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Addressing North Carolina Rural Counties' Maternal Health Birthing Crisis With Keywell.AI's Data

A Report for Keywell.Ai

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Keywell ai

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Keywell.ai

Executive Summary

Keywell.ai aims to explore ways the United States' Centers for Medicaid and Medicare Services (CMS) private insurance reimbursement data can be used to address maternal health equity. Maternal health response includes a variety of interventions such as prenatal care, birthing, postpartum care, and access to emergency obstetric care. [1] Additionally, maternal health response includes addressing the underlying factors that contribute to poor maternal health outcomes, such as poverty and long commute times to see health providers. CMS' dataset is now publicly available, but it is burdensome for the public to work with due to its large size. This data can potentially increase hospitals' negotiating power on reimbursement rates, facilitate price comparison and shopping of procedures for patients, and highlight reimbursement differences that advocates and administrators may be unaware of.

Rural patients face disadvantages due to their unique social determinants of health which are further exacerbated by inaccessible healthcare. The CMS dataset could help to bring new findings to improve maternal healthcare advocacy. Research reveals the critical need for accessible maternal health services and that pricing may affect its accessibility in rural counties. [2] Therefore, the policy team narrowed its focus to the following policy question:

"To what extent can Keywell.ai's data help prioritize rural North Carolina counties' responses to the maternal health birthing crisis?

Introduction

The team conducted an analysis of private payer reimbursement rates and interviewed healthcare advocates for insights and evidence on how Keywell.ai can use the CMS data to inform the maternal health response in rural NC counties. The policy team discovered that the data could be used to address maternal health inequities, increase price awareness, and address the social determinants of health in rural counties.

Findings

#1 **Consumers, key stakeholders, and experts have limited knowledge about CMS' price transparency data and how it could affect birthing outcomes for rural health providers.**

#2 **Private payer reimbursement data is not useful for providers.**

#3 **Private payer reimbursement rates are lower for rural hospitals than for urban hospitals**

Recommendations

#1 **Provide maternal health advocates and hospital administrators with data on the gap between urban and rural reimbursement rates.**

#2 **Develop and pilot a tool for maternal care advocates to compare birthing service reimbursement rates.**

Background

Price Transparency Tools to Address Health Equity

On July 1, 2022, CMS implemented the Transparency in Coverage rule. The rule required private insurers to publicly release their reimbursement rates to increase consumer price awareness.[3] The intended goal of the ruling is to "...reduce the secrecy behind health care pricing with the goal of bringing greater competition to the private health care industry." [4] These negotiated rates were confidential information until July 2022 when the Transparency in Coverage rule took effect which requires payers to publicize their negotiated rates in a machine-readable format. [5]

Keywell.ai's Commitment to Increase Price Transparency

Keywell.ai's services are comprised of four categories: strategy, dashboard, dataset, and algorithm deliverables. Keywell.ai is interested in expanding its services to include analysis of the CMS' publicly available price transparency data to address health equity and gaps in the healthcare system.

Rural Hospitals Providing Maternal Health Services Face Challenges

Rural hospitals face acute challenges in providing maternal health services. The most prominent challenges relate to a rural hospitals' operations and the surrounding community's unique social determinants of health. Women who live in low-income communities experience barriers to accessing health services due to a growing shortage of providers.[6] Over the past decade, a growing percentage of women are receiving late or no prenatal care in NC.

Rural vs. Urban Operational Disparities

Compared with urban OBGYN departments, rural OBGYN departments are more likely to experience greater difficulty hiring and retaining staff, lower birth volume, and lower reimbursement rates.[7]

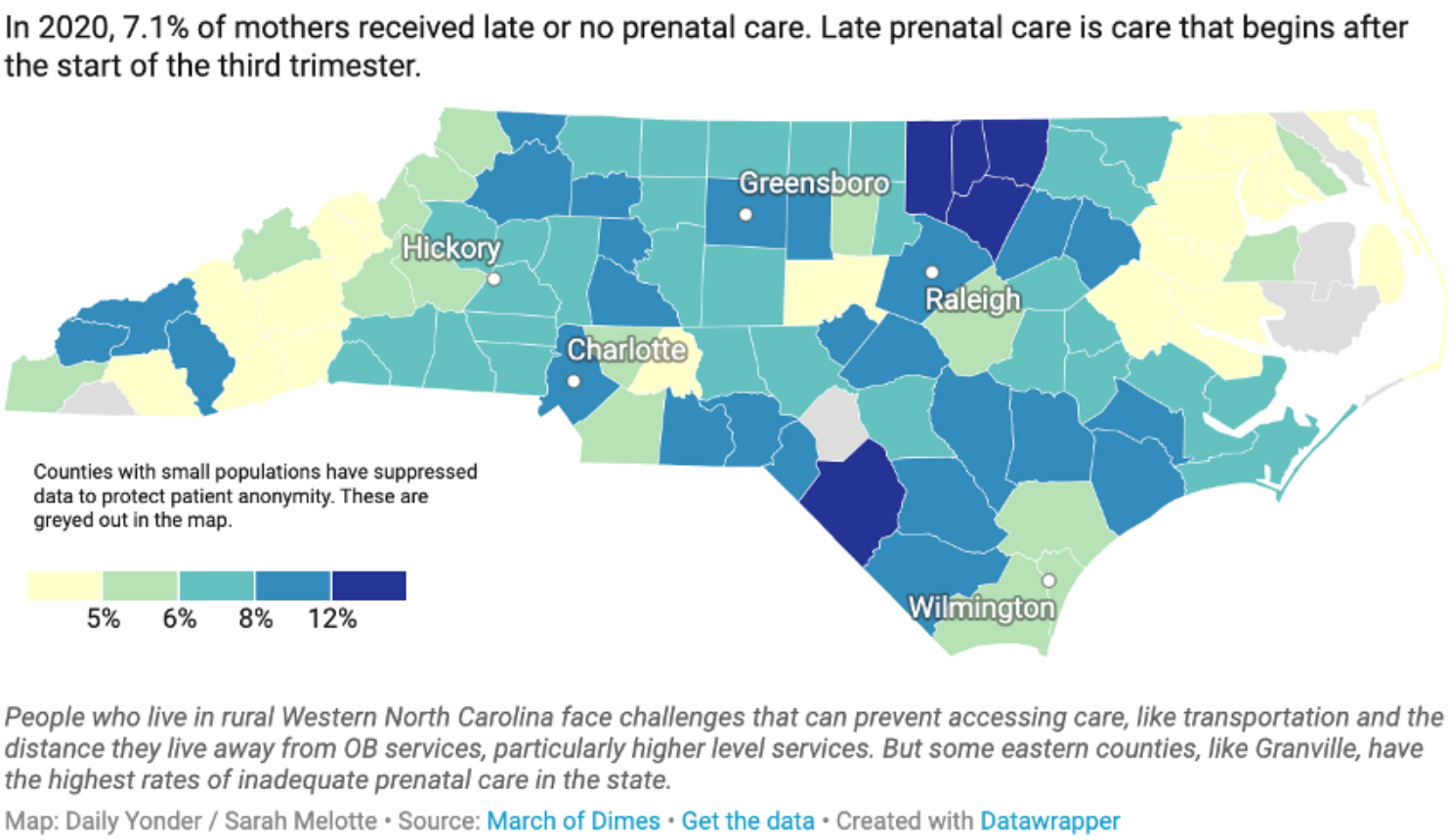


Figure 1: The graphic illustrates the average number of women who received late or no prenatal care in 2020. It indicates that rural counties in North Carolina received higher levels of late or no prenatal care compared to urban counties. Author analysis of March of Dimes, 2020

Low Birthing Volume Limits Resources

Rural OBGYN departments and rural hospitals most at risk of closure typically birth less than 100 infants per year.[8] Hospitals with low birth volumes allocate their resources to other services with higher volumes thus leaving maternity care with fewer resources. Additionally, a lower birth volume may mean fewer reimbursements for maternal health-related services due to fewer procedures.

Lower Reimbursement Rates due to Payer Mix

Rural hospitals typically face tight budget constraints due to their reliance on lower reimbursement rates from Medicaid and Medicare. These public insurance providers typically reimburse considerably lower than private insurance which makes rural hospitals more susceptible to financial hardship. Since 2005, 190 rural hospitals across the United States have shut down – **ten of which were in North Carolina**.[9]

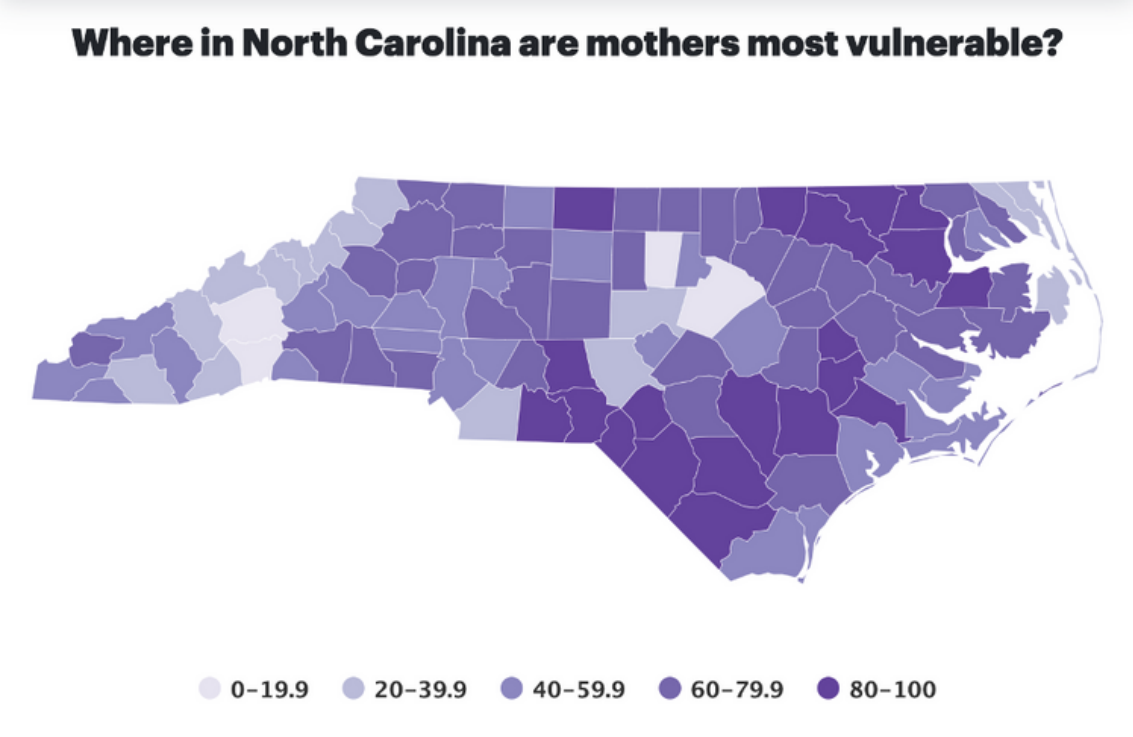


Figure 2: The graphic illustrates the areas in North Carolina where women are most vulnerable to poor pregnancy outcomes and pregnancy-related deaths. Rural counties are shaded darker than urban counties, which highlights their higher vulnerability. Author analysis of March for Dimes, 2022

Staffing and Retention Deficits

In North Carolina, 26 counties do not have a single OBGYN provider.[10] With only **6.4% of OBGYNs practicing in rural areas**, rural hospitals typically rely on primary care physicians or midwives for delivery. [11] Although this is sufficient for most low-risk pregnancies, high-risk pregnancies significantly benefit from the care of an OBGYN.

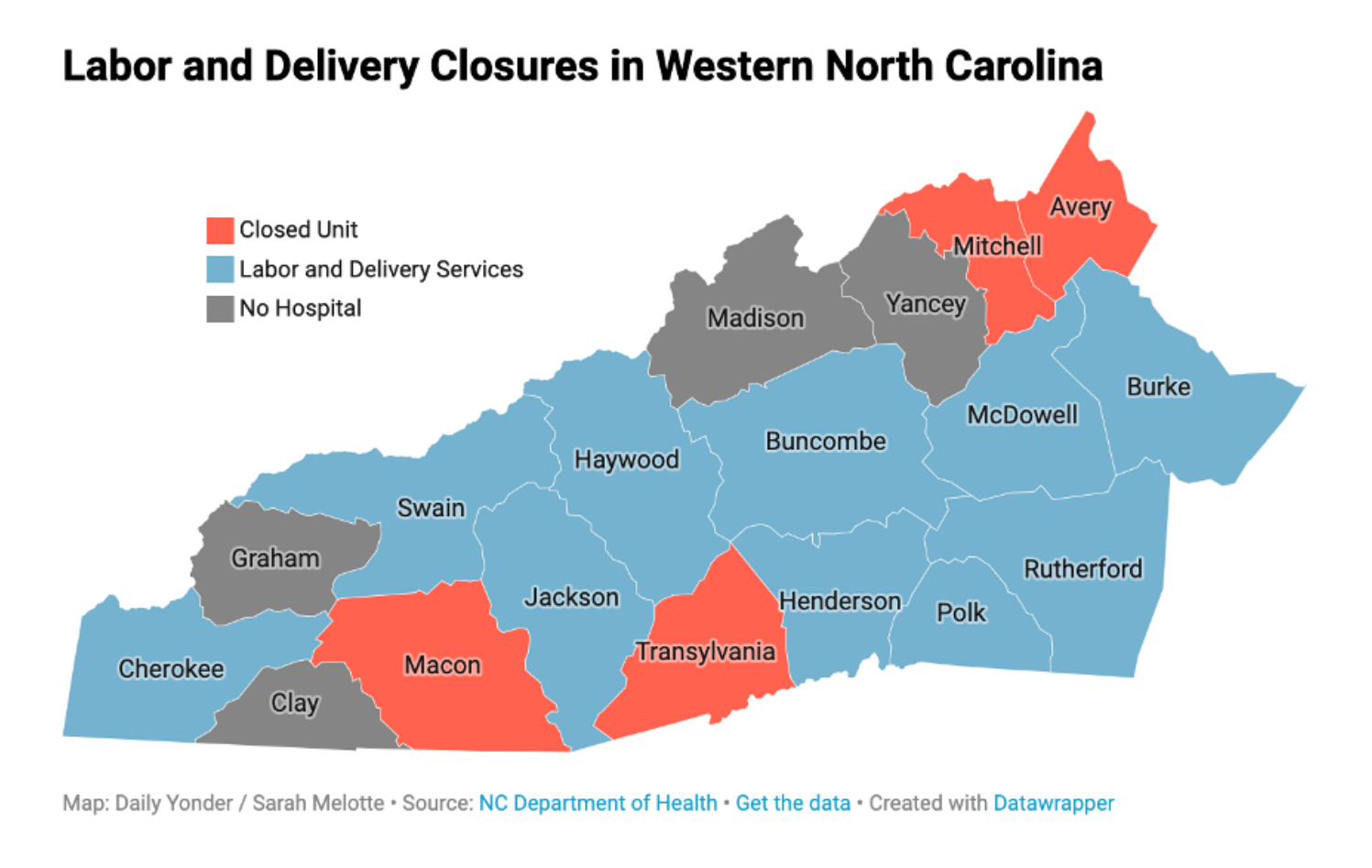


Figure 3: This graphic illustrates the amount of labor and delivery closures in Western North Carolina. If an expecting mother is living in Mitchell or Avery County, where they have a closed unit and neighboring counties such as Yancey and Madison lack hospitals, expectant mothers must seek services in other counties like Burke or McDowell County. Traveling from Avery County to McDowell County takes about an hour. Rural hospitals may also feel overwhelmed by the influx of mothers, which can result in limited resources and inadequate prenatal care that could ultimately affect birthing services. Authors analysis of NC DoH, 2023

Social Determinants of Health Affect Equity

Social determinants of health (SDOH) exacerbate the challenges that rural hospitals face. Social determinants of health, as described by the World Health Organization, are the non-medical factors that influence health outcomes.[12] Pregnant women, particularly those in rural areas, face challenges related to transportation barriers and access to insurance.

Inaccessible Transportation Causes Health Inequity

Rural hospitals are often difficult to access for expecting mothers due to inadequate or inaccessible transportation. Maternity care deserts are counties where maternal services are not available.[13] **Less than one-half of rural women live within a thirty-minute drive from the nearest hospital offering prenatal service**.[14]

Access to Private and Public Insurance:

Access to health insurance, whether private insurance or Medicaid, is a challenge for many women in rural areas. Private health insurance is more inaccessible in rural areas as well. Social stigmas and transportation barriers, among other reasons, can limit access to Medicaid enrollment.[15] These unmet insurance needs can lead to pregnancy and birth complications.

Racialized Disparities Impact Birthing Outcomes

Birthing outcomes differ among racial and ethnic categories. According to the 2015 North Carolina Maternal Mortality Review Committee, **"63% of maternal deaths in North Carolina were preventable."**[16]

Due to institutional racism and discrimination from health care providers, Black and Latinx patients experience higher levels of pregnancy complications. [17] According to the Centers for Disease Control and Prevention, nationally "Black women are three times more likely to die from a pregnancy-related cause than white women."[18] In North Carolina, **Black infants are two times more likely than white infants to be born with a low birth weight**.[19]

To gain further insight into the discrepancies in birthing services in rural areas, the policy team conducted interviews with experts in the field. Additionally, the team tested if rural reimbursement rates are lower than their urban counterparts. Keywell.ai's cleaned CMS dataset provides an opportunity to query the data for insights. The data is necessary to measure the reimbursement differences between urban and rural hospitals for maternal health services which have been highlighted in the qualitative findings.

Methodology

1. Semi-Structured Interviews

The policy team interviewed five experts in maternal and rural health care in North Carolina to learn about birthing inequities in rural areas. Refer to Appendix F for the experts' biographies and Appendix G for the interview questions.

2. Literature Review

The policy team reviewed published research papers, articles, state and federal websites, and medical articles.

3. Keywell.ai CMS Private Payer Reimbursement Rates

The team tested the data to determine if private payers reimburse rural hospitals at lower rates than urban hospitals. This quantitative analysis could provide evidence of lobbying efforts or legislative action.

Datasets

To make better use of the dataset for the policy question, all National Provider Identifiers (NPIs) were linked to a Rural-Urban Continuum Code (RUCC). This allows the specified providers to be categorized as urban or rural. CPT codes related to vaginal and cesarean section births were used to compare rates across each RUCC to determine reimbursement rate differences. Ten NPIs from rural areas were selected to be compared against ten NPIs from urban areas.

Dataset	Description
National Plan and Provider Enumeration System (NPPES)	NPPES[20] identifies the National Provider Identifiers, which are unique identifiers for health care providers. National Provider Identifier (NPI) registry public search is a free directory that gives the public access to the active NPI records. Type 1 NPIs refer Individual Health Care Providers while Type 2 NPIs refer to Organizational Health Care Providers.
Keywell.ai's Reimbursement Database	Keywell.ai has a consolidated database with reimbursement rates from the CMS' Transparency in Coverage rule. This data contains insurance reimbursement rates for specific services negotiated between specific payers and specific providers.
Rural-Urban Continuum Code (RUCC)	The RUCC[21] is a classification scheme that distinguishes urban and rural counties based on population size, urbanization and adjacency to a metro area or areas. It is an open data source that is available at the United States Department of Agriculture (USDA).
Maternal Care Deserts	The March of Dimes calculates statistics on the Maternal Care Deserts which it defines as "any county without a hospital or birth center offering obstetric care and without any obstetric providers."[22]
Current Procedural Terminology (CPT) Codes	The team chose CPT codes related to vaginal and cesarean birthing to narrow the question. This allows for a narrowed scope and tailored analysis of the question. Refer to Appendix C for the CPT codes our policy team analyzed.

Findings

#1 Consumers, key stakeholders, and experts have limited knowledge about CMS' price transparency data and how it could affect birthing outcomes for rural health providers.

Keywell.ai has made progress in establishing a private insurance price transparency dataset, which is currently lacking in the healthcare industry. Despite CMS' Transparency in Coverage rule, many maternal and rural healthcare stakeholders are not aware that this data is available and accessible.

When asked by our policy team, all of the experts expressed their familiarity with the CMS's price transparency data rule. However, their responses suggested a lack of detailed knowledge about the specific provisions of the rule and its potential positive impact on addressing birthing inequalities in rural communities.

#2 Private payer reimbursement data is not useful for providers.

Through interviews, our policy team discovered that providers such as doctors, nurses, and mid-wives are often aware of the CMS' Transparency in Coverage rule but do not see a direct effect on their work as front-line providers. These providers additionally noted that this sort of data would more likely be useful for an advocate or administrative staff whose work focuses on insurance rates.

Providers expressed a strong interest in seeing how this data may be paired with quality and outcome metrics.

Findings

#3 Private payer reimbursement rates are lower for rural hospitals than for urban hospitals

For both vaginal and cesarean delivery, rates for urban hospitals appear to be higher than those for rural hospitals. From hospitals in RUCC one to those in RUCC nine, reimbursement rates for vaginal and C-section births are **approximately 15-20% lower**, as seen in the figures below. Rural hospitals face challenges related to staffing and financing due to lower birth volume and a greater percentage of Medicaid-covered births.

Receiving lower private reimbursement rates places an even greater strain on maternal health services which typically operate at a loss. Additionally, we noticed during our expert interviews that doctors who work primarily for an urban health provider may be reimbursed at the urban rate even though they are working a day or two per week in a rural county.

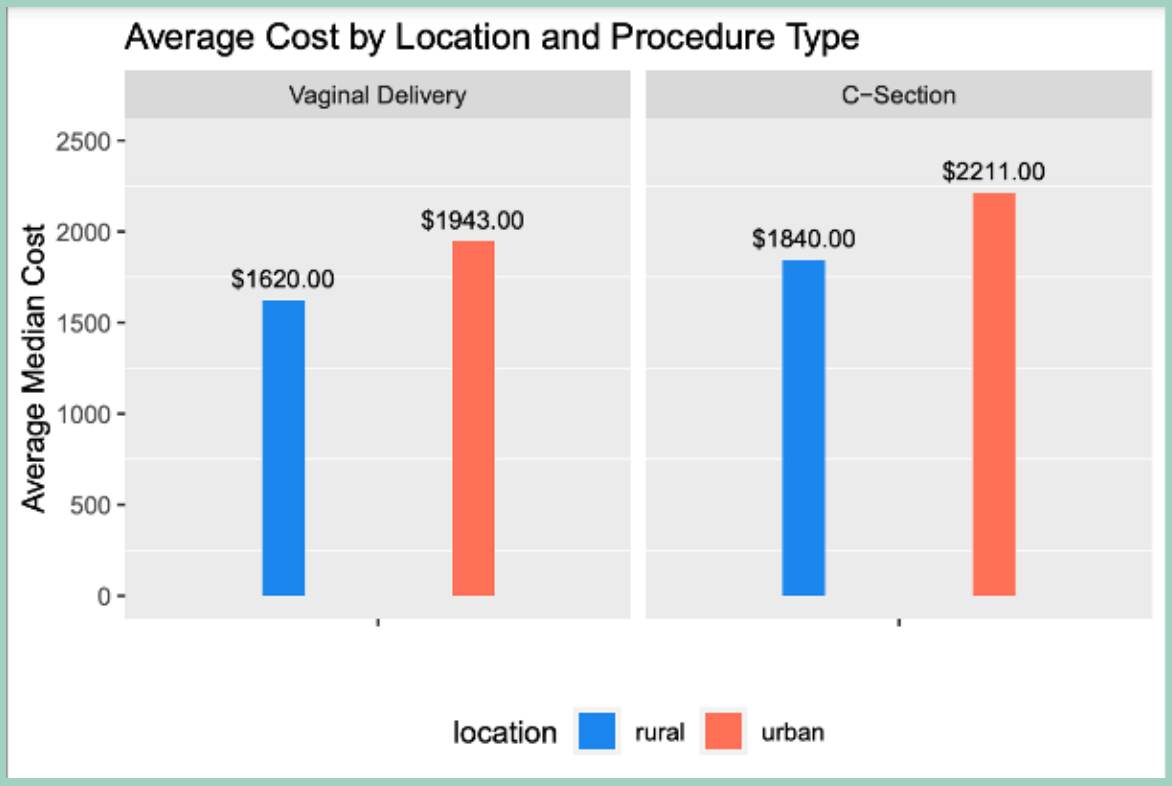


Figure 4: The graphic shows an averaged private reimbursement rate by RUCC that is based on the median reimbursement rates received by 10 selected rural NPIs and 10 selected urban NPIs. Source: Keywell.ai CMS data Authors analysis of Keywell.ai Price Transparency Data, 2023

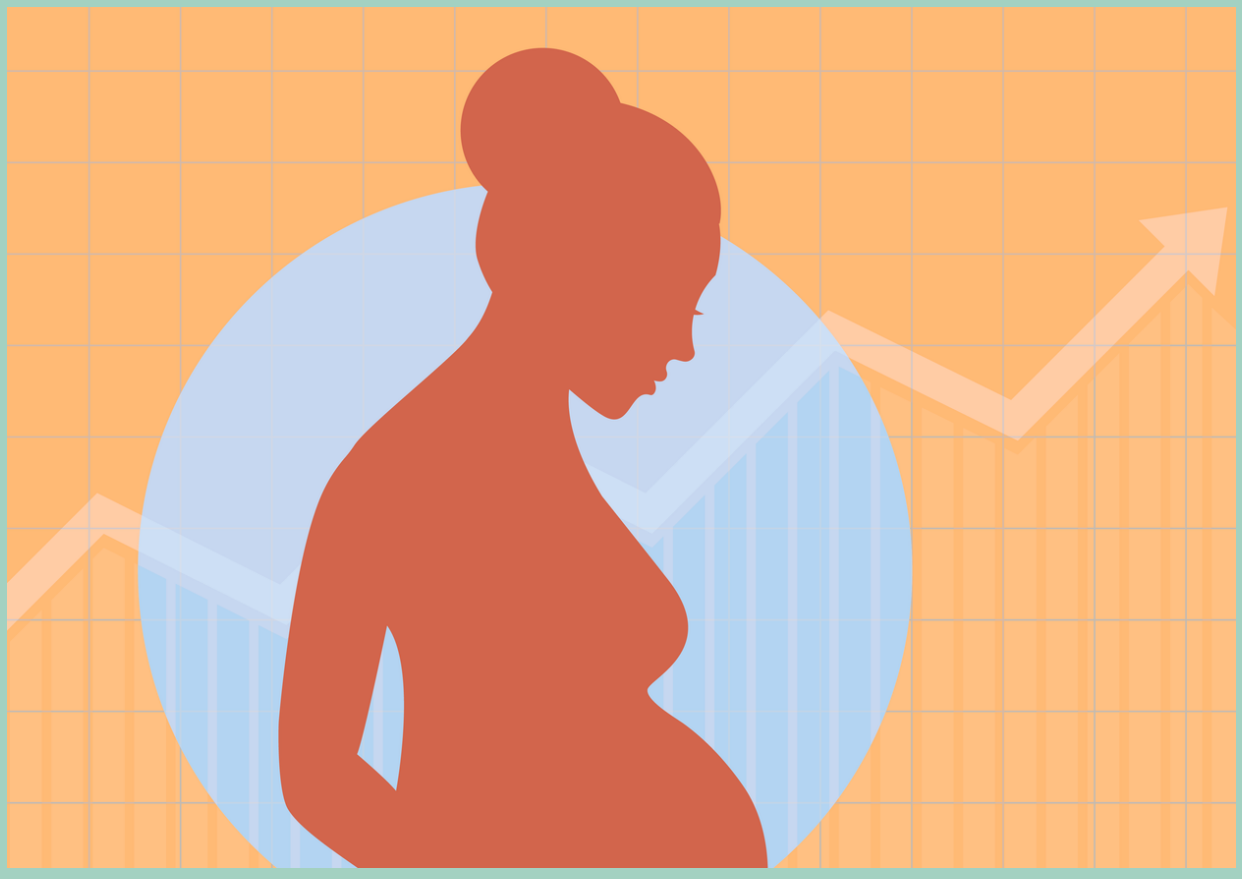
Recommendations

#1

Provide maternal health advocates this data on the gap between urban and rural reimbursement rates.

#2

Develop and pilot a tool for maternal care advocates and administrative staff to compare birthing service reimbursement rates.



Recommendation #1

Keywell.ai's data can be used to quantify the gap between private reimbursement rates. This information is particularly useful for healthcare advocates and hospital administrative staff. Our findings suggest significant differences between urban and rural reimbursement rates regarding vaginal and C-section deliveries. Advocates and administrative staff can use this information to better advocate and negotiate for higher reimbursement rates.

The data does not have to be limited to birthing services only. Gaps can be defined in other departments as well. It may be a best practice to investigate rural hospital departments that operate at a loss as these are the departments that are most likely to be closed. Reimbursement rates for services in these departments can be analyzed and prioritized for lobbying efforts and for stronger negotiating with private insurers.

Recommendation #2

Our policy team recommends that Keywell.ai refine the dataset and develop a pilot for a tool that allows maternal health advocates and administrative staff to compare birthing service reimbursement rates. The data shows a trend that rural hospitals are receiving lower reimbursement rates than urban hospitals. Hospitals administrative staff and advocates could request access to the pilot tool where they could manipulate parameters such as insurers, select procedures, and hospitals to further explore the data.

Producing a practical tool will help to showcase the data's effectiveness in addressing healthcare inequity. By providing rural maternal healthcare administrators with evidence, hospitals may have bolstered negotiating power to advocate for better rates and improve access to care for their patients. Advocates could also use the data to develop insights and evidence to support their lobbying efforts.

Study Limitations

1. Reimbursement Data is Noisy
2. Median Rates do not Capture the Nuance
3. Interviews are from a Provider Perspective
4. Unique Challenges Facing Each Community

Limitation #1

Our expert interviews were mostly with providers. Throughout the interviews, they emphasized valuing quality measures over reimbursement rates. Providers stated that this information is more likely to be useful for hospital administrators.

Limitation #2

Due to our limited time frame and lack of available quality metrics, our policy team was unable to include quality data with our quantitative data.

Limitation #3

The private insurance data is extremely large and contains large ranges in reimbursements rates for the same procedure. Though our policy team and Keywell.ai worked to clean up the quantitative data, there might be some inconsistencies within the dataset due to the large size. For example, there was a lot of overlap between Billing NPI (Type II) and Provider NPI (Type I). Due to these inconsistencies, the dataset may still be even more noisy especially at a hospital-to-hospital comparison level. Although we used the dataset in its current form for our analysis, it will likely need further refinement so that it may provide stronger insights for health advocates.

Limitation #4

We analyzed the data by comparing median reimbursement rates at hospitals. Although this provides macro-level insights, there are nuances that are less readily captured. There might be some inconsistencies in reimbursement rates with health providers working in both urban and rural areas. We noticed during our expert interviews that doctors who work primarily for an urban health provider may be reimbursed at the urban rate even though they are working a day or two per week in a rural county. This may skew the median a bit higher and may lead to reimbursement rates appearing equal for a rural hospital in comparison to an urban hospital.

Limitation #5

Each rural community faces unique challenges depending on their demographics and proximity to accessible maternal care. Race, education level, or socio-economic status can contribute to each community's access to maternal healthcare and can affect birthing outcomes. Our qualitative and quantitative research could not take all these contributing factors of birthing outcomes into account.

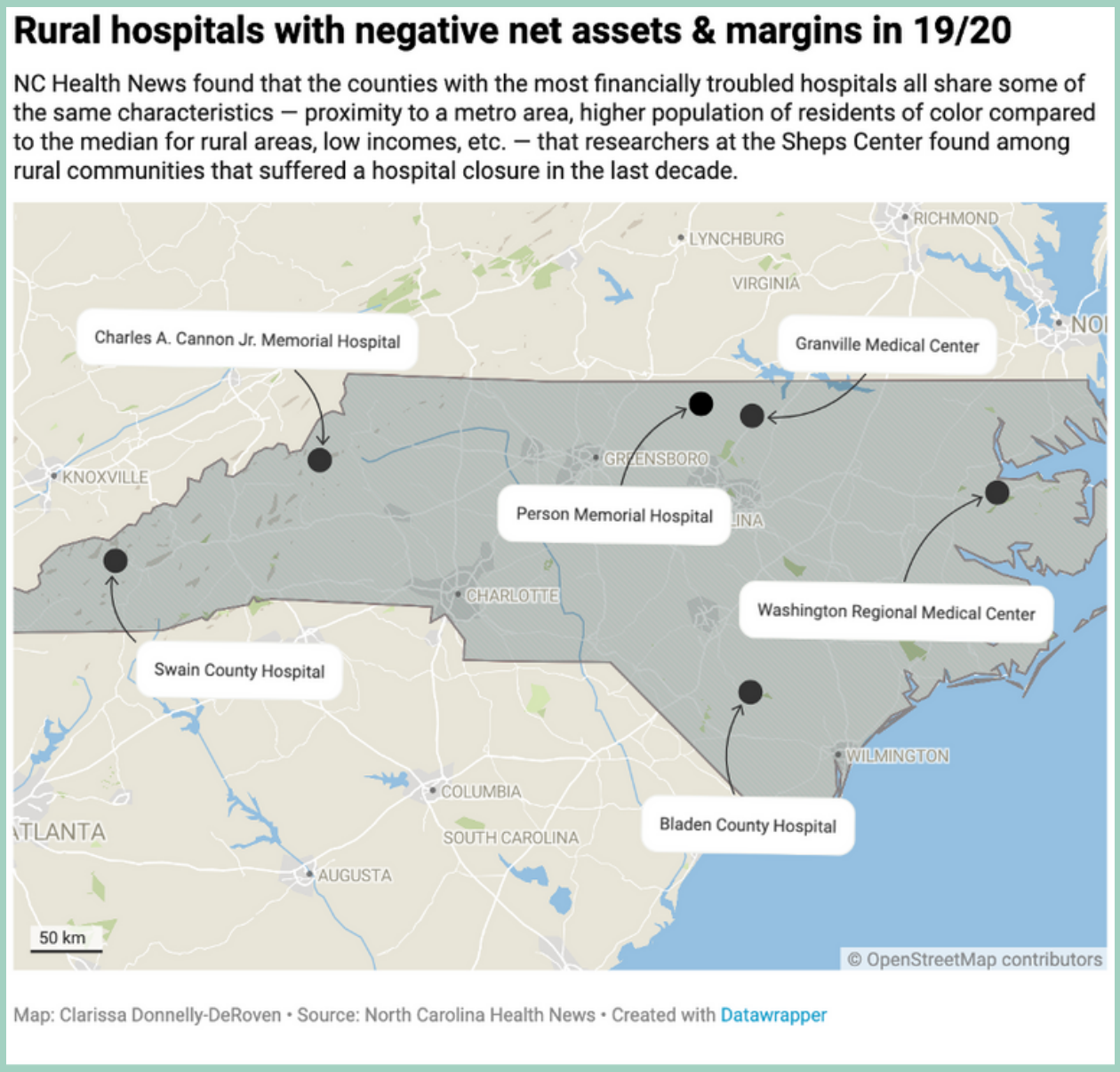


Figure 5: According to NC Health News, counties with the most financially troubled hospitals share unique challenges that affect health outcomes. For example, low incomes and high communities of color experience greater impacts when rural community hospitals close. For example, Washington Regional Medical Center is a rural hospital that serves predominately Black residents. Authors analysis of NC Health News, 2020

Conclusion

Keywell.ai's CMS dataset may not be best suited for healthcare providers in its current form. To be more useful, the data may need quality metrics that give some indication of reimbursement rates influencing outcomes.

The dataset's greatest strength is its ability to identify reimbursement discrepancies. This information could help to increase negotiating power for administrators which may help to reduce the hospital's financial strains. The information can also provide lobbyists, lawmakers, and maternal health non-profits with data points to fight for higher reimbursement rates.

Appendices:

Appendix A: Additional Datasets to Utilize in the Future

- **Alliance for Innovation on Maternal Health (AIM)**
  - Health Resources & Services Administration
  - The American College of Obstetricians and Gynecologists
- **Social Determinants of Health (SDOH)**
  - US Department of Health and Human Services
- **The U.S. Maternal Vulnerability Index**
  - Surgo Ventures

Appendix B: NC Private Insurance Companies the Policy Team Analyzed for Data

- **Aetna Health, Inc.**
- **Blue Cross Blue Shield of North Carolina**
- **CIGNA Healthcare of North Carolina, Inc.**
- **UnitedHealthcare of North Carolina, Inc.**
- **Third-Party Administrator - Self Insurance**

Appendix C: Shoppable Services for Maternal Health

Shoppable Service	CPT Code
Obstetrical pre- and postpartum care and vaginal delivery	59400
Vaginal delivery	59409
Vaginal delivery with post-delivery care	59410
Cesarean delivery	59514
Cesarean delivery with post-delivery care	59515
Cesarean delivery	59510

Appendix D: Key Terms

Accessible Health Care	The ability to obtain healthcare services such as prevention, diagnosis, treatment, and management of diseases, illness, disorders, and other health-impacting conditions.[23]
Birthing Volume	It is defined as the number of births per year.[24]
Consumer price transparency tool	"The consumer price transparency tool is an online tool for members that include personalized, real-time, cost-share estimates for covered services and items". [25]
Current Procedural Terminology	Current Procedural Terminology (CPT) refers to medical codes used by physicians, hospitals, and health professionals to describe procedures and services. CPT codes are also used by insurance companies for their reimbursements.[26]
Health Equity	NCDHHS defines health equity as "the absence of avoidable or remediable differences, allowing for the attainment of optimal health for all people." Health equity is achieved when people have the opportunity to have access to quality health care regardless of socially determined circumstances.[27]
Health Inequity	NCDHHS defines health inequities as "unfair health differences closely linked to social, environmental, or economic disadvantages that adversely affect specific groups of people."[28]

Appendix D: Key Terms

Machine-Readable	Machine-readable refers to “data in a data format that can be automatically read and processed by a computer, such as CSV, JSON, XML, etc. Machine-readable data must be structured data.”[29]
Maternal Health	The North Carolina Institute of Medicine defines maternal health as the health of women during pregnancy, childbirth, and post-natal period.[30]
Maternity Care Desert	Any county without a hospital or birth center offering obstetric care and without any obstetric providers.[31]
National Provider Identifier	National Provider Identifier (NPIs) is a unique identifier used by healthcare providers to identify themselves in the medical industry.[32]
NPPES	Center for Medicare & Medicaid Services has created a platform called National Plan and Provider Enumeration System (NPPES) to provide electronic transmission of health information.[33]
Payer Mix	Payer mix refers to your payer entities, such as patients who pay out-of-pocket, private-sector insurers, and Medicare and Medicaid. Each payer generates a specific income, and you can identify which payers generate the highest proportionate revenue. [34]
Price Transparency	Price transparency in hospitals helps Americans know the cost of hospital services before they receive them. [35]

Appendix D: Key Terms

Rural Health	Defined on the county level by using RUCC 4 and greater. These counties are considered rural and are therefore the providers operate in rural health.[36]
Rural Hospital	The hospitals that are in a nonmetropolitan county or in a metropolitan county which have a Rural Urban Continuum Codes (RUCC) code of 4 or greater.[37]
Shoppable Service	A service scheduled by the patients in advance.[38]
Social Determinants of Health (SDOH)	The non-medical factors that influence health outcomes. These include conditions like education, income, unemployment, political climate, etc.[39]
Urban Hospital	The hospital that is in a metropolitan county serving a densely populated area.[40]

Appendix F: Expert Interview Biographies

1. **Ryan Baker**, Administrator, Center for Telepsychiatry, MOTHeRS Project Core Member

Ryan Baker is an administrator for the North Carolina Statewide Telepsychiatry Program (NC-STeP) at East Carolina University Center for Telepsychiatry. NC-STeP has forty hospitals, twenty-one community sites, and over eight million dollars in grants and state funding. As the primary liaison, Ryan works with administration within Brody School of Medicine, the North Carolina Department of Health and Human Services Office of Rural Health, partner hospitals, community sites, grants, and provider groups. He manages activities with a focus on profitability and cost-efficient operations, develops and manages the annual budget, and maintains business plans for successful integration with the Brody School of Medicine strategic plan. Ryan collaborates with the Medical Director to provide overall administrative and operational direction for the Center for Telepsychiatry.

The MOTHeRS Project was established in 2020 with funding from United Health Foundation. It involves ECU Physicians Departments of OBGYN, Psychiatry, Family Medicine, and the Center for Telepsychiatry and e-Behavioral Health, aiming to improve health outcomes for mothers and babies in eastern North Carolina. The project addresses challenges related to COVID-19, including obstetric care for high-risk pregnancies, mental health needs of expectant and new mothers, and food insecurity. The project provides telehealth and face-to-face services at community-based primary care obstetric clinics, nearby health departments, and other clinics in the region, with a multidisciplinary approach involving various specialists and health professionals.

2. **Samuel T. Bauer**, MD, CPE, FACOG

Dr. Samuel T. Bauer is a board-certified Maternal-Fetal Medicine specialist and Associate Professor of Obstetrics and Gynecology at Duke University. He is also the Medical Director of Duke Perinatal Consultants and the Medical Director of Quality and Digital Health in the Department of Obstetrics and Gynecology at Duke. Dr. Bauer has extensive healthcare leadership experience and has held various leadership positions at Beaumont Health, where he was responsible for portfolio management, manpower planning, and administrative supervision of the Beaumont Medical Group OB/GYNs. Dr. Bauer's research focuses on reducing maternal morbidity through the establishment of quality metrics and safety bundle implementation. He is a member of the Society for Maternal-Fetal Medicine (SMFM) Maternal Safety and Quality Committee and is an ACOG Fellow and Physician Champion for the CDC-funded Fetal Alcohol Spectrum Disorder Program.

3. **Andre Chappel**, Director, Division of Public Health Services, Office of Health Policy

Dr. Andre Chappel is the Director of the Division of Public Health Services for the Office of Health Policy in the Office of the Assistant Secretary for Planning and Evaluation (ASPE) at HHS. He leads a team of experts who research and provide guidance on a wide range of public health topics, including maternal health, HIV/AIDS treatment and prevention, health disparities, and telehealth. Andre previously worked in the Division of Healthcare Financing Policy, where he focused on healthcare spending trends, competition, and payment systems. He holds a doctorate in Health Services Research from the University of Rochester.

4. **Jessica Muldowney** and **Lindsey Sullivan**, Apphealthcare Administrators

AppHealthCare is a district health department and Federally Qualified Health Center serving Alleghany, Ashe, and Watauga counties. They provide clinical care, nutrition services, WIC, community health services, and environmental health services. They accept private insurances, Medicaid, and Medicare, and offer a sliding fee discount program for patients. Their mission is to promote safe and healthy living, prevent disease, and protect the environment. They have been in operation since 1933 and recently underwent a rebranding initiative to continue providing high-quality patient care and essential services.

5. **Brittany Noe**, Patient Services Representative at Cateret OBGYN

Carteret Ob-Gyn Associates has been serving women in Carteret County and surrounding areas for 45 years, building a reputation for excellence in women's medicine. Their board-certified specialists provide the latest advances and technology in women's health, offering a range of services including in-office tests and treatments. They are dedicated to providing high-quality obstetrics and gynecology with warmth and compassion, and their physicians and staff are known for being friendly and attentive to patients' needs.

Appendix G: Interview Questions

1. How does your organization address maternal health?
2. How familiar are you with the CMS's newly available price transparency data? (If not, we gave a brief background about the data).
3. To what extent do you foresee private payer data as being beneficial to helping your organization in its mission?
4. How do you see insurance reimbursement rates affecting birth outcomes?
5. Can you describe the non-medical drivers of health that contribute to maternal health inequity?
6. What data could be useful in improving birthing outcomes in rural communities?
7. Thank you for your time today. We truly appreciate you taking the time to answer our questions and provide valuable insight from your experience. Do you know anyone else in a similar organization who we could speak to about these questions?

Appendix H: Map-Based Analysis of Critical Access Hospitals and Small Rural Hospitals in North Carolina by County

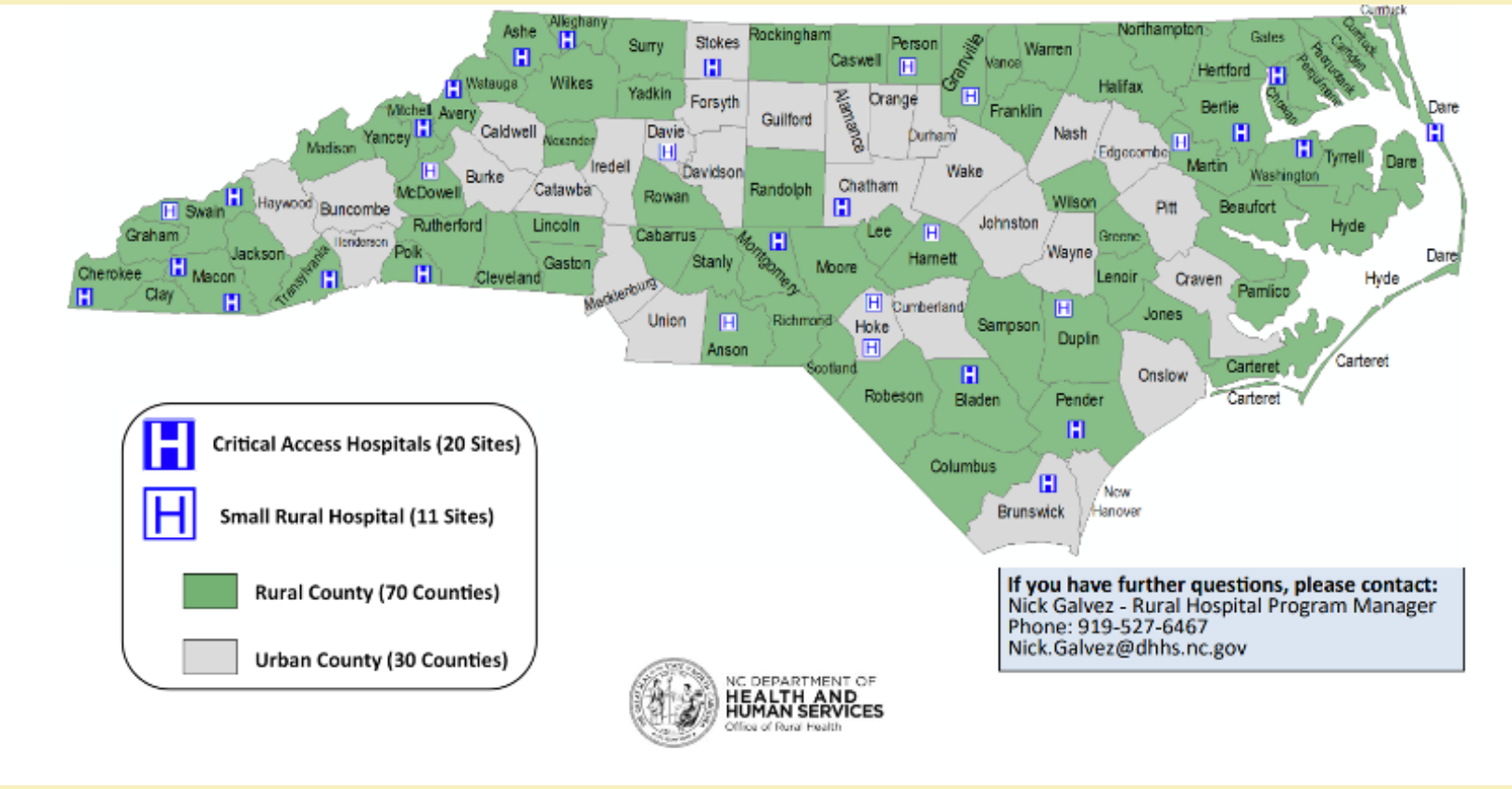


Figure 6: Authors analysis of NC Department of Health and Human Services: Office of Rural Health

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