Multi-Payer Analysis of Health Care Spending in North Carolina

Analytic Methodology

2020 V1.0

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1.   Introduction

Measuring variation of health care spending across counties and payer populations is an important step in understanding where a state's health care dollars are being spent. This project is a collaboration between Duke University, the Health Care Cost Institute (HCCI), and Blue Cross and Blue Shield of North Carolina (Blue Cross NC), with support from the Commonwealth Fund and Arnold Ventures. The project brought together health economists and researchers to design an approach to help policy leaders and the public to better understand some of the basic drivers of and variations in health care costs in North Carolina. Understanding key drivers of health care spending can in turn motivate and inform policy options to address it.

The *Multi-Payer Analysis of Healthcare Spending in North Carolina* uses claims data from individuals living in North Carolina who are enrolled in Employer-Sponsored Insurance (ESI) and Medicare Advantage (MA) from one of four major insurers, Medicare Fee-For-Service (FFS), and North Carolina Medicaid. Using a common claims classification methodology, the project aggregated data by payer type, county of residence, and service category to provide an analytic data set of per-person health care spending across the state. The data is also stratified by age and gender and includes detailed information on spending for certain common health care episodes and by individuals with select chronic conditions.

The purpose of this project is to facilitate analysis of variation in health care spending and provide a resource for policymakers, journalists, and the public to understand the drivers of health care spending across the state. Additionally, the project provides an important framework and methodology for interested parties in other states to replicate.

2. Methods

2.1 Data Contributors

2.1.1 HCCI

The HCCI data set used in this analysis includes health care claims data for approximately 50 million Americans enrolled in commercial health insurance coverage administered by Aetna, Humana, and UnitedHealth Group in each year between 2007 and 2017. This data set was developed from de-identified claims data that were compliant with the Health Insurance Portability and Accountability Act (HIPAA) and includes the allowed amounts (actual prices paid) to providers for services. To produce the findings in the *Multi-Payer Analysis of Healthcare Spending in North Carolina*, HCCI used an analytic subset of its data consisting of all eligible claims for those residing in North Carolina for at least one month, and up to 24 months, in 2016 or 2017. HCCI contributed data for individuals younger than age 65, covered by either fully-insured or self-insured Employer-Sponsored Insurance (ESI) and for individuals of all ages covered by a Medicare Advantage (MA) plan*.*

As a CMS-approved qualified entity (QE), HCCI also has the Medicare Master Beneficiary Summary File (MBSF) and 100 percent final-action (i.e. all claims adjustments have been resolved) Medicare Fee-For-Service (FFS) Part A institutional, Part B non-institutional, and Part D drug claims for 2012 through 2018. For this analysis, claims for those residing in North Carolina in 2016 or 2017 were analyzed. This included Medicare-related claims and payments for individuals dually-eligible for Medicare and Medicaid.

2.1.2 Blue Cross NC

Blue Cross NC serves North Carolina customers and communities of more than 3.8 million members, including almost 1.1 million served on behalf of other Blue Plans. To produce the findings in the *A Multi-Payer Analysis of Healthcare Spending in North Carolina,* Blue Cross NC used an analytic subset of its data consisting of all eligible claims for those residing in North Carolina specifically enrolled in a Blue Cross NC plan (as opposed to a different Blue Plan) for at least one month, and up to 24 months, in 2016 or 2017. Blue Cross NC contributed data for individuals younger than age 65,

covered by either fully-insured or self-insured ESI and for individuals of all ages covered by a MA plan.

2.1.3   Duke University

Duke University houses the 100% North Carolina Medicaid data from 2013 to 2019. Relevant to this project, each year of data comprises a person-level summary file, an enrollment file, institutional claims, professional claims, and prescription medication dispensing claims. There were other files not included in this project—e.g., dental services claims—because these services were not covered by the other insurers contributing data. All claims files include the allowed amounts (i.e., eligible expenses) associated with each service. To produce the findings in the *Multi-Payer Analysis of Healthcare Spending in North Carolina*, Duke University used an analytic subset of these data consisting of all eligible claims for those enrolled in North Carolina Medicaid for at least one month, and up to 24 months, in 2016 or 2017. A subsample of beneficiaries included in this population were dually-eligible for Medicare and North Carolina Medicaid.

2.2 Study Sample

2.2.1   Selection Criteria

The study sample included enrollment data for individuals who met the following criteria:

- At least one member month of medical coverage in 2016 or 2017 as a resident of North Carolina, defined as membership ZIP code "27XXX" or "28XXX"
- Known and unchanging gender in enrollment file
- Known age in enrollment file; enrollees in ESI were limited to those under age 65, while all individuals with a known age were included for other populations

Members were assigned to a county for the duration of the study period based on their county of residence in the first month in which they appear in the enrollment file. Members were not required to have prescription drug coverage to be included in the study sample; prescription drug spending (See Section 3.1.1 was calculated using the subset of the study sample with such coverage.

In addition to the inclusion criteria listed above, the following steps were taken by HCCI and other data contributors to align data:

ESI Population
- Counties were assigned based on ZIP codes using the Q12017 U.S. Department of Housing and Urban Development's (HUD) Office of Policy Development and Research crosswalk of ZIP codes to FIPS county code and then using the National Bureau of Economic Research (NBER) fiscal year 2017 FIPS county code to county name crosswalk

Medicare FFS population
- Beneficiaries were assigned a geographic county based on the Social Security Administration (SSA) county code in the MBSF after selection based on the mailing ZIP code as described above[1]
- Beneficiaries were required to be enrolled in both Medicare Part A and Part B to be included in the study sample
- Beneficiaries who were dually eligible for Medicare and Medicaid were presented as a data subset. Dual eligibility was defined as full duals, which includes beneficiaries designated as Qualified Medicare Beneficiaries (QMB), Specified Low-Income Medicare Beneficiaries (SLMB) and other eligible dual beneficiaries with full Medicaid coverage.

NC Medicaid population
- Beneficiaries were assigned a geographic county based on the county of residence present in the person-level summary file. No crosswalk from ZIP code was required. Beneficiaries with missing county information were excluded.
- NC Medicaid includes multiple healthcare insurance programs, each having different eligibility criteria. Beneficiaries in all programs were included in the study sample.
- The NC Medicaid population includes both beneficiaries enrolled only in NC Medicaid and those dually eligible for Medicare. The NC Medicaid spending includes spending for beneficiaries with NC Medicaid as their sole source of insurance and spending for those who are dually eligible for NC Medicaid and Medicare. Spending for those dually eligible individuals is reported separately for each payer.

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[1] Note, in some cases, the ZIP code may not be the actual state where the beneficiary resides. CMS obtains the mailing address used for cash benefits or the mailing address used for other purposes (for example, premium billing) from SSA and Railroad Retirement Board (RRB) Beneficiary Record Systems.

2.2.2   Sample Demographics

The analytic dataset includes pooled data from 2016 and 2017. Data from the three contributors were aggregated by payer type. The ESI population included aggregated data contributed by HCCI and Blue Cross NC. Similarly, the MA population included aggregated data contributed by HCCI and Blue Cross NC. The dually-enrolled population includes data contributed by HCCI and Duke University.

In total, the *Multi-Payer Analysis of Healthcare Spending in North Carolina* included 151,082,727 member months, or approximately 12.6 million total member years (6.3 million in each year) of data in 2016 and 2017, as shown in Table 1. This represents approximately 60% of total population of North Carolina in 2016 and 2017.

TABLE 1. DATA SUMMARY BY POPULATION

Population	Member Years
ESI	5,422,395
MA	1,051,952
Medicare FFS	2,315,204
NC Medicaid	3,800,681
Total	12,590,232

The analytic dataset was further divided into the high-level and detailed categories outlined in Section 2.3, as well as by gender and age bands. The age bands include 0-17 years, 18-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years, 65-74 years, 75-84 years, and 85+ years. The ESI population was limited to those under 65, as described in Section 2.2.1 . For some analyses, age bands were aggregated into three age categories: children (0-17 years), non-elderly adults (18-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years), and elderly adults (65-74 years, 75-84 years, and 85+ years).

2.3   Claims categorization

At the highest level, claims data were grouped into four major service categories: inpatient facility, outpatient facility, professional procedure, and prescription drugs. Claims in each of the four major service categories were further classified into detailed

service categories.

2.3.1   Inpatient facility claims

Inpatient facility claims came from hospitals and non-hospital facilities such as skilled nursing facilities (SNFs) and hospices, where there was evidence that the insured stayed overnight for treatment but not observation. Inpatient claims were identified using the following definition:

- Valid revenue center code and at least <u>one</u> of the following:
    o Place of service (POS) code 21, 31, 32, 33, 34, 51, 56, or 61
    o Valid Medicare Severity Diagnosis-Related Group (MS-DRG) code (V32)
    o Room and board revenue code 100-219
    o Medicare FFS claims with a National Claims History (NCH) claim type of 20, 30, 50, or 60

Inpatient claims were then subdivided into SNF, hospice, and acute inpatient. Acute inpatient was then further subdivided into medical, surgical and transplant, labor and deliveries, mental health and substance use, and newborns based on MS-DRG codes, POS codes, type of bill (TOB) codes, and billing provider taxonomy (BPT) codes. Some inpatient facility claims could not be categorized as described above; these claims were treated as ungroupable.

The methodology for subdividing inpatient facility claims is outlined in Table 2; the MS-DRG codes for classifying inpatient categories are available in the crosswalk as a csv file or txt file. If multiple claims had the same member identification and facility categorization (acute inpatient, SNF, or hospice) with overlapping or contiguous admission or discharge dates, they were grouped into one admission. An admission is defined as a unique combination of individual and admission and discharge dates.[2] The length of stay was determined as the discharge date less the admission date plus one day. If multiple claims were combined into one admission, the discharge date used was the latest discharge date among all claims; the admission date used is the earliest

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[2] Re-grouping of inpatient claims does not apply to Medicare FFS acute care claims, as each claim is considered a distinct admission.

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admission date among all the claims of the contiguous admission.

TABLE 2. INPATIENT CLAIMS CLASSIFICATION

Inpatient Category	Detailed Category	MS-DRG	POS	TOB	BPT	NCH	Notes
SNF	SNF	See crosswalk	31, 32, 33			20, 30	POS code 31, 32, 33 puts admit in this detailed category. Ignore other admit codes.
Hospice	Hospice	See crosswalk	34			50	POS code 34 puts admit in this detailed category. Ignore other admit codes.
Acute	Medical	See crosswalk				60	
Acute	Surgical & Transplant	See crosswalk				60	
Acute	Labor & Deliveries	See crosswalk				60	
Acute	Mental Health & Substance Use	See crosswalk	0911	651-669; 891-907	Starting with 315P, 3209, or 323P	60	
Acute	Newborns	See crosswalk				60	
Acute	Ungroupable	No MS-DRG					Any claim meeting inpatient criteria without meeting any other detailed category criteria is in this detailed category.

2.3.2   Outpatient facility claims

Outpatient services are rendered by sections of a hospital providing medical services that do not require an overnight stay or hospitalization (e.g., emergency room (ER), outpatient procedures, observation). These services can also be provided at freestanding outpatient facilities, including free-standing surgical centers, ambulatory surgical centers (ASCs), and clinics with certain diagnostic testing technologies (e.g., MRIs). These outpatient facilities all file Health Care Financing Administration (HCFA) 1500 form with insurers. Outpatient claims were identified using the following definition:

- Valid revenue center code and not classified as inpatient
- Includes all ambulance, home health, and DME/prosthetics/supplies, regardless of revenue center code presence or absence
- Includes all dialysis claims, regardless of revenue center code presence or absence
- Medicare FFS claims with an NCH claim type of 10, 40, 81, 82, and ambulance claims from the carrier file (NCH claim type 71)

Outpatient claims were classified into two high-level categories: 1) outpatient visits and 2) outpatient – other. Outpatient visits include ER, outpatient procedures, and observation. All outpatient claims that occur on the dates of an outpatient visit are classified as part of the visit and assigned to the detailed service category with the highest hierarchy value. Outpatient – other claims were classified as discrete outpatient services and were not grouped by date. Outpatient – other detail categories include administered drugs & immunizations, ambulance, durable medical equipment (DME), evaluation & management (E&M) visits, dialysis, home health, pathology & laboratory, radiology & imaging, and miscellaneous.

Detailed categories are based on revenue center code, TOB code, and the Current Procedural Terminology/Healthcare Common Procedure Coding System (CPT/HCPCS) code. Outpatient claims may have multiple services billed on the same claim, so a hierarchy was used to determine which detail line to use for categorization. For example, if the revenue code and the CPT/HCPCS code belong to different detailed categories, the claim was placed into the detailed category higher in the hierarchy. Additionally, if an outpatient – other claim occurred on the same date as an outpatient -

visit claim, the claim was considered part of the visit if the visit detailed category was higher in the hierarchy.[3] The CPT/HCPCS codes for classifying outpatient categories are available in the crosswalk as a csv file or txt file. The revenue center codes, TOBs codes, NCH claim type codes, and respective hierarchy level of each category is below in Table 3.

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[3] Exceptions to the outpatient classification hierarchy were made for some Medicare FFS claims due to the unique nature of how these claims are submitted. Home health claims, dialysis claims, and outpatient therapy claims were aggregated irrespective of the outpatient hierarchy; Medicare FFS outpatient therapy is included in the miscellaneous category since reconciling physical medicine claims across payers was out of scope for this analysis.

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TABLE 3. OUTPATIENT CLAIMS CLASSIFICATION

Outpatient Category	Detailed Category	CPT	Revenue Center	TOB	NCH	Hierarchy
Other	Administered Drugs & Immunizations	See crosswalk			40	1
Visit	Emergency (ER)	See crosswalk	0450-0452, 0456, 0459		40	2
Visit	Outpatient Procedures	See crosswalk	360-362, 367, 369, 481, 490, 499, 790, 799		40	3
Visit	Observation	See crosswalk	760, 761, 762, 769		40	4
Other	Dialysis	See crosswalk			40	5
Other	Radiology & Imaging	See crosswalk	320-324, 329-333, 335, 339, 340-344, 349-352, 359, 400-404, 409, 610-619		40	6
Other	Pathology & Laboratory	See crosswalk	300-307, 309-312, 314, 319		40	7
Other	Ambulance	See crosswalk			71	8
Other	DME	See crosswalk			81, 82	9
Other	Home Health	See crosswalk	0023, 0560, 0561, 0562, 0569, 0570, 0571, 0572, 0589, 0590, 0609, 056X, 057X, 058X, 059X, 060X	300-399	10	10
Other	Evaluation & Management	See crosswalk			40	11
Other	Miscellaneous	See crosswalk			40	12

2.3.3   Professional claims

Professional procedure claims are claims filed by a health care professional for medical services provided. Claims with no valid revenue code were assumed to be a professional procedure claim, unless otherwise noted. Medicare FFS claims with an NCH claim type of 71, 72, and Method II CAH claim lines (NCH claim type 40) were processed as a professional claim. Claims were classified into professional procedure detailed categories based on their CPT/HCPCS codes. The professional detailed categories include administered drugs & immunizations, behavioral health, ER, E&M visits, labs & pathology, procedures, radiology services, and miscellaneous. The CPT/HCPCS codes for classifying professional claims categories are available in the crosswalk as a csv file or txt file.

2.3.4   Prescription drug claims

Prescription drug and device pharmacy claims were defined as claims within the prescription drug and device pharmacy file. No further classification of these claims was made in this analysis, and this analysis does not account for manufacturer rebates.

2.4 Episode categorization

The dataset includes utilization and spending for six episodes of care: Caesarian section delivery, vaginal delivery, lower extremity joint replacement, and stroke. The methodologies for defining the episodes are as follows.

2.4.1   Delivery – Caesarian section (C-section)

C-section delivery episodes were identified by inpatient admissions with MS-DRG codes 765 or 766. The date of the episode was defined as one day prior to the date of the delivery (e.g., the day the MS-DRG appears in the inpatient file) to 60 days after the

date of delivery[4] or until the member no longer appeared in the data, whichever occurred first. All outpatient and professional claims occurring within the timeframe were included as part of the episode.

2.4.2   Delivery – Vaginal

Vaginal delivery episodes were identified by inpatient admissions with MS-DRG codes 767, 768, 774, or 775. The date of the episode was defined as one day prior to the date of the delivery (e.g., the day the MS-DRG appears in the inpatient file) to 60 days after the date of delivery[4] or until the member no longer appeared in the data, whichever occurred first. All outpatient and professional claims occurring within the episode are included as part of the episode.

2.4.3   Lower Extremity Joint Replacement

Lower extremity joint replacement episodes were identified by inpatient admissions with MS-DRG codes 469 or 470. The date of the episode was defined as three days prior to the date of the joint replacement (e.g., the day the MS-DRG appears in the inpatient file) to 30 days after the date of the joint replacement[5] or until the member no longer appeared in the data, whichever occurred first. All outpatient and professional claims occurring within the episode are included as part of the episode.

2.4.4   Stroke

Stroke episodes were identified by inpatient admissions with MS-DRG codes 061, 062, 063, 064, 065, or 066. The date of the episode was defined as one day prior to the date of the stroke (e.g., the day the MS-DRG appears in the inpatient file) to 90 days after the date of the stroke,[4] the start of another stroke, or until the member no longer

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[4] Wingert, Terence D., et al. "Constructing Episodes of Care from Encounter and Claims Data: Some Methodological Issues." Inquiry, vol. 32, no. 4, 1995, pp. 430–443. JSTOR, www.jstor.org/stable/29772581.

[5] Weeks, William B., et al. "Episode-of-Care Characteristics and Costs for Hip and Knee Replacement Surgery in Hospitals Belonging to the High Value Healthcare Collaborative Compared With Similar Hospitals in the Same Health Care Markets." Medical Care, vol 55, no. 6, 2017, pp.583-589. https://journals.lww.com/lww-medicalcare/FullText/2017/06000/Episode_of_Care_Characteristics_and_Costs_for_Hip.7.aspx.

appeared in the data. All outpatient and professional claims occurring within the episode are included as part of the episode.

2.5 Conditions

The dataset includes spending for people with one of four selected conditions: diabetes, depression, and opioid use disorder (chronic conditions), and lung cancer (acute-onset condition).

2.5.1 Depression

Depression was defined by International Classification of Diseases, Tenth Edition, Clinical Modification (ICD-10-CM) codes F32 and F33. Individuals with at least one claim in the inpatient or outpatient datasets or two claims in the professional dataset with the ICD-10-CM codes of interest were flagged as being part of the depression cohort. If an insured meets the inclusion criteria for the depression cohort, every month that the insured appears in the sample, including those prior to the first depression diagnosis, were counted as month(s) in which the individual is in the depression cohort. Thus, for all member months in which the insured is in the study sample, he is also in the depression cohort.

2.5.2 Diabetes

Diabetes was defined by ICD-10-CM codes E10, E11, E13, Z96.41, Z46.81, T85.614A, T85.624A, T85.633A, and T85.694A. Individuals with at least one claim in the inpatient or outpatient datasets or two claims in the professional dataset with the ICD-10-CM codes of interest were flagged as being part of the diabetes cohort. If an insured meets the inclusion criteria for the diabetes cohort, every month that the insured appears in the sample, including those prior to the first diabetes diagnosis, were counted as month(s) in which the individual is in the diabetes cohort. Thus, all member months in which the insured is in the study sample, he is also in the diabetes cohort.

2.5.3 Opioid Use Disorder

Opioid Use Disorder (OUD) was defined by ICD-10-CM code F11. Individuals with at least one claim in the inpatient or outpatient datasets or two claims in the professional

dataset with the ICD-10-CM code of interest were flagged as being part of the OUD cohort. If an insured meets the inclusion criteria for the OUD cohort, every month that the insured appears in the sample, including those prior to the first OUD diagnosis, were counted as month(s) in which the individual is in the OUD cohort. Thus, all member months in which the insured is in the study sample, he is also in the OUD cohort.

2.5.4   Lung Cancer

Lung cancer was defined by ICD-10-CM code C34. Individuals with at least one claim in the inpatient or outpatient datasets or two claims in the professional dataset with the ICD-10-CM code of interest were flagged as being part of the lung cancer cohort. Once an insured meets the inclusion criteria for the lung cancer cohort, they are included in the lung cancer cohort going forward for all remaining months in the study period.

3. Measures

3.1 Spending

Two sets of spending metrics were calculated: 1) allowed amounts and 2) out-of-pocket amounts. Allowed amounts are defined as the amount paid for the service, which is the sum of the insurer payment and the copayment or cost-sharing amount from the insured. The out-of-pocket amounts are the deductible, co-payment, and cost-sharing amount from the insured. All spending is reported as 2017 USD; all 2016 spending was inflated to 2017 USD using U.S. Bureau of Labor and Statistics inflation data.

Spending does not include any premium payments. Prescription drug spending reflects point-of-sale expenditures and does not include manufacturer rebates provided through separate transactions.

Medicare FFS spending includes both direct and indirect payments to providers in addition to fee-schedule payments, including Health Professional Shortage Area (HPSA) bonus payments, quality incentive payments and reductions, and pass through payments which include payments made by CMS to cover certain expense such as capital related costs, direct medical education costs, kidney acquisition costs for hospitals that are renal transplant carriers, and bad debts. Denied claims were excluded from the Medicare FFS analysis as were payments where Medicare was the secondary payer. We also excluded Part A and Part B spending for beneficiaries enrolled in an MA plan, which includes payments for beneficiaries enrolled in an MA cost plan who access FFS as well as about a quarter of a billion dollars in hospice spending from MA beneficiaries receiving hospice care.

Medicare Part D spending is included only for FFS beneficiaries enrolled in a stand-alone plan. The out-of-pocket spending includes only payments made by the beneficiary; the drug spending allowed amount includes all payments made by the plan and other payments made on behalf of the beneficiary, including low-income subsidy payments, in addition to the beneficiary's out-of-pocket spending.

Out-of-pocket spending was not calculated for the NC Medicaid data since nearly 100% of claims have $0.00 patient deductible and co-pay. Medicaid spending includes only claims payments and does not include supplemental payments to hospitals and other providers (e.g., cost settlements, Disproportionate Share Hospital Payments, Upper Payment Limits). For encounters associated with Medicaid Local Management Entities-Managed Care Organizations (LME-MCOs), allowed amounts are based on Medicaid pricing rules and provide the most appropriate comparison to fee for service claim payments, but the amounts may differ from what the LME-MCOs ultimately paid for those encounters.

3.1.1   Per-Person Spending

Annual per-person spending was calculated by dividing the sum of spending for all claims within each high-level and detailed category by the sum of member months, either for the total population, the condition-specific population, or the prescription drug coverage population and multiplying by 12. Annual out-of-pocket spending per person was calculated in an analogous manner, substituting the sum of out-of-pocket spending in the numerator. To calculate total annual per-person spending, the annual per-person spending for each high-level category (i.e., inpatient facility, outpatient, professional, prescription drug) was summed.

3.1.2   Per-Episode Spending Calculation

Per-episode spending was calculated for the episodes outlined in Section 3.1.2 . The numerator for each calculation was the sum of spending for all claims during the episode. The denominator for each calculation was the total number of episodes. Out-of-pocket spending per episode was calculated in an analogous manner.

3.2 Utilization

Utilization was measured for the selected episodes. Utilization was defined as the number of distinct admissions for the episodes and is reported for each population per 1,000 member years.

3.3 Age-Gender Adjustment

We adjusted for age and gender differences to facilitate comparison across geographic areas. Specifically, we calculated each gender-age group's share of medical and prescription drug coverage months for each payer type statewide. We then weighted the payer-type specific per-person spending in each county by the statewide share. We used the statewide share of medical coverage months for inpatient, outpatient, and professional services categories, and the statewide share of prescription drug coverage months for prescription drug spending. This results in a per-person spending in each county that assumes a consistent age-gender composition within the payer type. To calculate average per-person spending across all payer-types, we weighted county per-person spending by the county share for the payer type before summing.

3.4 Masking and Suppression

To ensure that individuals, providers, and payers were not identifiable in the public analytic data set, we do not report data where:

- fewer than 11 unique individuals in the age-gender-payer group in the county or state had a claim for a service in the category,
- fewer than 5 unique providers delivered a service in the category to patients in the age-gender-payer group in the county or state, or
- There was not a sufficient mix of payers in the county (for the employer-sponsored insurance and Medicare Advantage populations).

4. Limitations

This analysis has several limitations, as described below.

4.1 Representation of North Carolina Population

While this analysis provides a comprehensive analysis of health care spending in North Carolina, it does not account for the total population of the state. It does not include spending and utilization of the uninsured population, those insured through the individual market, those enrolled in ESI with plans administered by other issuers, members served on behalf of other Blue Plans, other types of supplemental insurance, nor does it include those enrolled in Tricare or care delivered through the Veterans Administration. Because these populations may be inherently different than the population included in this analysis, the findings may not be generalizable to the entire state of North Carolina.

Because individuals were selected into the sample based on their place of residence, the analysis does not include individuals who reside in other states but receive care in North Carolina. Further, it may include spending and utilization for individuals who reside in North Carolina but receive care outside of the state. Similarly, individuals were not linked between data contributors and payer types. Thus, an insured could move from one payer type to another during the study period; this was not accounted for in the analysis.

While the Medicare FFS data and the NC Medicaid data include information on their respective dually eligible populations, we were unable to match persons across data sources. As such, the approximately 246,000 dually eligible lives are counted as both Medicare beneficiaries in the Medicare data as well as Medicaid beneficiaries in the Medicaid data. We present spending information for the dually eligible reported by Medicare and reported by Medicaid. Note that in some cases spending may not be mutually exclusive. In particular, the out-of-pocket portion of Medicare spending is nearly always paid by the Medicaid program for dually eligible beneficiaries. Additionally, those dually eligible for Medicare and Medicaid were assumed to be enrolled in NC Medicaid and not another state's Medicaid program based on residence in NC in the MBSF; however, we cannot confirm given the inability to link beneficiaries across data populations.

4.2 Data Consistency

The structure of each contributors' data holdings differs. While close collaboration between the data contributors occurred throughout the analysis to ensure consistency, there are inherent differences in the claims that the contributors could not fully reconcile. While the methods in this document describe the nuances in data processing that data contributors used, there may be underlying differences that prevented complete consistency of measures for each payer type. Examples include the bundling of certain services particularly in the outpatient setting, particularly Medicare's OPPS packaged services which can vary from year to year.

In some cases, the service categories used in this project differed from how the source data is categorized. For example, the raw NC Medicaid data classifies certain claim lines (e.g., home health, non-emergency transport in ambulance) as professional services which were classified as outpatient services in this project. Thus, these claim lines were moved from professional services to outpatient services to align with other data sources, as described in Section 2.3.

4.3 Spending

As mentioned in Section 3.1, the analysis does not include premium spending and rebates for prescription drug spending. Additionally, the analysis does not consider benefit design when reporting allowed amount spending and out-of-pocket spending. Costs associated with populations outside of this analysis, including uncompensated care, is not included in this analysis, thus underestimating the true health care spending in North Carolina.