COLORECTAL CANCER DISEASE
IN ARKANSAS

Colorectal cancer (CRC) is the 3rd most diagnosed and deadliest cancer in Arkansas and the U.S. among men and women.[1] Screening prevents CRC and helps with early detection.
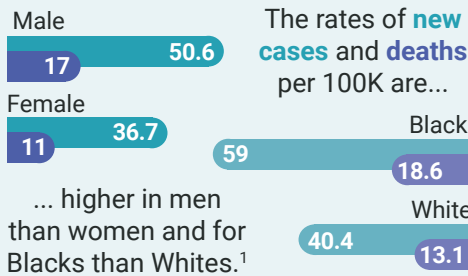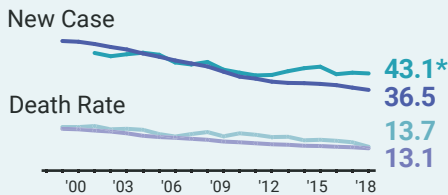
1,500 Arkansas will be newly diagnosed with CRC, and 500 Arkansans will die, in 2021.[2]

From 2014 to 2018, Arkansas ranked:[1]

5th in highest rate of new CRC cases in the U.S.

8th in highest rate of CRC deaths in the U.S.

**Arkansas's** CRC new case and death rates per 100K are above **U.S.** rates.[1]

New Case
Death Rate

43.1*
36.5
13.7
13.1

'00 '03 '06 '09 '12 '15 '18

Male
17 | 50.6

Female
11 | 36.7

The rates of **new cases** and **deaths** per 100K are...

Black
59 | 18.6

White
40.4 | 13.1

... higher in men than women and for Blacks than Whites.[1]

57.5% of the 1,528 new CRC diagnoses in 2017 were **late-stage**.[3]

Screening is the key to reducing CRC new cases and deaths.[4,5]

23,182 (or 5%) of Arkansans ages 50–75 enrolled in commercial, traditional Medicaid or Arkansas Works, or Medicare coverage **had stool-based tests** in 2017.

2,780 (12%) of these individuals **had follow-up colonoscopies**.[3]

12%
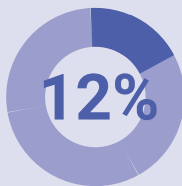
In 2021, Arkansas law and the USPSTF** **lowered the screening age range** from 50–75 to 45–75 years.

45 years screening age

Based on this change:

2,429 Arkansans ages 45 to 49 are expected to have stool-based tests.

304 of these will have follow-up colonoscopies.[3]

Despite increased accessibility, CRC screenings remain low compared to breast and cervical cancer screenings.

Barriers to screening include:
- financial barriers, such as cost-sharing or lack of health coverage
- failure to recommend screening by providers
- transportation.
- language barriers
- patient fear[6]

Removing financial barriers such as cost-sharing is an effective way to improve screening.[7,8]

Starting on January 1, 2022, most Arkansans ages 45 to 75 will no longer have out-of-pocket costs for follow-up colonoscopies.

Other states, such as Texas and Rhode Island, have also eliminated cost-sharing for these procedures.

Why is this important?

3 out of 5

eligible Arkansans*** who had a follow-up colonoscopy had cost-sharing in 2017.[3]

A study among Medicare enrollees found that removing the 20% coinsurance for a colonoscopy with a polyp removal or a follow-up colonosocpy would be **cost effective** if the screening rate increased by only 0.6 percentage points, from 60% to 60.6%.[7]

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FIGHT COLORECTAL CANCER

TIPS FOR CREATING AN ADVOCACY INFOGRAPHIC FOR COLORECTAL CANCER POLICY CHANGES

Infographics are useful tools that tell a visual narrative using data, graphics, and concise messages. They are used to display complex information in a brief and easy-to-understand format. This tip sheet is intended to help organizations develop content for infographics that can be used for the advocacy of colorectal cancer (CRC) screening policy changes.

CRC Advocacy Infographic Tips

1. When thinking through what to include in the infographic, first identify the intended audience. This will help inform what level and type of information to include.

2. Develop the the key messages you want the intended audience to take away from the infographic. In the example infographic below, the goal is to show that evidence indicates Arkansans are suffering and dying from CRC, screening is effective as a preventive measure against CRC, and a promising way to improve screening is to removing cost-sharing for follow-up colonoscopies. The key messages are:

   • "1,500 Arkansas will be newly diagnosed with CRC, and 500 Arkansans will die, in 2021."
   • "Screening is the key to reducing CRC new cases and deaths."
   • "Removing financial barriers such as cost-sharing is an effective way to improve screening."

3. Fill in the infographic with data and information that logically flow with the key messages. The flow in the example infographic below begins with a visual portrayal, with data, of the impact and severity of CRC among Arkansans and sub-populations and provides comparisons to the U.S. Next, the infographic discusses current recommendations and the state of screening in Arkansas. Lastly, the infographic concludes with information about how the removal of cost-sharing can benefit Arkansans.

4. Use reliable data sources for the visualizations. See the section "Sources for Colorectal Cancer Disease and Screening Data" for some CRC sources.

5. Use plain language and simple graphics and charts to make the infographic easy to understand.

Content Ideas

In this section, ideas for content to fill in the infographic after the key messages are developed are shared using the example infographic.
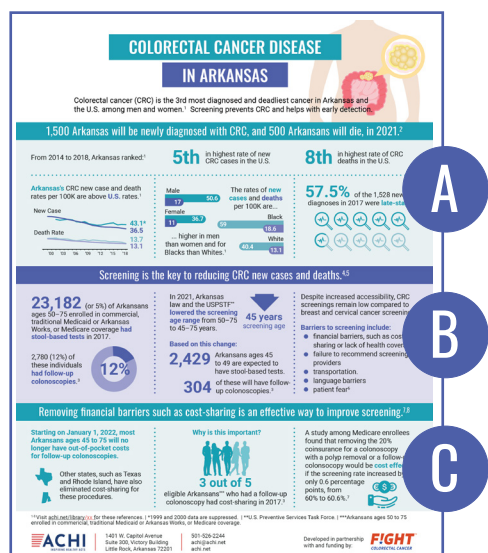
A. CRC DISEASE FACTS AND DATA

• How do your state's CRC incidence and mortality rankings compare to other states and the U.S. as a whole?
• What is the trend of CRC incidence and mortality in your state and compared to the U.S.?
• Are there existing studies by your local health department, educational institutions, and/or cancer research/advocacy organizations that can be included?
• Does CRC disproportionately impact certain sub-populations?
• What portion of the population with a diagnosis has late-stage CRC?

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B. CRC SCREENING FACTS AND DATA

- What are the current U.S. Preventive Services Task Force recommendations and the state laws regarding CRC screenings?
- What is the screening rate in your state?
- What are the barriers to screening?
- What types of screening are most utilized in your state and/or in the U.S.?
- What types of screenings are available?

C. DESIRED POLICY CHANGES

- What policy changes to screenings are you advocating for?
- What are the benefits to increased screenings?
- What are the benefits of each policy change, e.g., cost-effectiveness?
- Are there existing literature and/or evidence that show the policy changes are promising approaches?
- Have these policy changes been implemented in other states?

Sources for Colorectal Cancer Disease and Screening Data

1. **Behavioral Risk Factor Surveillance System** for national- and state-level CRC screening rates. The most current year of data is 2018.
   Link: https://www.cdc.gov/brfss/brfssprevalence/

2. **Cancer Statistics At a Glance Data Viz** tool by the Centers for Disease Control and Prevention. National-, state-, and county-level data on numbers, rates, and trends of new cancer cases and cancer deaths are available are available for years 2014–2018. Demographic data are available by sex, and race/ethnicity.
   Link: https://gis.cdc.gov/Cancer/USCS/#/AtAGlance/

3. **Cancer Statistics Center** by the American Cancer Society. National and state data on numbers and rates of new cancer cases and cancer deaths are available. The most current years of data are 2021 for new cancer and cancer deaths, 2013–2017 for incidence rates, and 2014–2018 for death rates. Demographic data are available by sex.
   Link: https://cancerstatisticscenter.cancer.org/#!/

4. **State Cancer Profiles** by the National Cancer Institute. National-, state-, and county-level data on numbers, rates, and trends of new cancer cases and cancer deaths are available. The most current years of data are 2014–2018 for incidence rates and 2015–2019 for death rates. Demographic data are available by age, race, and sex.
   Link: https://statecancerprofiles.cancer.gov/index.html

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ASSESSMENT OF COLORECTAL CANCER SCREENINGS AND DISEASE PREVALENCE IN ARKANSAS

ACHI
September 30, 2021

This report was funded by and developed in partnership with:

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COLORECTAL CANCER

Background

Colorectal cancer (CRC) is the third most commonly diagnosed cancer and third deadliest cancer among men and women in Arkansas and the United States. From 2014 to 2018, Arkansas had the fifth-highest annual average rate of new CRC cases at 44.0 per 100,000 persons and the eighth-highest annual average rate of deaths at 15.6 per 100,000 persons.[1,i] The American Cancer Society estimates that 1,500 Arkansans will be newly diagnosed with CRC and 500 Arkansans will die from CRC in 2021.[2]

Since the mid-1980s, overall CRC incidence and death rates have declined nationally, in part due to the uptake in CRC screenings. However, not all groups are experiencing these declines. For example, the trends indicate the incidence rates per 100,000 persons for persons age 49 or under and ages 50 to 64 rose an average of 2.2% and 1.0% each year from 2012 to 2016, respectively.[ii] However, the incidence rate fell by an average of 3.3% each year for persons age 65 or older.[i] Differences are also apparent between racial and ethnic groups: Since the 1980s, CRC incidence and death rates have remained considerably higher among Blacks than among Whites and Hispanics.[3]

In Arkansas, the trend for overall CRC incidence rates per 100,000 persons was stable at an average increase of 0.3% each year from 2013 to 2017. Among Arkansans age 49 and under, the incidence rate was stable at an average increase of 3.4% each year in the same five-year period; however, it declined by an average of 1.8% each year among Arkansans age 50 and over.[4]

Advances in screenings for colorectal cancer, particularly stool-based tests, have likely increased adherence to screening recommendations,[3] as these tests are relatively simple to administer, less expensive and less invasive than traditional equipment-based diagnostic tools (e.g., colonoscopy), and can be done in an outpatient setting or patient's home. These tests include the fecal immunochemical test (FIT), high-sensitivity guaiac-based fecal occult blood test (gFOBT), and multitargeted stool DNA test (Cologuard).

Despite the increased accessibility of stool-based testing, CRC screening remains low compared to screenings for breast and cervical cancers. Barriers to screening include patient fear, lack of appropriate insurance coverage, absence of a primary source of health care, failure of providers to provide screening recommendations, lack of transportation, language barriers, and lack of information about available resources or recommendations. Notably, these barriers may be prevalent in populations that traditionally lack socioeconomic and educational resources, such as low-income communities and minority communities.[3]

Recognizing the importance of CRC screenings, the Arkansas General Assembly enacted Act 779 of 2021, which will lower the age range for covered colorectal cancer preventive screenings from 50 and above to 45 and above, effective Jan. 1, 2022. The new law will also prohibit cost-sharing for a follow-up colonoscopy — a colonoscopy performed at any time after a positive or abnormal result from a non-colonoscopy colorectal cancer screening test. The

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[i] Rates are age-adjusted to the 2000 U.S. population standard.
[ii] Appendiceal tumors not included.

law will apply to most individual and group insurance policies, including those covering Medicaid expansion beneficiaries through the Arkansas Works program and the state and public school employee health benefit plan. Act 779 aligns with the U.S. Preventive Service Task Force's (USPSTF) updated CRC screening recommendation released May 18, 2021, which adds ages 45 to 49 to the ages for which CRC screening is recommended. For that age group, CRC is a "B" recommendation — a service that has "high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial."[5] This change requires CRC screenings to be covered as preventive services without cost-sharing, as mandated by the Affordable Care Act for USPSTF A and B recommendations for non-grandfathered private health insurance plans, Medicare, Medicaid expansion plans, and traditional Medicaid plans.[6]

Purpose of the Report

At the request of Fight Colorectal Cancer, ACHI conducted an assessment to identify gaps in access to colorectal screenings, including those related to follow-up colonoscopies and cost-sharing. Fight Colorectal Cancer is a patient-empowerment and advocacy organization with a mission to cure colorectal cancer through patient support, policy change, and research. The assessment examined current prevalence of and access to colorectal cancer (CRC) screenings and CRC disease incidence. ACHI also projected the number of Arkansans ages 45 to 49 who could be screened based on the final 2021 USPSTF recommendation to lower the CRC screening age to 45. Where available, ACHI generated demographic and geographic profiles to identify differences in marginalized or underserved populations.

More specifically, this report provides an assessment of the following:

o   The number of persons in Arkansas for whom a non-invasive CRC screening test (FIT, gFOBT, Cologuard) claim was paid.
o   The number of persons in Arkansas for whom a non-invasive CRC screening test and follow-up colonoscopy claim was paid.
o   The number of persons who had a copay for a follow-up colonoscopy.
o   The number of persons diagnosed with CRC by age, including ages 45–49.
o   The number of late-stage CRC diagnoses by age.
o   The number of persons ages 45 to 49 who would be screened based on the final USPSTF recommendation.

Analytic Approach

This assessment analyzed commercial coverage, traditional Medicaid (including the state's Medicaid expansion program, Arkansas Works), and Medicare medical claims of Arkansas residents ages 50 to 75 and 45 to 49 who met the guidelines for a colorectal cancer screening based on the 2020 USPSTF recommendation.[7] Arkansans included in the study population for the study duration of January 2017 to December 2018 were assessed for evidence of any history of stool-based tests and follow-up colonoscopies. For the purposes of the assessment, a follow-up colonoscopy was defined as a colonoscopy completed within six months of a stool-

based test. Stool-based tests included guaiac fecal occult blood tests (gFOBT), fecal immunochemical tests (FIT), and the stool DNA test Cologuard.

For individuals ages 50 to 75 who were screened and had follow-up colonoscopies, screening rates and counts for stool-based tests and follow-up colonoscopies were computed by coverage type, time to follow-up colonoscopy (one, three, or six months), race (Medicare only), and urban or rural geographic area. As current Medicare data are available through December 2018, follow-up colonoscopies within six months of an abnormal stool-based test that occurred after June 30, 2018, may not be reflected in the data reported to the Arkansas All-Payer Claims Database (APCD). Consequently, analyses regarding follow-up colonoscopies within six months in 2018 that include Medicare data are preliminary and only includes stool-based test data for Jan. 1 through June 30, 2018.[iii] Data for stool-based tests and follow-up colonoscopies within six months for full-year 2018 are available for Medicaid/Arkansas and commercial coverage analyses.

Claims payment and evidence of any cost-sharing for a stool-based test were assessed for variation by payer type and test type. Screening rates and counts for individuals ages 45 to 49 were also computed to project the stool-based test and follow-up colonoscopy rates and counts for persons ages 45 to 49.

To assess CRC incidence and the number of late-stage diagnoses by age group, ACHI analyzed cancer data from the Arkansas Cancer Registry. Colon and rectum recodes from SEER Site Recode ICD-O-3/WHO 2008 were used to identify the number of individuals who had a CRC diagnosis in 2016 and 2017.

DATA SOURCES

Data for the assessment were obtained from the Arkansas Healthcare Transparency Initiative's All Payer Claims Database (APCD), which is housed by ACHI. The APCD contains data for the majority of healthcare-covered lives in Arkansas including medical, pharmacy, and dental claims and enrollment and provider files, as well as death and birth certificates and cancer registry data. The version of the APCD used for this analysis includes data from 2013 through December 2018 for Medicare and 2013 through June 2020 for Arkansas Medicaid, fully-insured private payers, and self-insured payers receiving state funds. The cancer registry data is from January 2013 through December 2017. Data are submitted to the APCD on a quarterly basis pursuant to a mandate authorized by the Arkansas Healthcare Transparency Initiative Act of 2015. The data include some geographic and demographic information and a unique identifier permitting tracking of an individual over time and across datasets, but they do not include direct personal identifiers such as name or street address.

[iii] For the time to follow-up colonoscopy analysis, the dates were extended for follow-up colonoscopies that occurred within one month or three months from the stool-based test in partial-year 2018. These dates include: Jan. 1, 2020, through Nov. 30, 2020, for the one-month analysis and Jan. 1, 2020, through Sept. 30, 2020, for the three-month analysis.
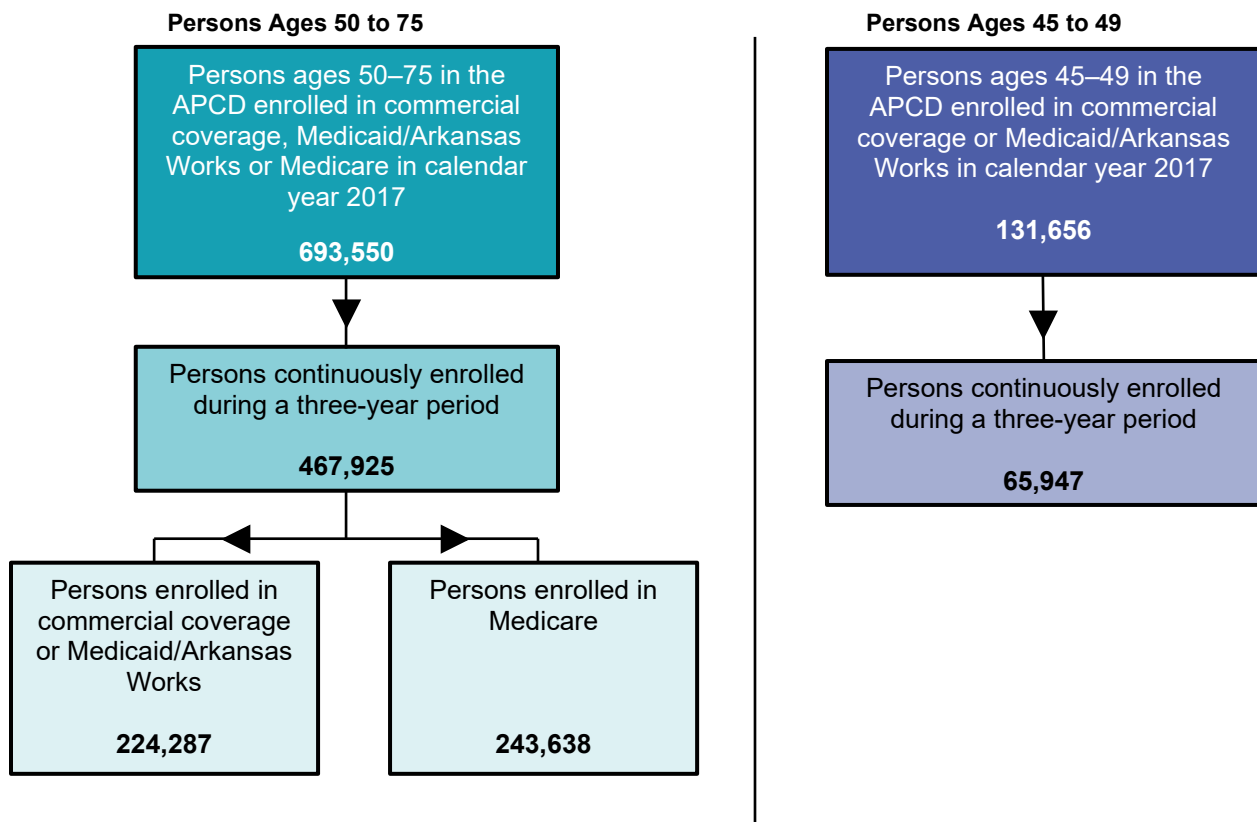
STUDY POPULATION

The overall study population included persons enrolled in commercial coverage, Medicaid (including Medicaid expansion/Arkansas Works), and Medicare. Figure 1 shows the flow of the individuals from the APCD who were included in the study population for year 2017. The study population flow is only displayed for the 2017 cohort because this is the first year of overlap for the selected overall study periods for commercial coverage and Medicaid/Arkansas Works enrollees and the Medicare enrollee population.

To be included in our overall study population, individuals had to be continuously enrolled for the entire study period; therefore, the individuals present in the 2017 cohort are included in subsequent study years. Because this analysis includes separate age groups and multiple study years, some individuals in the 45-to-49-year-old age group moved into the 50-to-75-year-old age group into subsequent study years.

The inclusion criteria among the commercial coverage and Medicaid/Arkansas Works enrollees included individuals age 45 as of Jan. 1, 2017, to age 75 as of Dec. 31, 2019, who were continuously enrolled from 2017 to 2019. "Continuously enrolled" is defined as having no gap in coverage or having one coverage gap of 45 days or less.

For Medicare enrollees, the inclusion criteria included individuals who reached age 65 as of Jan. 1, 2016, to age 75 as of Dec. 31, 2018, and who were continuously enrolled from 2016 to 2018.

FIGURE 1: FLOW CHART OF THE STUDY POPULATION, 2017

Persons Ages 50 to 75

Persons ages 50–75 in the APCD enrolled in commercial coverage, Medicaid/Arkansas Works or Medicare in calendar year 2017

693,550

Persons continuously enrolled during a three-year period

467,925

Persons enrolled in commercial coverage or Medicaid/Arkansas Works

224,287

Persons enrolled in Medicare

243,638

Persons Ages 45 to 49

Persons ages 45–49 in the APCD enrolled in commercial coverage or Medicaid/Arkansas Works in calendar year 2017

131,656

Persons continuously enrolled during a three-year period

65,947

LIMITATIONS

As with any claims-based data analysis, this analysis is subject to inherent provider-level billing and coding variation. While this is a known limitation of healthcare claims-based data analysis, the team at ACHI uses evidence-based research methods and conducts multi-layer data and analytic validation processes. Additionally, as discussed above, analyses with follow-up colonoscopies within six months in 2018 that include Medicare data are preliminary and only include stool-based test data for Jan. 1, 2018, through June 30, 2018, due to availability of Medicare data. The data also did not allow us to assess whether stool-based tests that were administered resulted in a positive screen, but follow-up colonoscopies observed in the the data were in the range of reported positive screens for gFOBTs, FITs, and Cologuard.[8,9,10]

Claims-based costs of follow-up colonoscopies are not included in this report due to resource limitations and the complexity of defining all costs associated with a follow-up colonoscopy (across multiple claim lines), as opposed to identifying follow-up colonoscopy occurences based on singular procedure codes. Assessment of costs associated with follow-up colonoscopies warrants further analysis.

Findings

The overall study population beginning in 2017 included 467,925 individuals ages 50 to 75 who were enrolled in commercial, Medicaid (including the Medicaid expansion/Arkansas Works population), or Medicare coverage. Nearly 16% (73,008) of the study population were ages 50 to 54, 16.8% (78,436) were ages 55 to 59, 13.3% (62,277) were ages 60 to 64, 24.8% (115,899) were ages 65 to 69, and 29.6% (138,305) were ages 70 to 75. More than half, 54.8% (256,636), were female, and 45.1% (211,196) were male. Fifty-seven percent of the study population lived in an urban area (265,546), and 43.1% (201,480) lived in a rural area. 2017 characteristics displayed below are representative of overall study period characteristics due to the previously described continuous enrollment inclusion criteria (Figure 2).

FIGURE 2: STUDY POPULATION CHARACTERISTICS, 2017

Study Population: 467,925

Age Groups

- 50 to 54: 15.6%
- 55 to 59: 16.8%
- 60 to 64: 13.3%
- 65 to 69: 24.8%
- 70 to 75: 29.6%

Gender*

- Female 54.8%
- Male 45.1%

Geographic Location**

43.1% live in rural areas
56.7% live in urban areas
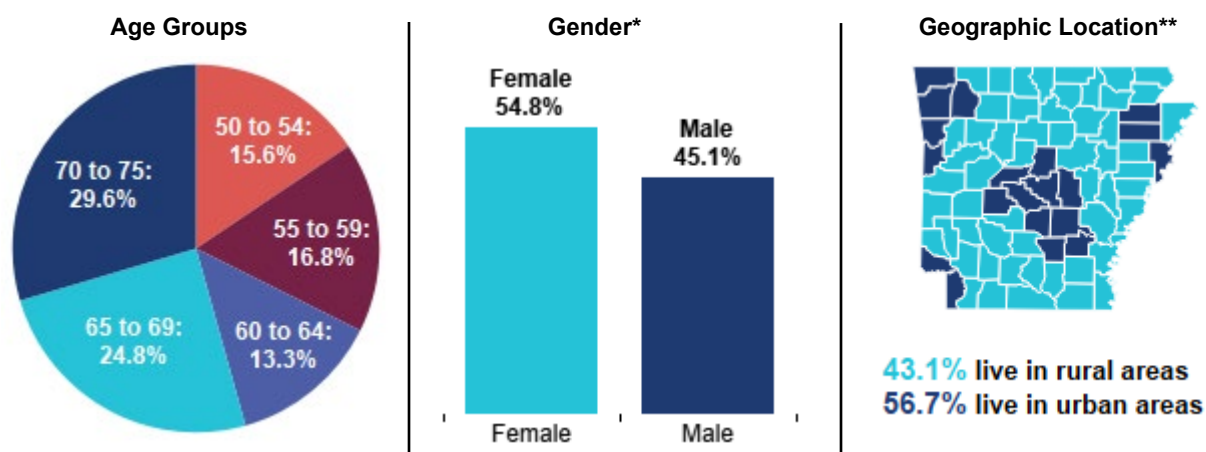
* 93 individuals had an unknown gender classification.
** 899 had missing information.

Figure 3 shows the number and percentage of unique individuals in the study population who were enrolled in commercial coverage, Medicaid/Arkansas Works, transitioned between those two coverage types ("other payer mix"), or Medicare in 2017. Approximately 52% (243,638) of the study population were enrolled in Medicare, 27.3% (127,935) were enrolled in commercial coverage, and 18.7% (87,569) were enrolled in Medicaid/Arkansas Works.

FIGURE 3: STUDY POPULATION HEALTH COVERAGE ENROLLMENT BY PAYER TYPE, 2017
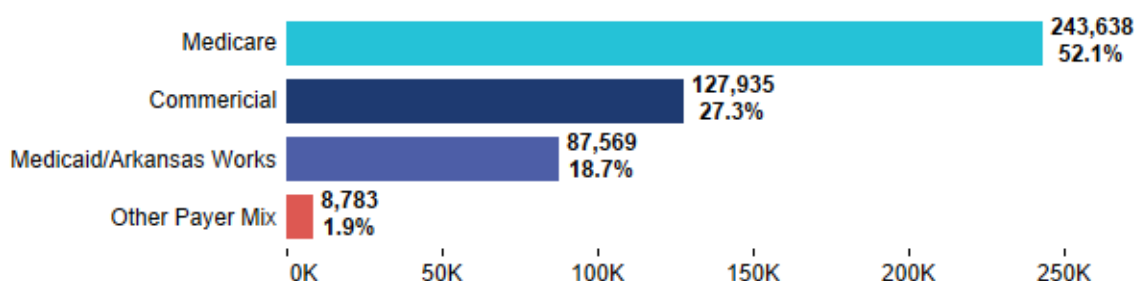
THE NUMBER OF PATIENTS IN ARKANSAS FOR WHOM A NON-INVASIVE CRC SCREENING TEST (FIT, GFOBT, COLOGUARD) CLAIM WAS PAID

For the study population ages 50 to 75 (467,925), 23,182 individuals, or 5.0%, had a stool-based test in 2017 (Figure 4). About 91% (21,155) of those individuals had stool-based tests that were paid for by a commercial payer, Medicaid/Arkansas Works, or Medicare (Appendix A). The overwhelming majority of individuals with a payer-paid stool-based test, 96.1% (20,328), had their tests fully paid, and 3.9% (827) of those individuals had partially paid tests.

Partial-year 2018 data indicate the percentage of individuals ages 50 to 75 who had a stool-based test was 2.5% (12,005). Of the individuals who had stool-based tests, 88.5% (10,619) had tests paid for by their payer. Similarly to the 2017 data, 96.4% (10,238) of individuals with payer paid stool-based tests had their tests fully paid and 3.6% (381) of those individuals had partially paid tests.

Among individuals in the population sub-group of ages 50 to 54 (73,008), the percentage of individuals who had a stool-based test in 2017 was lower at 3.7% (2,689) (Figure 4). Eighty-six percent (2,302) of individuals in this age group had their stool-based tests paid for by a payer in 2017. The majority of the individuals with payer-paid stool-based tests, 93.5% (2,153), had their tests fully paid, and 6.5% (149) of those individuals had partially paid tests.

Partial-year 2018 data indicate the percentage of individuals ages 50 to 54 who had a stool-based test was 1.8% (1,284). Of the individuals who had stool-based tests, 79.4% (1,019) had tests paid for by their payer. Ninety-five percent (968) of individuals with payer-paid stool-based tests had their tests fully paid, and 5% (51) of those individuals had partially paid tests.
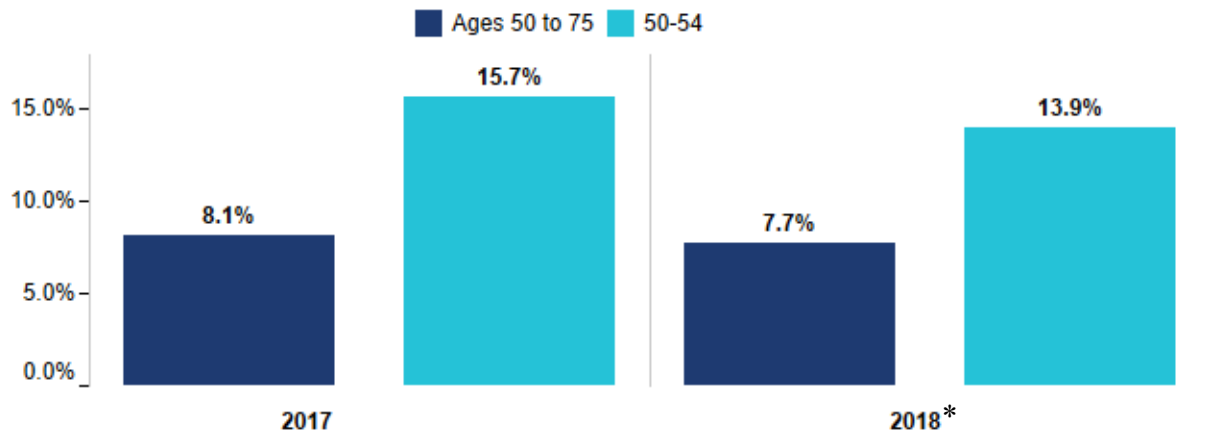
FIGURE 4: PERCENTAGE OF INDIVIDUALS AGES 50 TO 75 WHO HAD STOOL-BASED TESTS
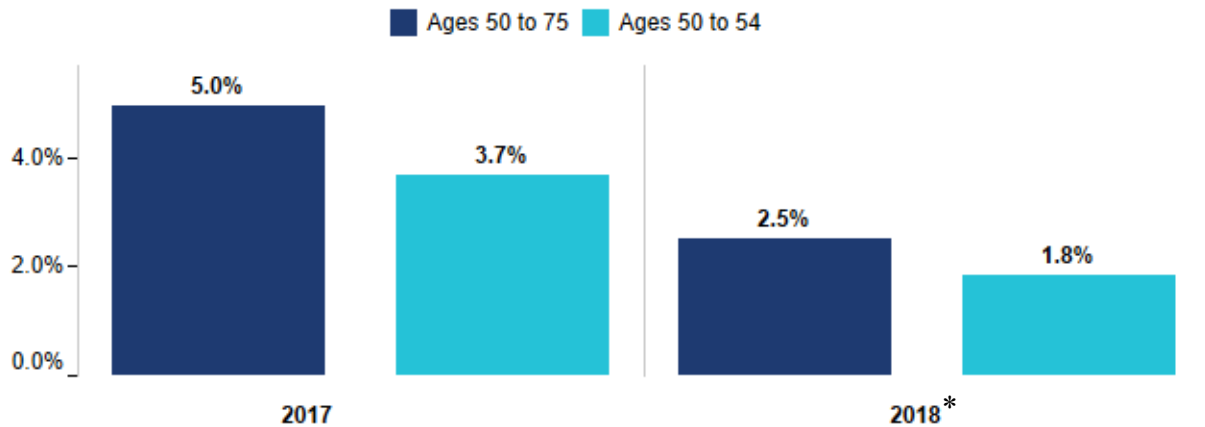
* Data from January 1, 2018, to June 30, 2018.

Eight percent (1,879) of individuals ages 50 to 75 who had a stool-based test in 2017 had out-of-pocket costs (Appendix A). The percentage was higher for the individuals in the 50 to 54 age subgroup at 15.7% (422) (Figure 5). Partial-year 2018 data show the percentage of individuals who had out-of-pocket costs was 7.7% (922) for individuals ages 50 to 75 and 13.9% (179) for individuals ages 50 to 54.

FIGURE 5: PERCENTAGE OF INDIVIDUALS AGES 50–75 WHO HAD STOOL-BASED TESTS AND OUT-OF-POCKET COSTS

* Data from January 1, 2018, to June 30, 2018.

The most widely used stool-based test for CRC screening was the FIT at 60% in 2017 and 2018. Cologuard tests made up 5.9% (1,382) of tests in 2017 and increased to 10% (2,658) in 2018. The percent of gFOBT tests decreased from 33.7% (7,916) in 2017 to 29.7% (7,859) in 2018 (Figure 6).
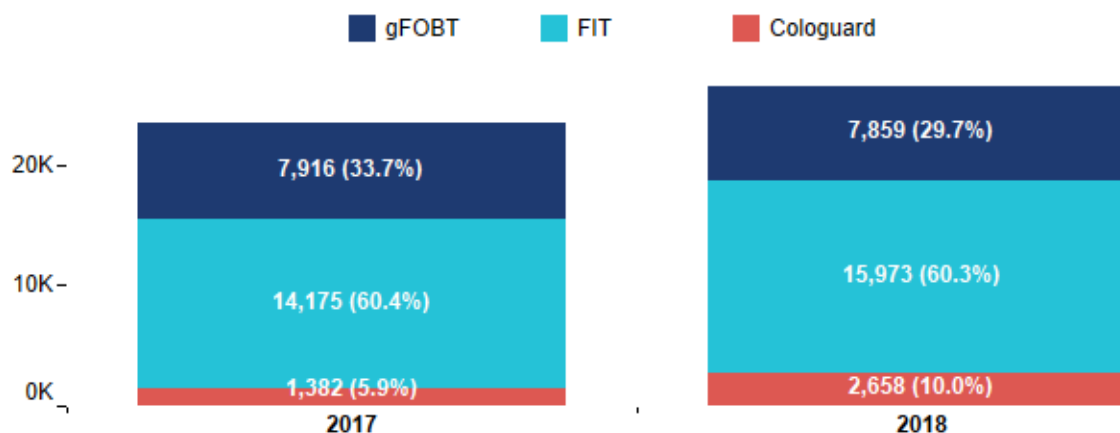
* Full-year 2018 data for all payers.

NUMBER OF PATIENTS IN ARKANSAS FOR WHOM NON-INVASIVE CRC SCREENING TESTS AND FOLLOW-UP COLONOSCOPY CLAIMS WERE PAID

Among the 23,182 individuals ages 50 to 75 who had stool-based tests in 2017, 12% (2,780) had follow-up colonoscopies within six months (Figure 7). About 96% (2,673) of those individuals had follow-up colonoscopies that were paid for by a commercial payer, Medicaid/Arkansas Works, or Medicare. The majority of individuals with payer-paid follow-up colonoscopies, 61.9% (1,655), had their tests partially paid, and 38.1% (1,018) of those individuals had fully paid follow-up colonoscopies.

Results were similar for partial-year 2018. Nearly 12% (1,431) of individuals who had stool-based tests (12,005) from Jan. 1, 2018, through June 30, 2018, had follow-up colonoscopies. About 96% (1,366) of those individuals had follow-up colonoscopies that were paid for by a payer. Sixty-one percent (835) of individuals with payer-paid follow-up colonoscopies had their procedures partially paid, and 38.9% (531) of those individuals had fully paid follow-up colonoscopies.

For individuals ages 50 to 54 who had stool-based tests (2,689), the percentage of individuals who had follow-up colonoscopies was 12.5% (335) in 2017. About 91% (306) of those individuals had follow-up colonoscopies that were paid for by a payer. Unlike the results for the entire study population of individuals ages 50 to 75, a higher percentage of individuals ages 50 to 52 had their follow-up colonoscopies fully paid for by a payer: 71.6% (219). Twenty-eight percent (87) had partially paid follow-up colonoscopies.

For partial-year 2018, the results were comparable for individuals ages 50 to 54. One hundred sixty (12.5%) individuals had follow-up colonoscopies after a stool test (1,284). Ninety-one percent (146) of individuals in this age group had their follow-up colonoscopies paid for by a payer (Appendix A). Seventy-three percent (107) of individuals with payer-paid follow-up

colonoscopies had their procedures fully paid and 26.7% (39) of those individuals had partially paid follow-up colonoscopies.

FIGURE 7: PERCENTAGE OF INDIVIDUALS AGES 50–75 WHO HAD FOLLOW-UP COLONOSCOPIES
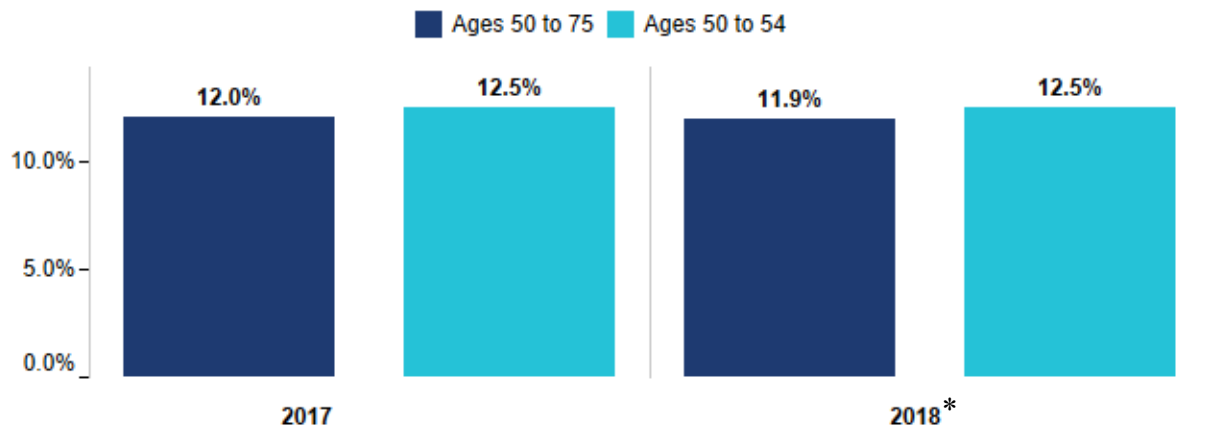
* Data from January 1, 2018, to June 30, 2018.

Figure 8 shows the percentage of individuals ages 50 to 75 who had a follow-up colonoscopy within one month, three months, or six months of a stool-based test. For 2017 and partial-year 2018, fewer than 4% (827 of 23,182 individuals and 740 of 24,262 individuals, respectively) had a follow-up colonoscopy within one month of a stool-based test. These percentages increase to 9.1% and 8.3% for 2017 and partial-year 2018, respectively, (2,100 of 23,182 individuals and 1,625 of 19,511 individuals, respectively) at three months and to around 12% at six months (2,780 of 23,182 individuals and 1,431 of 12,005 individuals, respectively.

FIGURE 8: PERCENTAGE OF INDIVIDUALS AGES 50–75 WHO HAD A FOLLOW-UP COLONOSCOPY WITHIN ONE MONTH, THREE MONTHS, OR SIX MONTHS OF A STOOL-BASED TEST
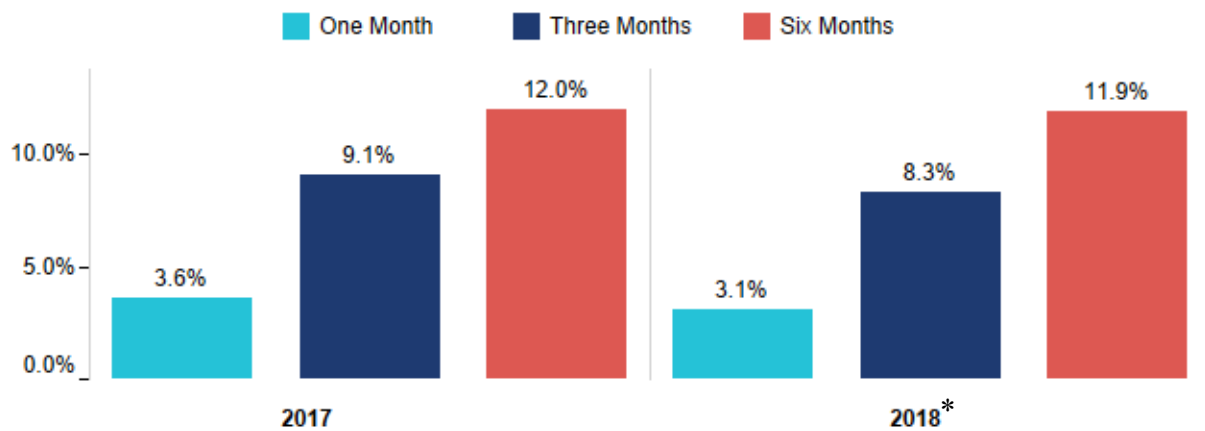

* Data for one-month analysis are from Jan. 1, 2018, through Nov. 30, 2018; data for the three-month analysis are from Jan. 1, 2018, through Sept. 30, 2018; and data for the six-month analysis from Jan. 1, 2018, to June 30, 2018.

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NUMBER OF PATIENTS WHO HAD COPAYS FOR FOLLOW-UP COLONOSCOPIES

Among those ages 50 to 75 who had follow-up colonoscopies (2,780) in 2017, 1,749 (62.9%) of individuals had out-of-pocket costs. (Figure 9). There were similar results at 62.1% of individuals for partial-year 2018. These percentages were lower for those ages 50 to 54, at 33.1% (111 of 335 individuals) in 2017 and 31.9% (51 of 160 individuals) in partial-year 2018. Average cost-sharing per patient for a follow-up colonoscopy could not be calculated for this report because cost-sharing amounts applicable to the colonoscopy procedure itself could not be isolated.

FIGURE 9: PERCENTAGE OF INDIVIDUALS AGES 50–75 WHO HAD FOLLOW-UP COLONOSCOPIES AND OUT-OF-POCKET COSTS
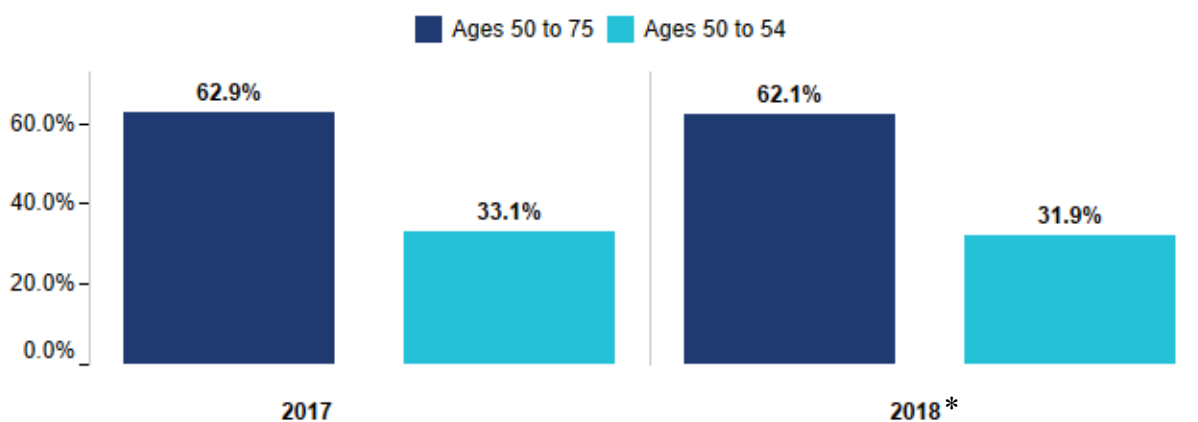
* Data from January 1, 2018, to June 30, 2018.

PAYER TYPE

To provide a more meaningful look at enrollee experiences by payer type, and due to the availability of only partial-year data for Medicare, this subsection of the report shows separate analyses for years 2017 to 2018 for commericial and Medicaid/Arkansas Works enrollees ages 50 to 75 and and only 2017 data for Medicare enrollees ages 65 to 75 (Appendix B). This subsection of the report includes individuals unique to each payer type and does not include individuals who fall into the "Other Payer Mix" category in Figure 3.

Commercial Coverage and Medicaid/Arkansas Works

Among the unique individuals ages 50 to 75 who were enrolled in commercial coverage or Medicaid/Arkansas Works, individuals enrolled in Medicaid/Arkansas Works had the lower rate of stool-based testing in 2017 and 2018. Only 2.7% (2,352) of the 87,569 unique Medicaid/Arkansas Works enrollees had a stool-based test, compared to 5.2% (6,680) of the 127,935 unique commercial coverage members in 2017. In 2018, the rates were 3.9% (3,506) for the 89,064 unique Medicaid/Arkansas Works enrollees and 5.1% (6,950) for the 136,219 unique commercial coverage enrollees (Figure 10).

However, the percentages of individuals who had follow-up colonoscopies in each payer group were similar, between 10% and 13% in 2017 and 2018. For Medicaid/Arkansas Works, 301 (12.8%) had follow-up colonoscopies in 2017 and 402 (11.5%) in 2018. Among commercial coverage enrollees, 787 (11.8%) had follow-up colonoscopies in 2017 and 726 (10.4%) in 2018 (Figure 11).

FIGURE 10: PERCENTAGE OF UNIQUE INDIVIDUALS AGES 50−75 WHO HAD STOOL-BASED TEST SCREENINGS BY PAYER
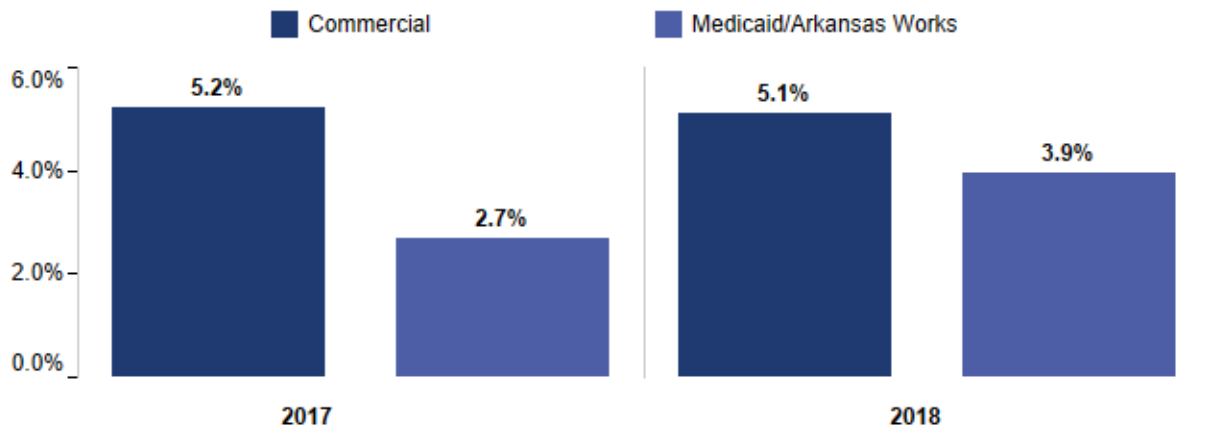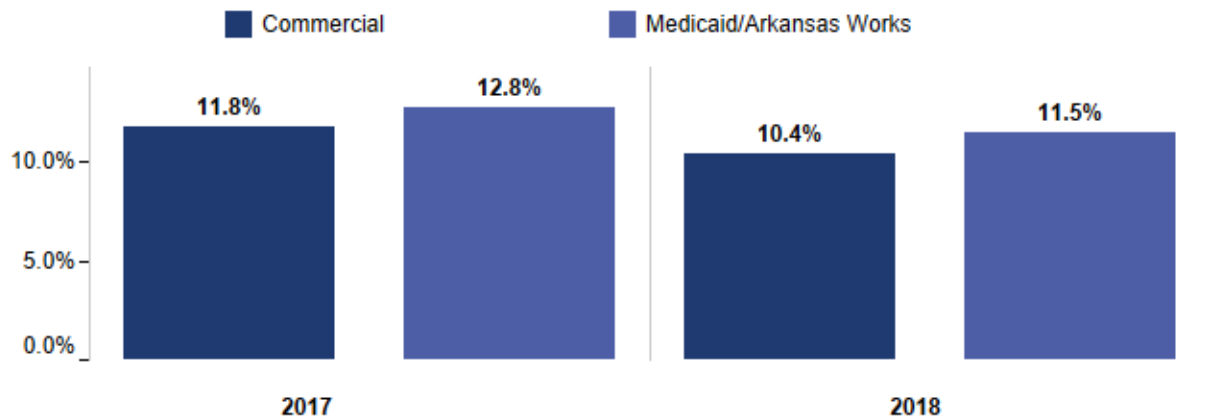

FIGURE 11: PERCENTAGE OF UNIQUE INDIVIDUALS AGES 50−75 WHO HAD FOLLOW-UP COLONOSCOPIES BY PAYER
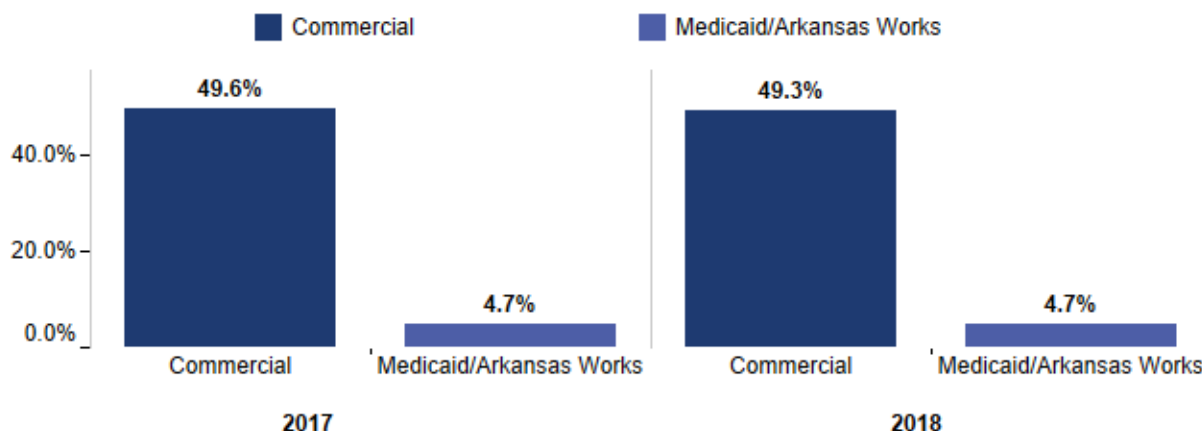

In 2017, 20.4% (1,361) of commercial members had out-of-pocket costs associated with their stool-based tests in 2017 and 19.5% (1,353) in 2018. For Medicaid/Arkansas Works enrollees, less than 1% had out-of-pocket costs.

Notably, the disparity was higher when comparing out-of-pocket costs for follow-up colonoscopies. Nearly half of commercial members had out-of-pocket costs for follow-up colonoscopies in 2017 and 2018, compared to 4.7% for Medicaid members (Figure 12). Specifically, 14 of 301 Medicaid/Arkansas Works enrollees had out-of-pocket costs in 2017

and 19 of 402 had out-of-pocket costs in 2018. For commercial enrollees, 390 of the 787 enrollees who had follow-up colonoscopies had out-of-pockets costs in 2017 and 358 of 726 had out-of-pocket costs in 2018.

Medicare

Among the 243,638 unique individuals ages 65 to 75 enrolled in Medicare, 5.6% (13,648) had a stool-based test in 2017 (Figure 13). The percentage of individuals who had a follow-up was 11.9% (Figure 14).

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Fewer than 4% of Medicare enrollees had out-out-pocket costs for a stool-based test in 2017 (465). Notably, 81.6% (1,330) of Medicare enrollees who had a follow-up colonoscopy had out-of-pocket costs for in 2017 (Figure 15).

FIGURE 15: PERCENTAGE OF MEDICARE ENROLLEES AGES 65–75 WHO HAD FOLLOW-UP COLONOSCOPIES AND OUT-OF-POCKET COSTS BY PAYER, 2017
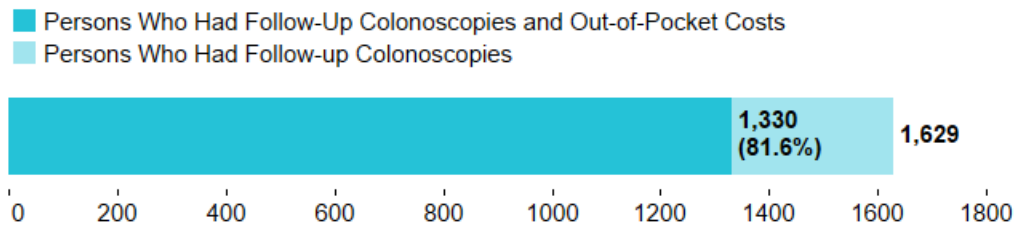
GEOGRAPHIC LOCATION

Rates of Arkansans ages 50 to 75 who had a stool-based test screening by urban or rural geographic location are similar. In 2017, the percentage of individuals living in urban areas (265,546) who had a stool-based test was 5.0% (13,203), compared to 4.9% (9,943) among individuals living in rural areas (201,480). This was similar to the state percentage of 5.0% (Figure 16).

FIGURE 16: PERCENTAGE OF ADULTS AGES 50–75 WHO HAD STOOL-BASED TESTS BY GEOGRAPHIC LOCATION

* 899 individuals did not have an urban or rural designation.

The percentages of individuals who had a follow-up colonoscopy after a stool-based test screening in 2017 were also similar across individuals in urban areas, rural areas, and statewide at 12.5% (1,651), 11.3% (1,121) and 12.0%, respectively (Figure 17).

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FIGURE 17: PERCENTAGE OF ADULTS AGES 50–75 WHO HAD FOLLOW-UP COLONOSCOPIES BY GEOGRAPHIC LOCATION
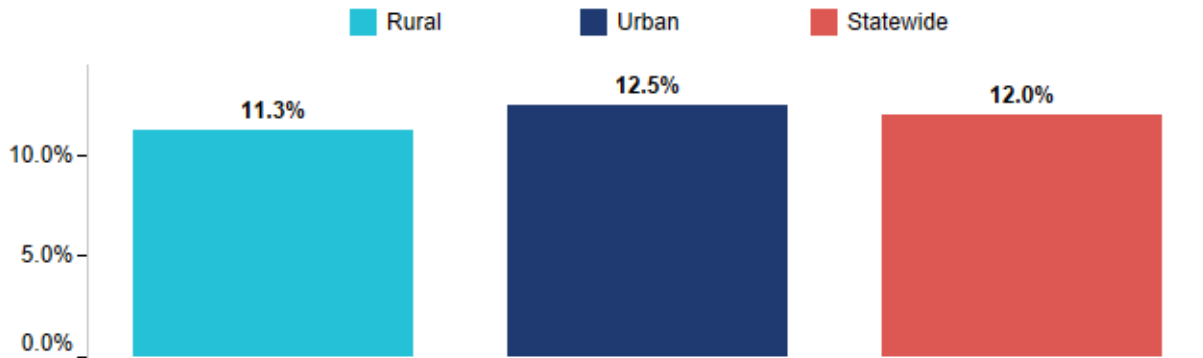
* 899 individuals did not have an urban or rural designation.

The percentages of individuals who had a follow-up colonoscopy with out-of-pocket costs were also similar at 60.6% (1,000) among those in urban areas, 66.9% (747) among those in rural areas, and 62.9% statewide (Figure 18).
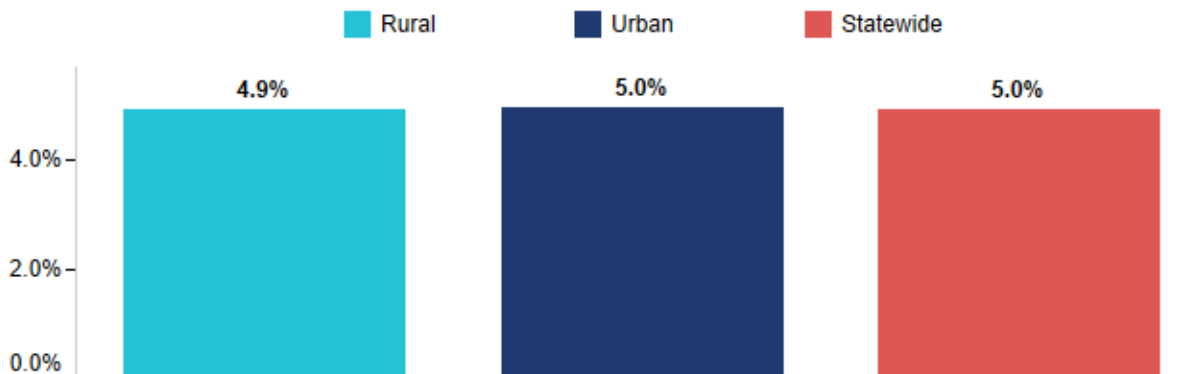
FIGURE 18: PERCENTAGE OF ADULTS AGES 50–75 WHO HAD FOLLOW-UP COLONOSCOPIES AND OUT-OF-POCKET COSTS BY GEOGRAPHIC LOCATION
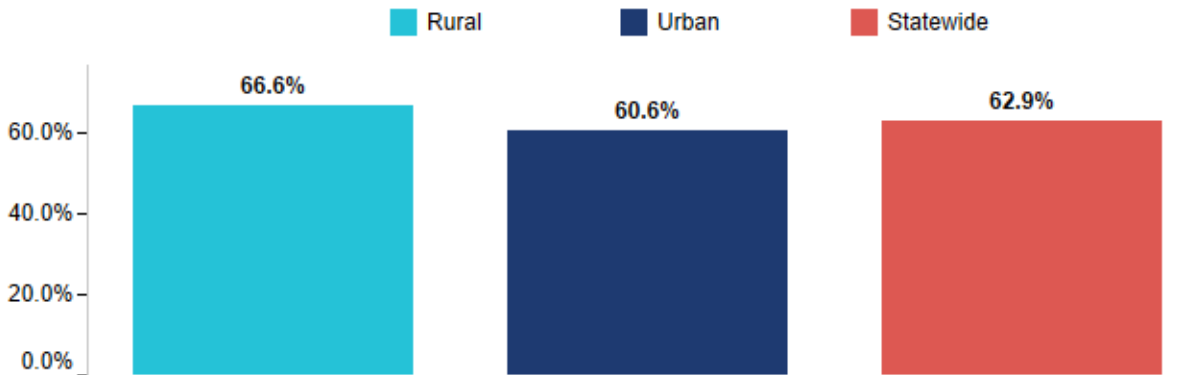
* 899 individuals did not have an urban or rural designation.

RACE AND ETHNICITY

Race and ethnicity CRC screening data are available for individuals ages 65 to 75 who had Medicare coverage in 2017. Figure 19 shows the proportions of individuals in the study population with Medicare coverage by race.

Among the 13,648 individuals who had a stool-based test in 2017, 83.8% were White, 9.3% were Black, 5.7% had an unknown race/ethnicity, 0.4% were Hispanic, 0.3% were Native American, 0.3% were another race, and 0.2% were Asian.

Figure 20 shows that the percentages of individuals with Medicare coverage who were screened by a stool-based test within each racial or ethnic group in 2017. The racial and ethnic groups that had the highest percentage were: Whites (5.7%), Blacks (5.2%), and individuals who did not have a known race or ethnicity (5.9%). The percentage for all Medicare enrollees in the study population was 5.6%. Figures 21 and 22 show, for each racial group, the percentage of individuals who had a follow-up colonoscopy and what percentage of those individuals had out-of-pocket costs.

FIGURE 20: PERCENTAGE OF MEDICARE ENROLLEES WHO HAD STOOL-BASED TESTS BY RACE, 2017

* Data from January 1, 2018, to June 30, 2018.

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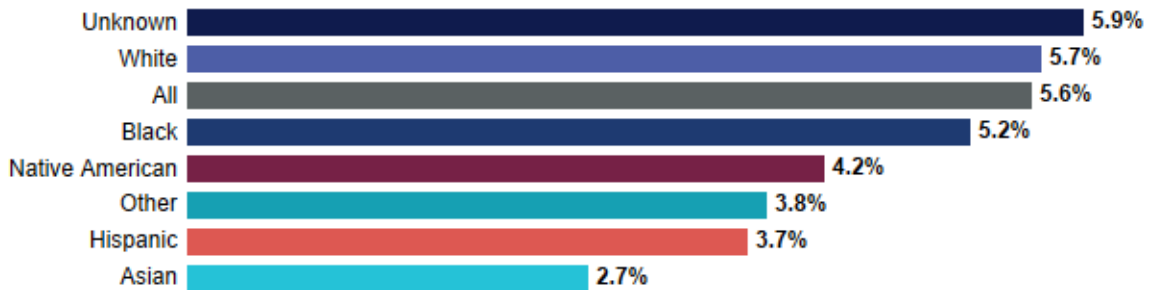
FIGURE 21: PERCENTAGE OF MEDICARE ENROLLEES WHO HAD FOLLOW-UP COLONOSCOPIES BY RACE, 2017

Black	12.9%
White	12.0%
All	11.9%
Unknown	8.2%
Native American*	
Other*	
Hispanic*	
Asian*	
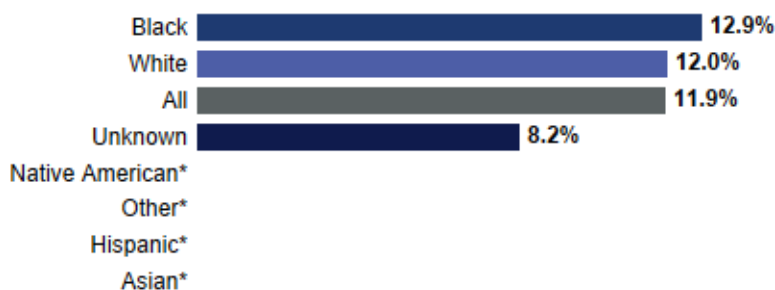
* Data suppressed.

FIGURE 22: PERCENTAGE OF MEDICARE ENROLLEES WHO HAD FOLLOW-UP COLONOSCOPIES AND OUT-OF-POCKET COSTS BY RACE, 2017

White	82.2%
All	81.6%
Black	81.0%
Unknown	68.8%
Native American*	
Other*	
Hispanic*	
Asian*	

* Data suppressed.

NUMBER OF PATIENTS AGES 45 TO 49 WHO WOULD BE SCREENED BASED ON THE USPSTF RECOMMENDATION

In 2017, 1,119 (1.7%) Arkansans ages 45 to 49 had a stool-based test screening. Of these individuals, 451 (40.3%) had out-of-pocket costs and 732 (65.5) had stool-based tests paid for by by a commercial payer, Medicaid/Arkansas Works, or Medicare .[iv] The majority of individuals who had payer paid stool-based tests, 86.5% (633), had fully paid tests. About 14% (99) had partially paid tests.

About 10% (106) of those who had a stool-based test had a follow-up colonoscopy within six months. Eighty-seven percent (92) of individuals had their follow-up colonoscopies paid for by a payer in 2017. Fifty-nine percent (54) of individuals with a payer paid stool-based test had their tests fully paid and 41.3% (38) of those individuals had partially paid tests.

[iv] The numbers and percentages of individuals with out-of-pocket costs and payer paid stool-based tests or follow-up colonoscopies are not mutually exclusive. For example, an individual may have both a partially paid stool-based test and out-of-pocket costs or both a partially paid follow-up colonoscopy and out-of-pocket costs.

Forty-eight percent (51) of individuals who had a follow-up colonoscopy had out-of-pocket costs.[iv]

Based on the 2017 rate of screening among 50-to-54-year-olds, 2,429 Arkansans ages 45 to 49 are projected to be screened based on the 2021 final USPSTF recommendation. Of these individuals, 304 are estimated to have a follow-up colonoscopy.

NUMBER OF PATIENTS DIAGNOSED WITH CRC BY AGE

In 2016, 1,473 Arkansans were diagnosed with CRC. Among persons age 45 and older, those in the 80-and-older age group and the 65-to-69 age group made up the largest proportions of the total individuals with a CRC diagnosis at 17.2% and 17.1%, respectively. Individuals in the 45-to-49 age group made up the smallest proportion at 6.5% of all individuals diagnosed with CRC (Figure 23).

In 2017, the number of Arkansans diagnosed with CRC increased to 1,518. Similar to the prior year, those in the 80-and-older and 65-to-69 age groups were the highest proportions of the individuals diagnosed, at 18.6% and 15.9%, respectively, and individuals in the 45-to-49 age group made up the smallest proportion at 5.5%.

Appendix C shows the age-adjusted incidence rates by age group for persons age 45 and older.

FIGURE 23: PROPORTION OF INDIVIDUALS AGE 45 AND OLDER DIAGOSED WITH ANY STAGE OF COLORECTAL CANCER BY AGE GROUP, 2016–2017
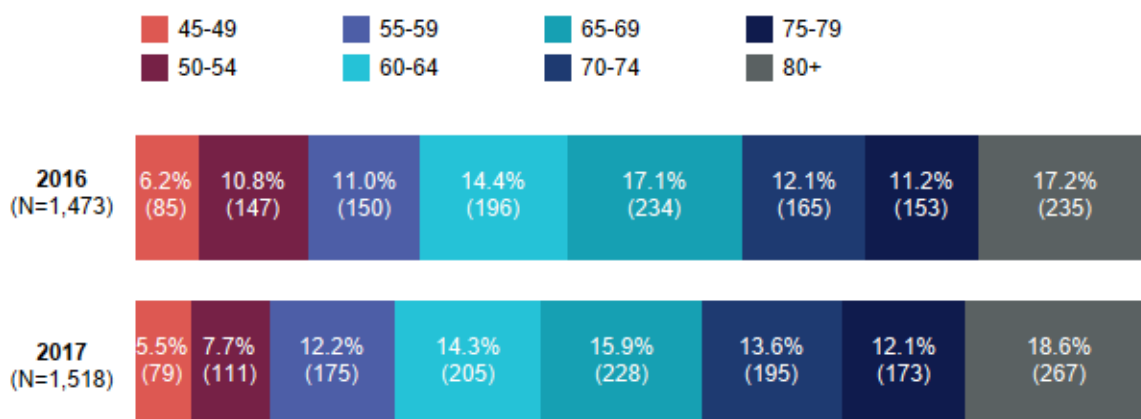
NUMBER OF LATE-STAGE CRC DIAGNOSES BY AGE

In 2016 and 2017, there were 1,488 and 1,528 any-stage CRC diagnoses, respectively. Over half of all CRC diagnoses in both years were late-stage diagnoses (55.4% in 2016 and 57.5% in 2017). Among those age 45 and older, all but one age group had percentages of late-stage diagnoses above 50% in 2016. In 2017, among those 45 and older, all age

groups had over 50% of the diagnoses in the late stage. The percentages of late-stage diagnoses were highest among persons in the 45-to-49 age group at 67.4% in 2016 and 70.9% in 2017 (Figure 24).[v]

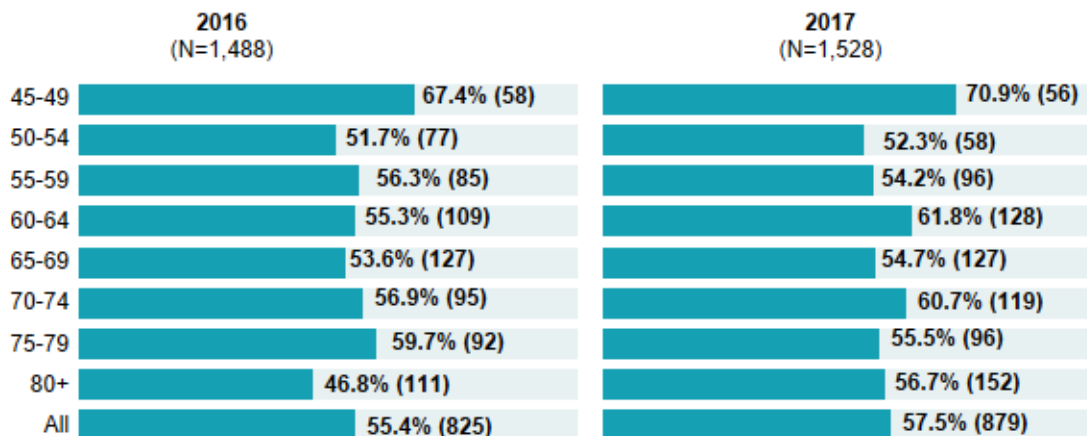|	2016 (N=1,488)	2017 (N=1,528)
45-49	67.4% (58)	70.9% (56)
50-54	51.7% (77)	52.3% (58)
55-59	56.3% (85)	54.2% (96)
60-64	55.3% (109)	61.8% (128)
65-69	53.6% (127)	54.7% (127)
70-74	56.9% (95)	60.7% (119)
75-79	59.7% (92)	55.5% (96)
80+	46.8% (111)	56.7% (152)
All	55.4% (825)	57.5% (879)

* The CRC diagnoses are not mutually exclusive. An individual may have more than one CRC tumor diagnosis.

Discussion

This assessment presents CRC incidence among individuals ages 50–75 enrolled in commercial coverage, Medicaid/Arkansas Works, or Medicare; utilization of and out-of-pocket costs for colorectal cancer stool-based screening and follow-up colonoscopies by age and payer type; and a projection of future utilization for persons ages 45 to 49 based on new USPSTF recommendations. Although no statistical-significance tests were performed on the results in the report, there are some important observations to highlight for purposes of advancing policy.

- There was a considerable increase in the utilization of Cologuard as a screening tool from 2017 to 2018. Cologuard represented 5.9% of all tests administered in 2017 and 10% in 2018. This suggests either a change in coverage of the test among payers or a change in test preference by providers or patients.

- The percentage of individuals in the age 50–54 subgroup who received a stool-based test in 2017 (3.7%) was lower than the percentage of individuals receiving a stool-based test in the overall study population of individuals ages 50–74 (5.0%). This suggests that access barriers may be more prevalent in younger populations. Indeed, individuals in the 50–54 age subgroup experienced out-of-pocket costs more often (15.7% in 2017, 13.9% in 2018) compared to those in the entire study population (8.1% in 2017, 7.7% in 2018). This could be the result of differences

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[v] Some of the age groups below age 45 had higher proportions of late-stage diagnoses. However, for the purposes of this report, only age groups 45 and older are shown.

between the coverage policies of commercial coverage and those of Medicare, which is coverage that individuals in the subgroup are unlikely to have.

- Individuals covered by Medicaid/Arkansas Works were less likely to have received a stool-based test across both years (2.7% in 2017, 3.9% in 2018) compared to those in commercial coverage (5.2% in 2017, 5.1% in 2018). This could be the result of a number of factors, including differential coverage/exposure to cost-sharing in the traditional Medicaid program (Arkansas Works enrollees are in private plans that are required to cover screening at no cost) or other access barriers commonly observed in low-income communities and communities of color. Among Medicare enrollees ages 65–75 in 2017, those whose race was unknown (5.9%) or White (5.7%) were slightly more likely to have received a stool-based test than the total study population (5.6%), while those whose race was Black (5.2%), Native American (4.2%), Hispanic (3.7%, or Asian (2.7%) were less likely than the total study population to have received a stool-based test in the same year.

- The rate of follow-up colonoscopies observed in the study population (12.0% in 2017, 11.9% in 2018) was similar to what would be expected, given that the reported positivity rates for stool-based screening tests range from 2.4% to 28% among gFOBTs and FITs[8] and 12.2% to 16.1% for Cologuard.[9,10] The rate of follow-up colonoscopies for the 50–54 age subgroup was only slightly higher than the rate for the overall population. There was only minor variation in the rates of follow-up colonoscopies by payer type and rurality. Among Medicare enrollees ages 65–75 in 2017, those whose race was Black (12.9%) or White (12.0%) were slightly more likely than the total study population to have received a follow-up colonoscopy, while those whose race was unknown (8.2%) were less likely to have received a follow-up colonoscopy. Due to data suppression requirements, however, observations on these findings are limited.

- Among those who had a follow-up colonoscopy, more than three in five enrollees (62.9% in 2017, 62.1% in 2018) had out-of-pocket costs. Roughly half of commercial plan enrollees in 2017 and 2018 had out-of-pocket costs, while Medicaid/Arkansas Works enrollees had much more limited exposure to out-of-pocket costs (4.7% of enrollees in 2017and in 2018). This suggests that the impact of the out-of-pocket cost protections in Act 779 of 2021 will be substantial among those enrolled in commercial plans, including those in plans offered to Arkansas Works beneficiaries. Among Medicare enrollees ages 65–75 in 2017, more than four in five (81.6%) had out-of-pocket costs for a follow-up colonoscopy. Since the majority of screening procedures occur in Medicare populations, Medicare policy change is critical to eliminating financial barriers for access to follow-up colonoscopies. Medicare enrollees whose race was unknown (68.8%) were less likely to be exposed to cost-sharing for a follow-up colonoscopy when compared to the total study population (81.6%), while cost-sharing exposure for those whose race was White (82.2%) or Black (81.0%) were comparable to cost-sharing

exposure for the total study population. Again, data suppression requirements limit findings based on race.

- In 2016 and 2017, there were 1,488 and 1,528 CRC diagnoses, respectively, in Arkansas for all age groups. More than half, 55.4% in 2016 and 57.5% in 2017, of all the CRC diagnoses were late-stage. The highest percentages of late-stage diagnoses were among the 45-to-49 age group, at 67.4% in 2016 and 70.9% in 2017. This suggests that extension of recommended screenings to ages 45 to 49 by the USPSTF could have a substantial impact on early detection.

- Based on the 2017 rate of screening and follow-up colonoscopies among 50-to-54-year-olds, 2,429 Arkansans ages 45 to 49 are projected to be screened based on the 2021 final USPSTF recommendation. Of these individuals, 304 are estimated to go on to have a follow-up colonoscopy.

Since the start of the coronavirus disease 2019 (COVID-19) pandemic, there have been disruptions and delays to cancer diagnoses and treatment. For example, delays due to supply chain disruption, medicine shortages, or a reduction in the healthcare workforce staff.[11,12] Continued observation of changes in utilization and out-of-pocket costs are warranted to assess the impact of 2021 legislative changes, USPSTF recommendations, and COVID-19 pandemic.

Appendices

APPENDIX A: INDIVIDUALS AGES 50—75 IN THE STUDY POPULATION WHO HAD STOOL-BASED TEST SCREENINGS AND FOLLOW-UP COLONOSCOPIES

Age Group	Year	Study Population	Persons Who Had a Stool-Based Test			Persons Who Had an Associated Follow-Up Colonoscopy		
			Had a Stool-Based Test	Had a Payer Paid Test	Had Out-of-Pocket Costs	Had a Follow-Up Colonoscopy	Had a Payer Paid Follow-Up Colonoscopy	Had Out-of-Pocket Costs
50-75	2017	467,925	23,182	21,155	1,879	2,780	2,673	1,749
50-75	2018*	481,135	12,005	10,619	922	1,431	1,366	888
50-54	2017	73,008	2,689	2,302	422	335	306	111
50-54	2018*	70,235	1,284	1,019	179	160	146	51

* Data from January 1, 2018, to June 30, 2018.

APPENDIX B: INDIVIDUALS AGES 50—75 WHO HAD STOOL-BASED TEST SCREENINGS AND FOLLOW-UP COLONOSCOPY BY PAYER

Payer Type	Year	Study Population	Persons Who Had a Stool-Based Test		Persons Who Had an Associated Follow-Up Colonoscopy	
			Had a Stool-Based Test	Had Out-of-Pocket Costs	Had a Follow-Up Colonoscopy	Had Out-of-Pocket Costs
Commercial	2017	127,935	6,680	1,361	787	390
Commercial	2018	136,219	6,950	1,353	726	358
Medicaid/ AR Works	2017	87,569	2,352	**	301	14
Medicaid/ AR Works	2018	89,064	3,506	**	402	19
Medicare	2017	243,638	13,648	465	1,629	1,330

* Data from January 1, 2018, to June 30, 2018.
** Data suppressed.

APPENDIX C: NUMBER AND AGE-ADJUSTED INCIDENCE RATE OF COLORECTAL CANCER DIAGNOSES BY AGE GROUP

Age Group	2016		2017	
	Number of Persons	Age-Adjusted Incidence Rate (per 100,000 persons)	Number of Persons	Age-Adjusted Incidence Rate (per 100,000 persons)
45-49	85	3.31	79	3.11
50-54	147	4.59	111	3.51
55-59	150	3.75	175	4.37
60-64	196	4.33	205	4.43
65-69	234	5.23	228	4.95
70-74	165	4.53	195	5.19
75-79	153	5.03	173	5.50
80+	235	6.93	267	7.81

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ANALYTIC METHODOLOGY FOR ASSESSMENT OF COLORECTAL CANCER SCREENINGS AND DISEASE PREVALENCE IN ARKANSAS

ACHI
September 30, 2021

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Introduction

At the request of Fight Colorectal Cancer, ACHI conducted an assessment to identify gaps in access to colorectal screenings, including those related to follow-up colonoscopies and cost-sharing. Fight Colorectal Cancer is a patient-empowerment and advocacy organization with a mission to cure colorectal cancer (CRC) through patient support, policy change, and research. The assessment examined current prevalence of and access to CRC screenings and CRC disease incidence. ACHI also projected the number of Arkansans who could be screened based on the final 2021 United States Preventive Services Task Force (USPSTF) recommendation to lower the age to start CRC screenings to 45. Where available, ACHI generated demographic and geographic profiles to identify differences in marginalized or underserved populations.

This document provides guidance on the methodology used by ACHI to complete the colorectal cancer assessment. Appendices are included that contain specific examples of SAS code used to complete this analysis. More specifically, this document provides guidance on the following:

o   Data sources used for the analyses
o   Study population inclusion and exclusion criteria
o   Methods for Arkansas Cancer Registry data analyses of colorectal cancer
o   Methods for administrative claims-based analyses of screenings
o   Procedure codes used and other designations of utilization
o   Approach to estimates of potential future screenings
o   Limitations of the data sources and the of the analysis overall
o   Examples of SAS® code used to create the analytic programs used in this assessment

DATA SOURCES

Data for the assessment are from the Arkansas Healthcare Transparency Initiative's All-Payer Claims Database (APCD),[i] housed at ACHI. The APCD contains data for the majority of healthcare covered lives in Arkansas including medical, pharmacy, and dental claims, enrollment and provider files, as well as death and birth certificates and cancer registry data. The APCD version used for this analysis includes data from 2013 through December 2018 for Medicare and 2013 through June 2020 for Arkansas Medicaid, fully insured private payers, and self-insured payers receiving state funds. Cancer registry data is from January 2013 through December 2017. Data are submitted to the APCD on a quarterly basis pursuant to a mandate authorized by the Arkansas Healthcare Transparency Initiative Act of 2015. The data include some geographic and demographic information and a unique identifier permitting tracking of an individual over time and across datasets, but they do not include direct personal identifiers such as name or street address.

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[i] Arkansas APCD Website https://www.arkansasapcd.net/Home/
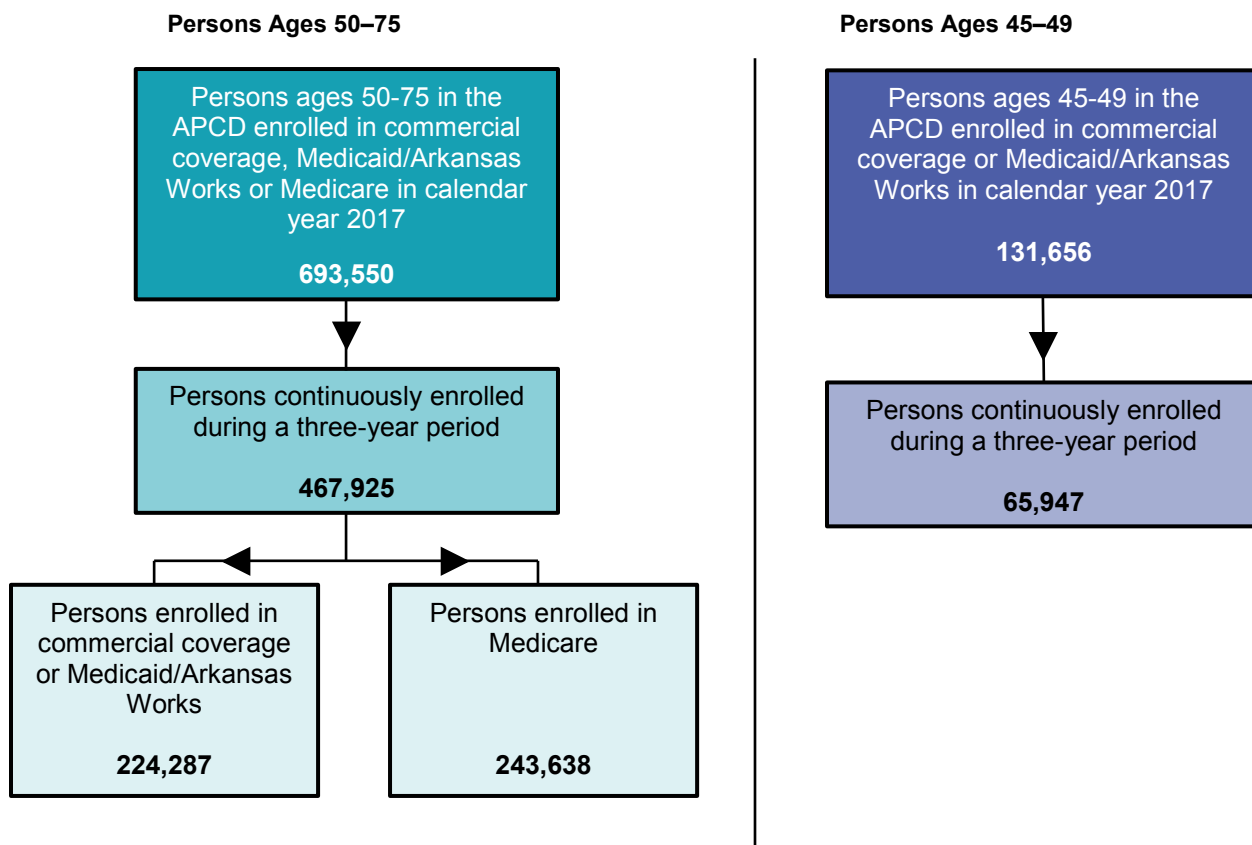
STUDY POPULATION

The overall study population for the CRC screening portion of this analysis included persons enrolled in commercial coverage, Medicaid (including Medicaid expansion "Arkansas Works"), and Medicare. Figure 1 shows the flow of the individuals from the APCD that were included in the study population for year 2017. The study population flow is only displayed for the 2017 cohort because this is the first year of overlap for the selected overall study periods for Commercial and Medicaid/Arkansas Works enrollees and the Medicare beneficiary population.

To be included in our overall study population, individuals had to be continuously enrolled for the entire study period; therefore, the same individuals present in the 2017 cohort are included in subsequent study years. Because this analysis includes separate age groups and multiple study years, some individuals in the 45- to 49-year-old age group moved into the 50- to 75-year-old age group into subsequent study years.

The inclusion criteria among the commercial and Medicaid/Arkansas Works enrollees included individuals age 45 as of January 1, 2017, to age 75 as of December 31, 2019, who were continuously enrolled from 2017 to 2019. Continuously enrolled is defined as having no gap in coverage or having one coverage gap of 45 days or less.

For Medicare enrollees, the inclusion criteria included individuals who reached age 65 as of January 1, 2016, to age 75 as of December 31, 2018, and who were continuously enrolled from 2016 to 2018.

FIGURE 1: FLOW CHART OF THE STUDY POPULATION, 2017

Persons Ages 50–75

Persons ages 50-75 in the APCD enrolled in commercial coverage, Medicaid/Arkansas Works or Medicare in calendar year 2017

693,550

↓

Persons continuously enrolled during a three-year period

467,925

Persons enrolled in commercial coverage or Medicaid/Arkansas Works

224,287

Persons enrolled in Medicare

243,638

Persons Ages 45–49

Persons ages 45-49 in the APCD enrolled in commercial coverage or Medicaid/Arkansas Works in calendar year 2017

131,656

↓

Persons continuously enrolled during a three-year period

65,947

ADMINISTRATIVE CLAIMS-BASED ANALYSES OF CRC SCREENINGS

This assessment includes analyses of frequency of CRC screenings among individuals ages 50-75 enrolled in commercial coverage, Medicaid/Arkansas Works, or Medicare, including utilization of and out-of-pocket costs for colorectal cancer stool-based screenings and follow-up colonoscopies by age and payer type. These analyses also includes a projection of future utilization for persons ages 45–49 based on new USPSTF recommendations

For this assessment we analyzed commercial, traditional Medicaid (including Medicaid expansion "Arkansas Works"), and Medicare medical claims of Arkansas residents ages 50–75 and 45–49 who met the guidelines for a colorectal cancer screening based on the 2020 USPSTF recommendation.[1] Arkansans included in the study population for the study duration of January 2017 to December 2018 were assessed for evidence of any history of stool-based tests and follow-up colonoscopies. For the purposes of the assessment, a follow-up colonoscopy was defined as a colonoscopy completed within six months of a stool-based test. Stool-based tests included guaiac fecal occult blood tests (gFOBT), fecal immunochemical tests (FIT), and the stool DNA test Cologuard.

For individuals ages 50–75 who were screened and had follow-up colonoscopies, screening rates and counts for stool-based tests and follow-up colonoscopies were computed by coverage type, time to follow-up colonoscopy (one, three, or six months), race (Medicare only), and urban or rural geographic area. As current Medicare data are available through December 2018, follow-up colonoscopies within six months of an abnormal stool-based tests that occurred after June 30, 2018, may not be reflected in the data reported to the APCD. Consequently, analyses regarding follow-up colonoscopies within six months in 2018 that include Medicare data are preliminary and only include stool-based test data for January 1–June 30, 2018.[ii] Data for stool-based tests and follow-up colonoscopies within six months for full year 2018 are available for Medicaid/Arkansas Works and commercial coverage analyses.

Claims payment and evidence of any cost-sharing for a stool-based test were assessed for variation by payer type and test type. Screening rates and counts for individuals ages 45–49 were also computed to project the stool-based test and follow-up colonoscopy rates and counts for persons in that age group.

These analyses use Medicare fee-for-service, commercial, and Medicaid enrollment and claims information from 2013 through 2018, and references the appropriate CRC colonoscopy and stool-based test procedure codes (for FIT, gFOBT, and Cologuard). Claims and enrollment records were extracted for individuals who met the age-specific and continuous enrollment inclusion criteria for each payer.

[ii] For the time to follow-up colonoscopy analysis, dates were extended for follow-up colonoscopies that occurred within one month or three months from the stool-based test in partial year 2018. These dates included: January 1, 2020, through November 30, 2020, for the one-month analysis and January 1, 2020, through September 30, 2020 for the three-month analysis.

To establish the eligible study population, records were extracted by payer group according to the continuous enrollment criteria included above. Eligible Medicare enrollees who were also enrolled in Medicaid or commercial populations at some previous time during the study period are included in the Medicare group, and excluded appropriately from the Medicaid and commercial groups. For these individuals, any relevant claims history (e.g., stool-based CRC screening history) that occurred during the study period was included, even if it occurred on commercial or Medicaid claims for that individual. Age categories were created for the following groups: 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, and 80 and older. These age groups were selected in part due to alignment with previous and new USPSTF guidelines for CRC screening age recommendations.

Analysis of stool-based tests and follow-up colonoscopies was done using appropriate procedure codes for each test type. These codes are included in the appendices of this report.

Counts of stool-based screenings were stratified by age group and divided by the overall study population for each age group to calculate utilization rates. Variables designating amounts paid by the payer and for patient out of pocket costs (the sum of any co-pay, coinsurance, and deductibles) were flagged to calculate the proportion of members whose stool-based screenings were paid for by the payer, and/or for which any out of pocket costs were paid. Percentages were calculated for each of these occurrences based on the overall number of individuals receiving a stool-based screening by age group. For iterative review and validation we calculated the mean, median, minimum, maximum, and inner-quartile range for all payer-paid amounts and out-of-pocket costs.

ESTIMATING THE NUMBER OF ADDITIONAL PATIENTS WHO WOULD UTILIZE A STOOL-BASED SCREENING BASED ON THE UPDATED USPSTF CRC RECOMMENDATION

To produce a simple estimate of the number of additional Arkansans who would be screened based on the 2021 final USPSTF recommendation of CRC screenings for 45–49 year olds, we used the 2017 rate of stool-based screening among 50–54 year olds as a proxy utilization rate. The 50–54 age group was chosen for the proxy utilization rate (as opposed to the entire eligible age range) because it is assumed that their behavior in seeking evidence-based screenings would be more comparable to that of 45–49 year olds than that of the entire age-eligible population (50–75). The utilization rate among 50–54 year olds was mutliplied by the state population estimate for 45–49 year-olds to derive an estimated number of individuals of that age who would be screened in alignment with the updated USPSTF recommendation. The rate of follow-up colonoscopy utilization among 50–54 year olds who had a stool-based screening also was used to estimate the number of individuals aged 45–49 who would have a follow-up colonoscopy. For this estimate, we multiplied the proxy follow-up colonoscopy rate by the estimated number of individuals ages 45–49 who would have a stool-based CRC screening.

ANALYSIS OF CANCER REGISTRY DATA FOR CRC INCIDENCE AND STAGE AT DIAGNOSIS

To assess CRC incidence and the number of late-stage diagnoses by age group, ACHI analyzed cancer data from the Arkansas Cancer Registry. Cancer registry data availability may vary by state. The Arkansas APCD includes Arkansas Cancer Registry data as part of the state's broader Healthcare Transparency Initiative. Diagnoses of CRC were stratified by age group for each study year.

The number of CRC late-stage diagnoses was part of this analysis, and results were stratified by age groups for each study year.

Colorectal cancer incidence was identified by using cancer registry "recodes," which are a variable derived from the cancer primary site variable (cnr_primarysit) and the cancer histology variable (cnr_histology3). The National Cancer Institute designates recodes by group, and the information is documented on their site.[iii] Colon and rectum recodes from SEER Site Recode ICD-O-3/WHO 2008 were used to identify the number of individuals who had a CRC diagnosis in 2016 and 2017. Cancer registry data was queried to include all colorectal cancers in the study period by using recodes 21041, 21042, 21043, 21044, 21045, 21046, 21047, 21048, 21049, 21051, 21052, and 21060, which are designated for colorectal cancer. Inclusion criteria for record extraction for this analysis were any records with a CRC diagnosis date ocrruing in 2016 or 2017.

Cancer stage was obtained from the "devss2000" field, defined as "derived SEER summary stage 2000" and defined as: 0, 1 = Localized; 2, 3, 4, 7 = Advanced; 9 = Unstaged. There were none in our data with a code of 8.

To enable stratifcation by age group, a new field containing each patient's age at the time of diagnosis was added, then another new field separating patients into five-year age groups. To calculate rates of incidence, an age group table was created and joined to a table containing the same year/age group-specific state populations on age groups to perform the following calculations: count by unique CRC patient ID (cnr_pid), rate of incidence as count(distinct ID/state age group population estimate)*10,000. This output was then organized by age groups. Age-specific population estimates were derived from the U.S. Census American Communities Survey estimaes for 2016 and 2017, for the following age groups: 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, and 80 and older. These age groups were selected in part due to alignment with previous and new USPSTF guidelines for CRC screening age recommendations.

Rates of incidence were age-adjusted using the 2000 U.S. Standard Population per 100,000. To complete this step the output table containing the unadjusted incidence rates was joined to the table containing 2000 U.S. Standard Population. The new table included all fields from the previous unadjusted table as well as the following calculations of the age-weighted incidence as a proportion of total count of incidence for each age group.

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iii NIH Recodes classification list: https://seer.cancer.gov/siterecode/icdo3_dwhoheme/index.html

LIMITATIONS

As with any claims-based data analysis, this analysis is subject to inherent provider-level billing and coding variation. While this is a known limitation of healthcare claims-based data analysis, the team at ACHI uses evidence-based research methods and conducts multi-layer data and analytic validation processes. Additionally, as previously discussed, analyses with follow-up colonoscopies within six months in 2018 that included Medicare data are preliminary and only include stool-based test data for January 1–June 30, 2018, due to availability of Medicare data. The data also did not allow us to assess whether stool-based tests that were administered resulted in a positive screen, but follow-up colonoscopies observed in the the data were in the range of reported positive screens for gFOBTs, FITs, and Cologuard.[2,3,4]

Claims-based costs of follow-up colonoscopies are not included in the analysis due to resource limitations and the complexity of defining all costs associated with a follow-up colonoscopy (across multiple insurance claim lines), as opposed to identifying follow-up colonoscopy occurences based on singular procedure codes. Assessment of costs associated with follow-up colonoscopies warrants further analysis.

As with claims-based data, there is also an inherent lag in availability of cancer registry data. At the time of the analysis, the most recent year of available cancer registry data was 2017.

Race and ethnicity information is not readlily avilable for the entire study population, however that information is available for the study population subset of individuals ages 65–75 who had Medicare coverage in 2017.

Appendices

APPENDIX A:

EXAMPLE OF SAS CODE FOR ADMINISTRATIVE CLAIMS-BASED ANALYSIS OF CRC SCREENINGS

Note: This code has been generalized for use on other data sources. The original code was developed to be utilized on the Arkansas APCD.

Step 1.
Determine which denominator will best suit your policy question and the data that you have available. For example, state population estimates may be most suitable for your analyses.

Step 2.

```sas
/*Extract medical claims that contain one of the screening procedure codes, restricting by time period of interest.*/
%let screening_procs = "G0328" "G0464" "82270" "82274" "81528";

proc sql;
create table stool_tests as
  select distinct *
    ,case
      when ProcedureCode in ("82270") then "gFOBT"
      when ProcedureCode in ("G0328","82274") then "FIT"
      when ProcedureCode in ("G0464") then "FIT-DNA"
      when ProcedureCode in ("81528") then "Cologuard"
    end as Test_Type,
    ,year(DateOfServiceFrom) as stool_test_year
    ,DateOfServiceFrom as stool_test_date '' format=date9.,
    ,year(DateOfServiceFrom) - year(MemberDateOfBirth) as test_age
    ,case
      when Calculated test_age le 44 then 'less 44'
      when 45 le Calculated test_age le 49 then '45 to 49'
      when 50 le Calculated test_age le 54 then '50 to 54'
      when 55 le Calculated test_age le 59 then '55 to 59'
      when 60 le Calculated test_age le 64 then '60 to 64'
      when 65 le Calculated test_age le 69 then '65 to 69'
      when Calculated test_age ge 70 then '70 plus'
    end as test_age_cat
    ,case
      when 50 le Calculated test_age le 55 then '50 to 55'
    end as Fifty_to_55
    ,sum(CopayAmount,CoinsuranceAmount,DeductibleAmount) as Amt_OOP
    ,sum(CopayAmount,CoinsuranceAmount,DeductibleAmount, PaidAmount) as Total_Paid
      from medical_claims
```

```
          where year(DateOfServiceFrom) in (2016,2017,2018,2019) and ProcedureCode in
          (&screening_procs.);
quit;

/*Extract medical claims that contain one of the follow-up procedure codes, restricting by time
period of interest.*/
%let follow_up_procs = "45385" "45380" "45378" "G0121" "G0105" "45384" "45388" "45385"
"45380" "45378";
proc sql;
create table Follow_up_extract as
  select distinct  *
  ,sum(CopayAmount,CoinsuranceAmount,DeductibleAmount) as Amt_OOP
  ,sum(CopayAmount,CoinsuranceAmount,DeductibleAmount, PaidAmount) as Total_Paid
    from medical_claims
      where year(DateOfServiceFrom) in (2016,2017,2018,2019) and ProcedureCode in
      (&follow_up_procs.);
quit;

/*Combine information from screening procedure claims with follow-up procedure claims
joining on patient ID. Create indicators identifying follow-up procedures occurring within 1, 3,
and 6 months from the stool test.*/
proc sql;
create table Follow_ups as /* 52,978 */
  select distinct *
  /*Flag indicating that follow-up occurred within 6 months of stool test.*/,case
    when b.stool_test_date le DateOfServiceFrom le (b.stool_test_date + 180) then 1
    else 0
  end as Six_Month_Followup
  /*Flag indicating that follow-up occurred within 3 months of stool test.*/,case
    when b.stool_test_date le DateOfServiceFrom le (b.stool_test_date + 90) then 1
    else 0
  end as Three_Month_Followup
  /*Flag indicating that follow-up occurred within 1 month of stool test.*/,case
    when b.stool_test_date le DateOfServiceFrom le (b.stool_test_date + 30) then 1
    else 0
  end as One_Month_Followup
  ,DateOfServiceFrom - b.stool_test_date as Days_after_Stool_Test
    from Follow_up_extract a left join stool_tests b on a.patient_id = b.patient_id
      where not missing(stool_test_date);
quit;

/*Calculate measures of interest. */
proc sql;
/*number of individuals with a stool-based test*/
```

```
create table stool_test as
  select distinct stool_test_year, count(distinct patient_id) as Stool_tests
    from stool_tests
      where stool_test_year = &yr.;

/*number of individuals with a stool-based test that was at least partially paid for by a payer*/
create table Stool_Amt_Payer_Paid as
  select distinct stool_test_year, count(distinct patient_id) as Stool_Amt_Payer_Paid
    from stool_tests
      where stool_test_year = &yr. and PaidAmount > 0;

/*number of individuals with a stool-based test that had an out of pocket cost, regardless of
payer paid amount*/
create table Stool_Amt_Out_ofPocket as
  select distinct stool_test_year, count(distinct patient_id) as Stool_Amt_Out_ofPocket
    from stool_tests
      where  stool_test_year = &yr. and Amt_OOP > 0;

/*number of individuals with a follow-up procedure*/
create table Follow_up as
  select distinct stool_test_year, count(distinct patient_id) as Follow_up
    from Follow_up
      where stool_test_year = &yr.
      group by stool_test_year;

/*number of individuals with a follow-up procedure that was at least partially paid for by a
payer*/
create table Follow_up_Amt_Payer_Paid as
  select distinct stool_test_year, count(distinct patient_id) as Follow_up_Amt_Payer_Paid
    from rdrive.Follow_up
      where and stool_test_year = &yr. and PaidAmount > 0
      group by stool_test_year;

/*number of individuals with a follow-up procedure that had an out of pocket cost, regardless
of payer paid amount */
create table Follow_up_Amt_Out_ofPocket as
  select distinct stool_test_year, count(distinct patient_id) as Follow_up_Amt_Out_ofPocket
    from rdrive.Follow_up
      where and stool_test_year = &yr. and Amt_OOP > 0
      group by stool_test_year;
quit;

/*Build an output table grouped by stool test year.*/
proc sql;
```

```sql
create table Year_&yr. as
  select distinct a.stool_test_year
/*chosen denominator based on available options*/
  ,denominator
/*distinct number of individuals with a stool test*/
  ,b.Stool_tests
/*percent of individuals with a stool test*/
  ,b.Stool_tests/denominator as Rate_of_Stool_test
/*distinct number of individuals with any stool test cost covered by payer (partially or totally)*/
  ,c.Stool_Amt_Payer_Paid as Stool_Amt_Payer_Paid
/*percent of individuals with payer-paid stool test */
  ,c.Stool_Amt_Payer_Paid/b.Stool_tests as Rate_paid_Stool
/*distinct number of individuals with any out of pocket costs for stool tests*/
  ,d.Stool_Amt_Out_ofPocket
/*percent of members who had stool test with out-of-pocket costs */
  ,d.Stool_Amt_Out_ofPocket/b.Stool_tests as Pct_Stool_Amt_Out_ofPocket
/*distinct number of individuals with a follow up colonoscopy*/
  ,e.Follow_up
/*distinct number of individuals whose follow-up colonoscopy was paid by payer (partially or
totally)*/
  ,f.Follow_up_Amt_Payer_Paid as Follow_up_paid
/*percent of individuals who had a follow up colonoscopy after a stool test*/
  ,e.Follow_up/b.Stool_tests as Pct_Follow_up
/*percent of individuals whose follow up colonoscopy was paid by payer (partially or totally)*/
  ,f.Follow_up_Amt_Payer_Paid/e.Follow_up as Pct_Follow_up_Amt_Payer_Paid
/*distinct number of individuals with any out of pocket costs for follow ups*/
  ,g.Follow_up_Amt_Out_ofPocket
/*percent of individuals who had follow-up colonoscopy with out-of-pocket costs*/
  ,g.Follow_up_Amt_Out_ofPocket/f.Follow_up as Pct_Follow_up_Amt_Out_ofPocket
/*distinct number of individuals who had follow-up colonoscopy without any out-of-pocket
cost*/
  ,e.Follow_up - g.Follow_up_Amt_Out_ofPocket as Follow_No_OOP
/*percent of individuals who had follow-up colonoscopy without any out-of-pocket costs */
  ,Calculated Follow_No_OOP/e.Follow_up as Pct_Follow_No_OOP
    from stool_tests a
      left join stool_test b on a.stool_test_year = b.stool_test_year
      left join Stool_Amt_Payer_Paid c on a.stool_test_year = c.stool_test_year
      left join Stool_Amt_Out_ofPocket d on a.stool_test_year = d.stool_test_year
      left join Follow_up e on a.stool_test_year = e.stool_test_year
      left join Follow_up_Amt_Payer_Paid f on a.stool_test_year = f.stool_test_year
      left join Follow_up_Amt_Out_ofPocket g on a.stool_test_year = g.stool_test_year;
quit;
```

APPENDIX B:

LIST OF PROCEDURE CODES USED FOR ADMINISTRATIVE CLAIMS-BASED ANALYSIS OF CRC SCREENINGS

Screening Type	Code	Code System	Definition
Stool-based: FOBT	G0328	HCPCS	Colorectal cancer screening; fecal occult blood test, immunoassay, 1-3 simultaneous (G0328)
Stool-based: FIT-DNA	G0464	HCPCS	Colorectal cancer screening; stool-based DNA and fecal occult hemoglobin (e.g., kras, ndrg4 and bmp3) (G0464)
Stool-based: FOBT	82270	CPT	Blood, occult, by peroxidase activity (e.g., guaiac), qualitative; feces, consecutive collected specimens with single determination, for colorectal neoplasm screening (i.e., patient was provided 3 cards or single triple card for consecutive collection)
Stool-based: FOBT	82274	CPT	Blood, occult, by fecal hemoglobin determination by immunoassay, qualitative, feces, 1-3 simultaneous determinations
Stool-based: Cologuard	81528	CPT	Oncology (colorectal) screening, quantitative real-time target and signal amplification of 10 DNA markers (KRAS mutations, promoter methylation of NDRG4 and BMP3) and fecal hemoglobin, utilizing stool, algorithm reported as a positive or negative result.
Colonoscopy	45385	CPT	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s) or other lesion(s) by snare technique
Colonoscopy	45380	CPT	Colonoscopy, flexible, proximal to splenic flexure, with biopsy, single or multiple
Colonoscopy	45378	CPT	Colonoscopy, flexible, proximal to splenic flexure; diagnostic, with or without collection of specimen(s) by brushing or washing , with or without colon decompression (separate procedure)
Colonoscopy	G0121	HCPCS	Colorectal cancer screening; colonoscopy on individual not meeting criteria for high risk
High-Risk Colonoscopy	G0105	HCPCS	Colorectal cancer screening; colonoscopy on individual at high risk
Colonoscopy	45384	CPT	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s) or other lesion(s) by hot biopsy forceps or bipolar cautery
Colonoscopy	45388	CPT	Colonoscopy, flexible; with ablation of tumor(s), polyp(s), or other lesion(s) (includes pre and post-dilation and guide wire passage, when performed)
Barium Enema	45385	CPT	Radiologic examination, colon; contrast (e.g., barium) enema, with or without KUB
Barium Enema	45380	CPT	Radiologic examination, colon; air contrast with specific high density barium, with or without glucagon
Barium Enema	45378	CPT	Colorectal cancer screening; alternative to G0105, screening colonoscopy, barium enema

APPENDIX C:

Note: This code is based on the Arkansas Cancer Registry Database

Step 1.

Prepare the 2000 US Standard Million Population table downloaded from https://seer.cancer.gov/stdpopulations/stdpop.19ages.html. This table was copied into an Excel file and prepared for use by combining the age groups of 00 years and 01-04 years into a 0 to 5 years age group and combining the age groups of 80-85 years and 85+ years into an 80+ years age group.

Prepare a state population table using the same age groups as the standard table.

Step 2.

```
/*Select all records that have a recode that identifies Colorectal Cancer, restricting by time
period of interest.*/
%let year_of_interest = 2016;
%let yr = 16;

proc sql;
create table coloreccancer&yr as
  select *
    from cancer_registry_table
      where recode in (21041, 21042, 21043, 21044, 21045, 21046, 21047, 21048, 21049,
      21051, 21052, 21060) and cnr_dxdate = &year_of_interest;
quit;

proc sql;
  create table colorecagegroups&yr as
    select distinct *
/*Create an age group field that aligns with the age field in the 2000 US Standard Million
Population table to link the two tables together.*/
    , case
        when 0 le cnr_dxage < 5  then "0-4"
        when 5 le cnr_dxage < 10  then "5-9"
        when 10 le cnr_dxage < 15 then "10-14"
        when 15 le cnr_dxage < 20 then "15-19"
        when 20 le cnr_dxage < 25 then "20-24"
        when 25 le cnr_dxage < 30 then "25-29"
        when 30 le cnr_dxage < 35 then "30-34"
        when 35 le cnr_dxage < 40 then "35-39"
        when 40 le cnr_dxage < 45 then "40-44"
        when 45 le cnr_dxage < 50 then "45-49"
        when 50 le cnr_dxage < 55 then "50-54"
        when 55 le cnr_dxage < 60 then "55-59"
```

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```
        when 60 le cnr_dxage < 65 then "60-64"
        when 65 le cnr_dxage < 70 then "65-69"
        when 70 le cnr_dxage < 75 then "70-74"
        when 75 le cnr_dxage < 80 then "75-79"
        when cnr_dxage ge 80 then "80+"
        else "?"
    end as AgeGroup
/*Create an cancer stage field based on the summary stage field in the cancer table*/
    , case
        when cnr_summarystg00 in ('0', '1') then "Localized"
        when cnr_summarystg00 in ('2', '3', '4', '7') then "Advanced"
        else "Unstaged"
    end as Stage
        from coloreccancer&yr;
quit;


/*The code below will produce a table with age group, number of individuals in age group with
CRC, the state population per age group, the crude rate, the 2000 US Standard Population, the
proportion of the US Standard Population, and the age-weighted incidence per 100,000 of the
2000 US Standard Population.*/


proc sql;
select sum(US_STD_POP_2000) into :uspop from standardpop;

create table agegroup&yr as
    select distinct
    a.AgeGroup
    /*number of individuals in age group with CRC*/
    ,count(distinct a.cnr_pid) as incidence_of_cancer
    /*the state population per age group*/
    ,b.StatePop format = comma16.
    /*crude rate*/
    ,(count(distinct a.cnr_pid)/b.StatePop)*100000 as crude_incidence_rate
    /*2000 US Standard Population*/
    ,b.US_STD_POP_2000
    /*proportion of the US Standard Population*/
    ,(c.US_STD_POP_2000/&uspop.) as USstandardpopulation format = 8.3
        label ='Proportion of US Standard Population'
    /*the age-weighted incidence per 100,000 of the 2000 US Standard Population*/
    ,(c.US_STD_POP_2000/&uspop.)*(count(distinct a.cnr_pid)/b.StatePop)*100000) as weighted
        label = 'Age-weighted incidence'
    from colorecagegroups&yr a  left join statepop b on a.AgeGroup = b.AgeGroup
                                left join standardpop c on a.AgeGroup = c.AGE_GROUP
        group by a.AgeGroup;
```

```sas
quit;

/*The code below will produce a table with stage, number of individuals in stage group with
CRC, the crude rate, and the age-weighted incidence per 100,000 of the 2000 US Standard
Population.*/

proc sql;
select sum(US_STD_POP_2000) into :uspop from standardpop;

/*Calculating age weighted adjustments by stage group.*/
create table stageagegroup&yr as
  select distinct
  a.AgeGroup
  a.Stage
  ,count(distinct a.cnr_pid) as incidence_of_cancer
  ,b.StatePop format = comma16.
  ,(count(distinct a.cnr_pid)/b.StatePop)*100000 as crude_incidence_rate
  ,b.US_STD_POP_2000
  ,(c.US_STD_POP_2000/&uspop.) as USstandardpopulation format = 8.3
        label ='Proportion of US Standard Population'
  ,(c.US_STD_POP_2000/&uspop.)*(count(distinct a.cnr_pid)/b.StatePop)*100000) as weighted
        label = 'Age-weighted incidence'
    from colorecagegroups&yr a  left join statepop b on a.AgeGroup = b.AgeGroup
                                left join standardpop c on a.AgeGroup = c.AGE_GROUP
      group by a.AgeGroup, a.Stage;
quit;

/*Determining final age weighted adjustments by stage group.*/
proc sql;
  create table stagepop_rolled_&yr as
    select distinct
    Stage
    , sum(incidence_of_cancer) as incidence_of_cancer_bystage
    , sum(crude_incidence_rate) as CrudeRate format=6.2
    , sum(weighted) as AgeWeightedRate format=6.2
        from stageagegroup&yr
          group by Stage;

quit;
```

APPENDIX D:

LIST OF RECODES USED FOR ANALYSIS OF CANCER REGISTRY DATA FOR CRC INCIDENCE AND STAGE AT DIAGNOSIS

Site Group	ICD-O-3 Site	ICD-O-3 Histology (Type)	Recode
Colon excluding Rectum			
Cecum	C180	excluding 9050-9055, 9140, 9590-9992	21041
Appendix	C181		21042
Ascending Colon	C182		21043
Hepatic Flexure	C183		21044
Transverse Colon	C184		21045
Splenic Flexure	C185		21046
Descending Colon	C186		21047
Sigmoid Colon	C187		21048
Large Intestine, NOS	C188-C189, C260		21049
Rectum and Rectosigmoid Junction			
Rectosigmoid Junction	C199	excluding 9050-9055, 9140, 9590-9992	21051
Rectum	C209		21052
Anus, Anal Canal and Anorectum	C210-C212, C218		21060

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[1] U.S. Preventive Services Task Force. Final Recommendation Statement, Colorectal Cancer: Screening. May 18, 2021. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/colorectal-cancer-screening

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Quality (U.S.); 2021 May. (Evidence Synthesis, No. 202.) Appendix D, Tables. Available from: https://www.ncbi.nlm.nih.gov/books/NBK570907/

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