0.3%), compared to a prevalence of 6.5% (SE=1.2%) among Medicaid-eligible adults. These data suggest that, relative to all adults less than 65 years old in South Carolina, the severity of chronic conditions among Medicaid-eligible adults is shifted toward higher severity, and, therefore, higher healthcare costs.

The largest proportion of adults less than 65 years old in South Carolina during year 2017 were those who reported conditions of Low Severity, comprising an estimated 2.28 million among all adults (95% CI: 2.22 million – 2.35 million) and 190,000 Medicaid-eligible adults (95% CI: 170,000 – 210,000 adults) (**Table II**). This group comprised approximately three-fourths of all adults in South Carolina and two-thirds of Medicaid-eligible adults. The total estimated number of adults less than 65 years old in South Carolina during year 2017 who were living with conditions of at least Medium-Low Severity was 780,000 adults (95% CI: 740,000 – 820,000 adults), comprising the remaining one-fourth of this population. Among Medicaid-eligible adults, 100,000 (95% CI: 85,000 – 115,000 adults) reported chronic conditions of Medium-Low, Medium-High, or High Severity.

The estimated number of 190,000 Medicaid-eligible adults with Low Severity chronic conditions (**Table II**), is similar to the estimate of 180,000 Medicaid-eligible and able-bodied adults (**Table I**). Disability status and chronic condition severity are highly correlated in this population; of those who reported no disability, 85% also reported having Low Severity chronic conditions (data not shown). This suggests that either measure can be used to evaluate able-bodied adults among those eligible for Medicaid. The combined total of both able-bodied adults and those with only Low Severity chronic conditions is 140,000 adults, or roughly half of all Medicaid-eligible adults.

These results have implications for a possible new work policy to Medicaid Waiver 1115 that was recently approved by the Centers for Medicare and Medicaid Services.⁵ To date, 13 states have submitted proposals for work requirements, and four have been approved. Of those approved, exemptions were made for adults at least 60 years old in the State of Indiana. Other pending state exemptions include ages ranging from 50 years old and above, to 65 years old and above, as well as reduced work requirements for parents who have children in the household.⁶ The use of disability status and/or measure of chronic condition severity are alternatives for quantifying the expected number of adults who would be able to fulfill work requirements, and provides an estimate of Medicaid-eligible adults for whom the work requirement would be an exceptional burden.

Estimates of chronic conditions with the BRFSS are likely to be under-reported since they are based on respondents who have visited a health care provider and been diagnosed with a chronic condition. Also, the severity categories are limited to chronic conditions queried in the BRFSS, and although these conditions are considered of high healthcare cost and of high public health importance,⁷ they do not constitute all chronic conditions that may contribute to either chronic condition severity or healthcare costs.

SEVERITY OF CHRONIC CONDITIONS AMONG MEDICAID-ELIGIBLE ADULTS LESS THAN 65 YEARS OLD, BY AGE GROUP

Severity of chronic conditions among Medicaid-eligible adults in South Carolina was evaluated by age group, and as expected, showed that the prevalence of Low Severity chronic conditions decreased with age for both years 2014-2017, combined, and years 2011-2014, combined (**Table III**). For instance, during years 2014-2017, the prevalence of Low Severity chronic conditions decreased from a high of 81.9% (SE=1.6%) among 18-34 year olds, to a low of 35.4% (SE=2.6%) among 55-64 year olds. Conversely, the prevalence of Medium-High Severity conditions increased from 3.2% (SE=0.6%) among 18-34 year olds, to a high of 19.1% (SE=2.3%) among 55-64 year olds. The distribution of chronic severity, by age group, in 2014-2017 did not differ significantly compared to that in years 2011-2014 ($p > 0.05$). A mild increase over time ($p < 0.10$) was observed for High Severity conditions among adults 45-54 years old, with a concomitant decrease among Low Severity conditions.

Table III
Change in Severity of Chronic Conditions,¹ By Age Group, Among Medicaid-Eligible Adults (18-64 Years Old)²
2011-2014 versus 2014-2017
Behavioral Risk Factor Surveillance System, South Carolina, 2011-2017

| Severity of Diagnosed Chronic Condition(s) | Years 2011-2014, Combined | | | Years 2014-2017, Combined | | | Significance (p<0.05) ³ |
|--|---------------------------|-------------|-------|---------------------------|-------------|-------|------------------------------------|
| | Prevalence | Percent (%) | (SE) | Prevalence | Percent (%) | (SE) | |
| 18-34 Years Old | | | | | | | |
| 1. Low | 75,000 | 79.5 | (2.2) | 130,000 | 81.9 | (1.6) | Not significant |
| 2. Medium-Low | 15,000 | 16.8 | (2.1) | 20,000 | 13.5 | (1.5) | Not significant |
| 3. Medium-High | na | na | | 5,000 | 3.2 | (0.6) | |
| 4. High | na | na | | na | na | | |
| 35-44 Years Old | | | | | | | |
| 1. Low | 40,000 | 70.2 | (2.9) | 55,000 | 68.6 | (2.4) | Not significant |
| 2. Medium-Low | 10,000 | 19.9 | (2.7) | 15,000 | 17.5 | (1.9) | Not significant |
| 3. Medium-High | na | na | | 5,000 | 8.5 | (1.5) | |
| 4. High | na | na | | na | na | | |
| 45-54 Years Old | | | | | | | |
| 1. Low | 20,000 | 55.8 | (3.0) | 25,000 | 47.2 | (2.8) | Not significant* |
| 2. Medium-Low | 10,000 | 21.7 | (2.4) | 10,000 | 22.8 | (2.4) | Not significant |
| 3. Medium-High | 5,000 | 12.8 | (2.2) | 10,000 | 14.6 | (1.9) | Not significant |
| 4. High | 5,000 | 9.7 | (1.6) | 10,000 | 15.4 | (2.3) | Not significant** |
| 55-64 Years Old | | | | | | | |
| 1. Low | 10,000 | 39.6 | (3.5) | 15,000 | 35.4 | (2.6) | Not significant |
| 2. Medium-Low | 10,000 | 32.2 | (3.2) | 10,000 | 29.4 | (2.5) | Not significant |
| 3. Medium-High | 5,000 | 14.8 | (2.2) | 10,000 | 19.1 | (2.3) | Not significant |
| 4. High | 5,000 | 13.4 | (2.2) | 5,000 | 16.1 | (2.1) | Not significant |

SE - Standard error of the percent prevalence.

na - Percent prevalence not available due to a low number of survey responses and poor statistical validity.

* - Significantly lower at $p < 0.10$;

** - Significantly higher at $p < 0.10$.

¹ - Severity of chronic conditions was calculated as described in the **Methods** section.

² - Medicaid eligibility was based on household size and annual income; see **Methods** section.

³ - Significance test for higher or lower percent prevalence, 2014-2017, compared to 2011-2014, as described in the **Methods** section.

Source : Behavioral Risk Factor Surveillance System, U.S. Centers for Disease Control and Prevention, (<https://www.cdc.gov/brfss/index.html>), accessed on November 6, 2018.

During years 2014-2017, combined, the number of Medicaid-eligible adults, by age group, in South Carolina with more than Low Severity chronic conditions was estimated to total 25,000 adults, 20,000 adults, 30,000 adults, and 25,000 adults among 18-34 year olds, 35-44 year olds, 45-54 year olds, and 55-64 year olds, respectively (Table III).

These data indicate that, relative to years 2011-2014, combined, chronic conditions among Medicaid-eligible adults shifted toward greater severity among older adults. These results are consistent with an age-dependence observed with most chronic conditions,⁸ and the general aging of the South Carolina adult population.⁹

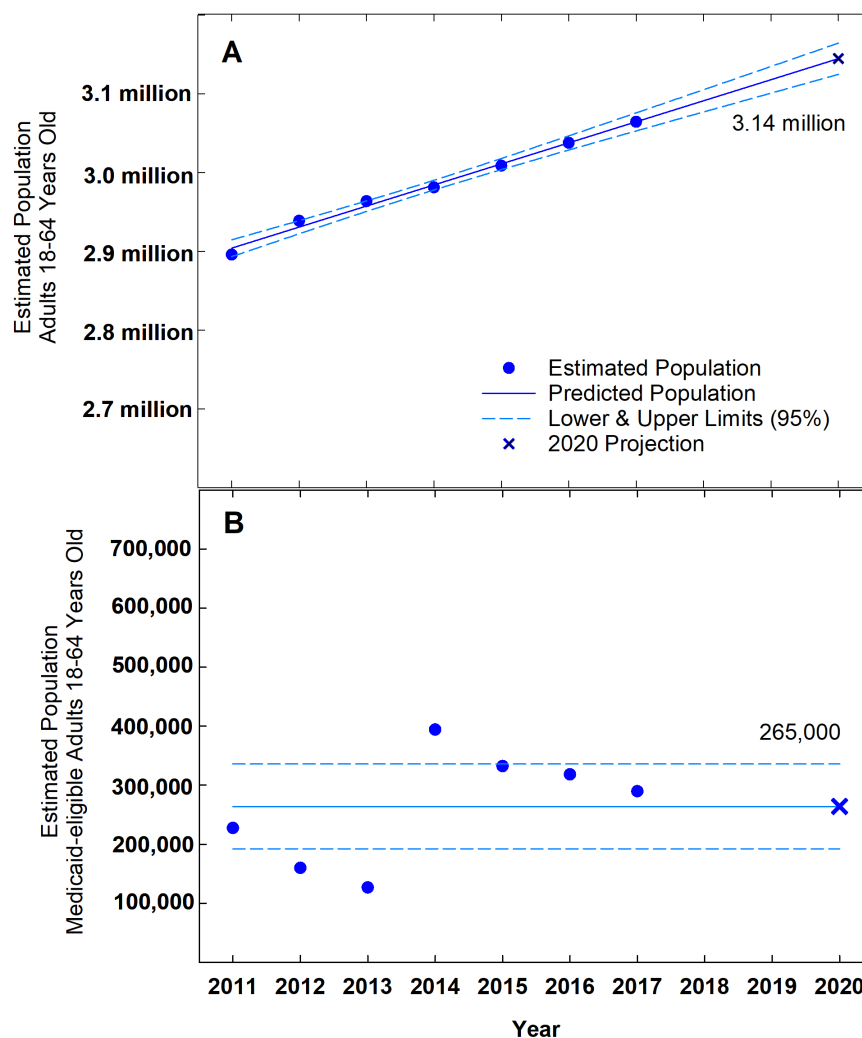
TREND AND PROJECTED POPULATION OF ALL ADULTS AND MEDICAID-ELIGIBLE ADULTS IN SOUTH CAROLINA

Linear regression analysis of population estimates for all adults less than 65 years old in South Carolina from years 2011 through 2017 resulted in a significant increasing trend of 25,000 adults per year ($p < 0.0001$), from a low of 2.90 million adults in 2011 to a high of 3.06 million adults in 2017 (Figure 1A). Projecting this annual increase beyond 2017, the population of adults less than 65 years old in year 2020 is expected to be 3.14 million adults (95% CI: 3.12 million - 3.16 million adults). These results are consistent with recent projected population estimates of adults 18-64 years old conducted independently in South Carolina.¹⁰

The estimated population of Medicaid-eligible adults less than 65 years old varied from 230,000 in year 2011 to 290,000 in year 2017 (Figure 1B), however this apparent increase was not statistically significant ($p=0.16$). Assuming a continued stable population, the number of Medicaid-eligible adults in year 2020 is expected to be 265,000 (95% CI: 190,000 - 335,000 adults).

A possible reason for the apparent, yet insignificant, increase among Medicaid-eligible adults in South Carolina may be related to the sampling methodology used for the BRFSS survey within the state. In 2011, the U.S. Centers for Disease Control and Prevention initiated a sampling strategy that included cell phones, in addition to traditional landline phones.¹¹ The rationale for this change was the increasing use of cell phones in households across the nation. In addition, as noted in a recent report from July-December 2017, more than half of adults live in wireless-only households, and a higher proportion of these adults are younger, of low-income, and/or of minority race/ethnicity.¹²

Figure 1
Population Trends Among Adults 18-64 Years Old
South Carolina, 2011-2017, Projected to 2020



Although initiated in some states in year 2011, a separate variable for adult household size among cell phone responses was not implemented until the 2014 survey year (C. Stone, personal communication; **Figure 1B**). This change may explain the dramatic increased estimate of Medicaid-eligible adults observed from year 2013 (125,000 adults) to year 2014 (395,000 adults). In years 2014 through 2017, there was an apparent decreasing drift in the population of Medicaid-eligible adults. This may be due to the constant use in South Carolina of a cell phone sample size less than 50%, despite the current estimate of 57% cell phone only use during year 2017 for the southern region of the nation.¹² The Pew Foundation recently announced that it would increase cell phone sample size to 75%,¹³ and a similar increase in South Carolina would likely increase the reliability and validity of estimates for the Medicaid-eligible population within the state. Despite these limitations, the differences in the Medicaid-eligible population observed from years 2011-2014 to years 2014-2017 was statistically insignificant (**Table III**), suggesting that further analysis across all available years is appropriate.

■ TREND AND PROJECTED POPULATION OF MEDICAID-ELIGIBLE ADULTS IN SOUTH CAROLINA WITH DISABILITIES AND CHRONIC CONDITIONS

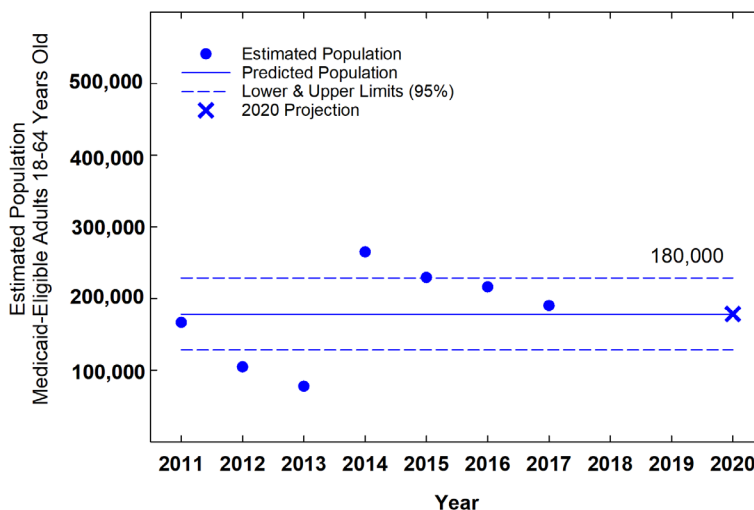
Trends in disability were not possible due to a limited number of years during which the full set of disability questions was included in the South Carolina BRFSS (2014 through 2017). A preliminary linear regression over these four years was not statistically significant ($p = 0.113$). Assuming a continued stable population, the number of Medicaid-eligible adults with disabilities is expected to be 135,000 (95% CI: 120,000 – 150,000 adults; data not shown).

As shown previously for year 2017 (**Table II**), the largest proportion of Medicaid-eligible adults less than 65 years old in South Carolina were those who reported Low Severity chronic conditions. From years 2011 through 2017, the estimated number of Medicaid-eligible adults with Low Severity chronic conditions varied from a low of 80,000 adults in year 2013 to a high of 265,000 adults in year 2014 (**Figure 2**). This dramatic increase from the 2013 to 2014 surveys is consistent with the previously discussed change in BRFSS sampling methodology (**Figure 1B**).

Linear regression analysis across the available survey years of 2011 through 2017 was not statistically significant ($p = 0.218$), suggesting an average stable population of 180,000 Medicaid-eligible adults with Low Severity chronic conditions (**Figure 2**). Assuming continued stability in this population, the expected number of Medicaid-eligible adults with Low Severity chronic conditions is expected to remain at 180,000 adults (95% CI: 150,000 - 205,000 adults).

The number of Medicaid-eligible adults reporting one or more chronic conditions of higher severity (Medium-Low, Medium-High, or High Severity) represented a smaller proportion of the total population of Medicaid-eligible adults less than 65 years old (**Figure 3**). For Medicaid-eligible adults with Medium-Low Severity chronic conditions (**Figure 3A**), the

Figure 2
Population Trend Among Medicaid-Eligible Adults 18-64 Years Old
Low Severity Chronic Conditions
South Carolina, 2011-2017, Projected to 2020



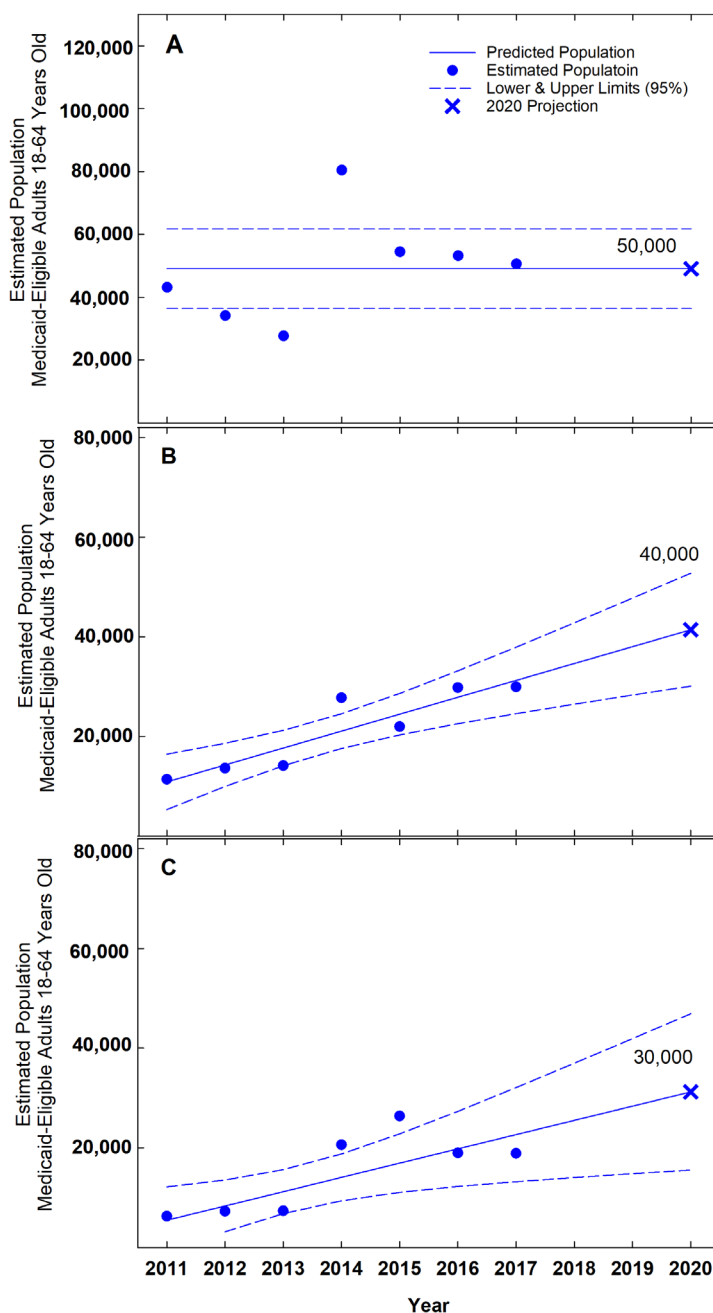
trend in population estimates from years 2011 through 2017 was not statistically significant ($p = 0.309$). The average population across all years was 50,000 adults, and assuming continued stability, the year 2020 projected estimate is expected to remain at 50,000 adults (95% CI: 35,000 - 60,000 adults).

The estimated population of Medicaid-eligible adults with Medium-High Severity chronic conditions increased significantly from years 2011 through 2017 ($p = 0.004$; **Figure 3B**), from a low of 10,000 adults in year 2011 to a high of 30,000 adults in year 2017. Assuming this trend continues, the estimated population of Medicaid-eligible adults with Medium-High Severity chronic conditions is expected to be 40,000 adults in year 2020 (95% CI: 30,000 - 55,000 adults).

The estimated population of Medicaid-eligible adults with High Severity chronic conditions also increased significantly from a low of 5,000 adults in year 2011 to a high of 20,000 adults in year 2017 ($p = 0.022$; **Figure 3C**). Assuming a continuing trend, the estimated population of Medicaid-eligible adults with High Severity conditions in year 2020 is expected to be 30,000 adults (95% CI: 15,000 - 50,000 adults).

These trend analyses suggest that, whereas Medicaid-eligible adults less than 65 years old in South Carolina are expected to remain stable in the next few years, the proportion of adults with Medium-High or High Severity chronic conditions is expected to continue its increasing trend. No single chronic condition is itself of high enough weight in the scoring methodology to constitute a Medium-High or High Severity condition (see **Methods** section, **Table A**), indicating that these higher severity categories require at least two co-occurring chronic conditions. Since the weights for each chronic condition are based on overall hospitalization costs per event, it is expected that hospitalization costs due to these chronic conditions will likely increase. The estimated increase in hospitalization costs among Medicaid-eligible adults in South Carolina, as well as the loss of quality of life resulting from the accumulation of chronic conditions with age, need to be further studied.

Figure 3
Population Trend Among Medicaid-Eligible Adults 18-64 Years Old
Medium-Low (A), Medium-High (B), and High Severity (C) Chronic Conditions
South Carolina, 2011-2017, Projected to 2020



The trends described in this report were conducted using annual estimates over a limited number of seven years (2011 through 2017), with a change in survey sampling methodology from 2013 to 2014. Despite these limitations, chronic conditions of Medium-High Severity and High Severity increased statistically over time. Trends that were not statistically significant may be due to a truly stable trend, but may also be due to the internal error of estimates or the limited number of data points. True trends in these cases may be overshadowed by the regression error. To partially control for these limitations, regression analysis was conducted by weighting each regression point according to the inverse of the standard error associated with each estimate.

METHODS

POPULATION-BASED ESTIMATES AND SIGNIFICANCE TESTING

Population-based estimates were obtained from the Behavioral Risk Factor Surveillance System (BRFSS). Files for survey years 2011 through 2017, which included responses from all U.S. states and territories, were downloaded from the BRFSS website at the U.S. Centers for Disease Control and Prevention.¹ Responses assigned to South Carolina were extracted from the dataset (N=81,605), containing the following annual sample sizes: 12,948 (2011); 12,759 (2012); 10,717 (2013); 11,027 (2014); 11,607 (2015); 11,236 (2016); and 11,311 (2017).

Population estimates and percent prevalence estimates were generated with SAS software (Cary, NC), using the PROC SURVEYFREQ program,¹⁴ and using weights and strata provided by CDC.¹⁵ Estimates with a 20% or higher coefficient of variation were not included in this report. All responses of “Don’t Know/Not Sure” or “Refused” were coded as missing. Population estimates were rounded to the nearest 5,000 number.

Statistical significance for percent prevalence estimates was conducted with one-sided, two-population binomial tests for either higher or lower percent prevalence. Testing was conducted at the $p=0.05$ level, unless noted otherwise in this report.

The BRFSS has been classified as EXEMPT by the U.S. Centers for Disease Control and Prevention Human Research Protection Office (protocol number 2988.0).

SEVERITY OF CHRONIC CONDITIONS

As shown in **Table IV**, scores for severity of chronic conditions were determined from cumulative positive responses to the “Chronic Conditions” section of the Behavioral Risk Factor Surveillance System (BRFSS), which is a core section of the survey offered annually. Each positive response for a respondent was weighted by the hospitalization costs for each of the conditions in South Carolina during 2016, as reported by the online Health Utilization–Online Query System maintained by the South Carolina Revenue and Fiscal Affairs Office.¹⁶ A total cumulative weighted score for each respondent was then calculated as the total of all positive responses to the chronic conditions. Respondents who reported having no chronic conditions received a score of zero, and the hypothetical maximum possible core for respondents reporting diagnoses for all queried chronic conditions was set at 10.000. This sample of BRFSS responses produced scores that ranged from zero (no reported chronic conditions; $n=38,130$ responses), to a high score of 8.03 ($n=4$ responses). A hospitalization cost estimate for diagnosed arthritis was not available, therefore this chronic condition, though an important factor for quality of life, was not included in this analysis.

Table IV
Chronic Condition Severity Scoring Process

| Condition | Behavioral Risk Factor Surveillance System (BRFSS) Questions (Chronic Conditions Section) | Overall Cost per Hospitalization (2016) | Score Weight |
|---|---|---|---------------|
| <i>Has a doctor, nurse, or other health professional EVER told you that you had any of the following?</i> | | | |
| Coronary heart disease or heart attack | (Ever told) you that you had a heart attack also called a myocardial infarction? (Ever told) you had angina or coronary heart disease? | \$63,803 | 1.962 |
| Skin cancer and other cancers | (Ever told) you had skin cancer? (Ever told) you had any other types of cancer? | \$58,870 | 1.810 |
| Cardiovascular disease or stroke | (Ever told) you had a stroke? | \$57,548 | 1.770 |
| Diabetes | (Ever told) you have diabetes? | \$34,621 | 1.065 |
| Kidney disease | (Ever told) you have kidney disease? Do NOT include kidney stones, bladder infection or incontinence. | \$33,589 | 1.033 |
| COPD | (Ever told) you have Chronic Obstructive Pulmonary Disease or (COPD), emphysema or chronic bronchitis? | \$33,565 | 1.032 |
| Asthma | (Ever told) you had asthma? | \$20,023 | 0.616 |
| Depression | (Ever told) you have a depressive disorder, including depression, major depression, dysthymia, or minor depression? | \$23,152 | 0.712 |
| Arthritis | (Ever told) you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia? | - | 0.000 |
| Total | | \$325,171 | 10.000 |

The following ranges were established for the severity categories:

| CHRONIC CONDITION SEVERITY CATEGORY | SCORE |
|-------------------------------------|----------------|
| 1. Low Severity | 0 - 0.999 |
| 2. Medium-Low Severity | 1.000 - 1.999 |
| 3. Medium-High Severity | 2.000 - 3.499 |
| 4. High Severity | 3.500 - 10.000 |

For the BRFSS in years 2011 through 2017, combined, the total number of respondents classified in each severity category was: 46,385 respondents with Low Severity conditions; 16,237 respondents with Medium-Low Severity conditions; 5,538 respondents with Medium-High Severity conditions; and 2,170 respondents with High Severity conditions.

MEDICAID-ELIGIBLE ADULTS

Medicaid eligibility was calculated from responses in the BRFSS to the following questions: “How many members of your household, including yourself, are 18 years of age or older?”; “How many children less than 18 years of age live in your household?”; “Are you currently pregnant?”; “Is your annual household income from all sources – less than \$10,000? Less than \$15,000? Less than \$20,000? Less than \$25,000? Less than \$35,000? Less than \$50,000? Less than \$75,000? At least \$75,000?” Responses to household income were then categorized into five groups: Less than \$15,000, \$15,000-\$24,999, \$25,000-\$34,999, \$35,000-\$49,999, \$50,000 or more. Responses to the other questions were used to calculate household size and federal poverty level. The 2017 federal poverty level was defined in the table below. Since responses to the BRFSS are for income ranges, the determination of household poverty level was an approximation.

| Persons in Household | 100% Federal Poverty Level | Persons in Household | 100% Federal Poverty Level |
|----------------------|----------------------------|----------------------|----------------------------|
| One | \$15,060 | Two | \$20,290 |
| Three | \$25,520 | Four | \$30,750 |
| Five | \$35,980 | Six | \$41,210 |
| Seven | \$46,440 | Eight | \$51,670 |

\$5,200 for each additional person

Source: <https://obamacare.net/2017-federal-poverty-level/>

In this study, Medicaid-eligibility in South Carolina was determined as described in **Table V**, in which adult respondents living in households below 0.62% of the federal poverty level were eligible for Medicaid. Pregnant respondents living below 194% of the federal poverty level were also classified as eligible for Medicaid.

Table V
Determination of Medicaid-Eligibility

| Total Number in Household (Adults and Children) | Income Group for Eligibility |
|---|------------------------------|
| <i>Household Without Pregnant Adult Female</i> | |
| One adult (respondent only) | not eligible |
| Two or three total | less than \$15,000 |
| Four through seven total | less than \$25,000 |
| Eight through eleven total | less than \$35,000 |
| At least twelve total | less than \$50,000 |
| <i>Household With Pregnant Adult Female</i> | |
| One total (respondent only) | less than \$25,000 |
| Two total | less than \$35,000 |
| Three or four total | less than \$50,000 |

TREND ANALYSIS AND PROJECTION ESTIMATES

Linear regression was conducted with PROC GLM using BRFSS population estimates from 2011-2017, and weighting each annual estimate according to the inverse of its standard error. This approach allowed estimates with less reliability to have less weight in the regression model. The regression models with statistically significant annual rates of change were extended from 2017 to 2020 to produce projected estimates, with associated 95% confidence intervals for the regression. When the regression results showed statistically insignificant annual rates, all annual estimates across years 2011 through 2017 were averaged, with 95% confidence intervals, and extended to 2020.

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