NORTH CAROLINA'S MATERNAL AND CHILD HEALTH TRENDS, CONTRIBUTING FACTORS, AND THE DEMONSTRATED BENEFIT OF PUBLIC INVESTMENTS

By

Susanna Khachaturyan

A paper presented to the faculty of The University of North Carolina at
Chapel Hill in partial fulfillment of the requirements for the
degree of Master of Public Health in the
Department of Maternal and Child Health.
Chapel Hill, N.C.

November 9, 2018

Approved by:

First Reader ________________

Second Reader ________________

Abstract

The North Carolina Division of Public Health reported that, in 2016, African American infants died at more than 2.5 times the rate of white infants, a ratio that has worsened from ten years ago. This and others disparities are indicative of poor maternal and infant health outcomes that affect many North Carolinians and reflect the many systems and policies that impose barriers to health and prosperity. Many of the factors that influence maternal and child health are beyond the influence of individual mothers and their families. Public policies can address disparities, improve quality of life for North Carolina's communities, and ultimately improve outcomes. However, they require a commitment to providing equitable opportunities and public investments that support those strategies. Targeted efforts to remove barriers that lead to racial and ethnic health disparities and economic injustice are necessary, particularly due to the persistent and growing disparities across many measures of health and wellbeing in the state. This paper provides an analysis of the factors that drive maternal and child health outcomes, as well as family economic conditions, and describes their connections to public policies. Examining disparities and the many systems that influence them can inform policies that improve health and economic and social wellbeing. Through smart investment of public dollars into strategies that are known to work, all North Carolinians can lead healthy and prosperous lives.

Introduction

The health of mothers and babies is inextricably linked to a wide range of biological, social, and political dynamics. In fact, factors outside of the health care system are largely responsible for an individual's health. It is thought that health care is responsible for only 10 to 15 percent of preventable mortality in the United States[1] while an estimated 75 percent of the determinants of health are due to social factors.[2] Today, North Carolina families face many barriers to good health and economic prosperity. These barriers include costly health insurance coverage, limited access to health and mental health care, and low-wage jobs. It is therefore necessary to understand the multitude of challenges faced by women and their families in order to eliminate barriers.

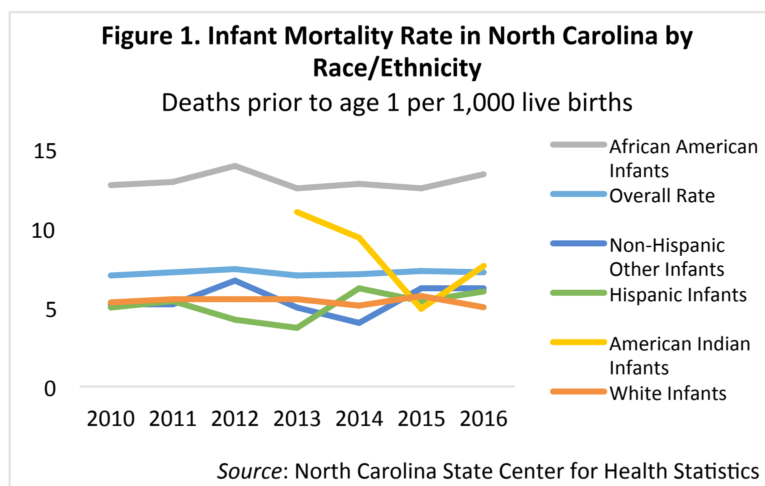
Sustained improvements in health outcomes require long-term investments that account for the interconnectedness of health with other systems.[1,3,4] The investment of public dollars into effective strategies promotes equity by providing services to those who need them most.[5] When families struggle to meet their basic needs, communities suffer, however when all North Carolinians have the opportunities to lead healthy and prosperous lives, all stand to benefit.

This paper will provide an overview of trends in North Carolina's maternal and child health outcomes, examine health system barriers to health, consider broader challenges to prosperity that families face, discuss strategies to mitigate barriers through public investments, and offer evidence-based policy recommendations.

Trends in Maternal and Child Health Outcomes in North Carolina

Three commonly used measures to track the health of mothers and babies are infant mortality, pregnancy-related or maternal mortality, and low birthweight births. Each measure is influenced by many different factors and, as a result, they each provide unique insights into the health of the population, as well as the forces that influence them.

Infant mortality is defined as the number of deaths prior to age one and is typically reported as the rate of deaths per 1,000 live births. In 2011, the most common causes of death among infants in the United States were birth defects, preterm and low birth weight births, sudden infant death syndrome, pregnancy complications, and accidents.[6]

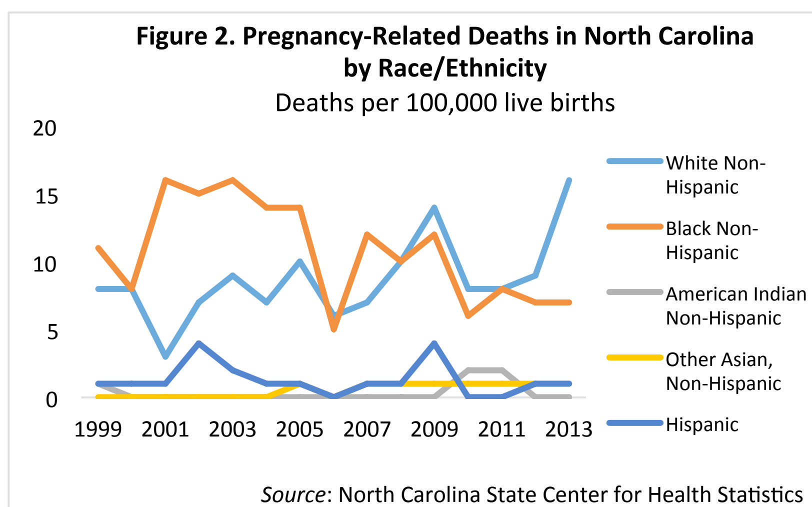


In North Carolina, the overall infant mortality rate has remained steady since 2010, however there are large and persistent differences when disaggregated by race and ethnicity (Figure 1). African American infants in North Carolina experience the highest rate of infant mortality, more than twice the rate of white infant mortality, and the majority of African American infant deaths are attributable to preterm births and the complications that arise from them.[7] The infant mortality rate among American Indians was not recorded in North Carolina prior to 2013, and it quickly declined from 11 deaths per 1,000 live births in 2013 to 7.6 deaths in 2016. The rate of Hispanic infants has varied, with a range of 2.5

deaths per 1,000 live births, between 2010 and 2016 but has remained slightly below the overall infant mortality rate, as have the rates of white and other non-Hispanic infants.

Pregnancy-related deaths are the deaths that occur during pregnancy or within one year after the end of a pregnancy due to causes that are related to or aggravated by the pregnancy.[8] In North Carolina, and in many other states, these deaths are identified by a Maternal Mortality Review Board, which carefully examines available records to determine whether or not a death can be attributed to pregnancy. These deaths are typically reported as a ratio, calculated as the number of pregnancy-related deaths per 100,000 live births.

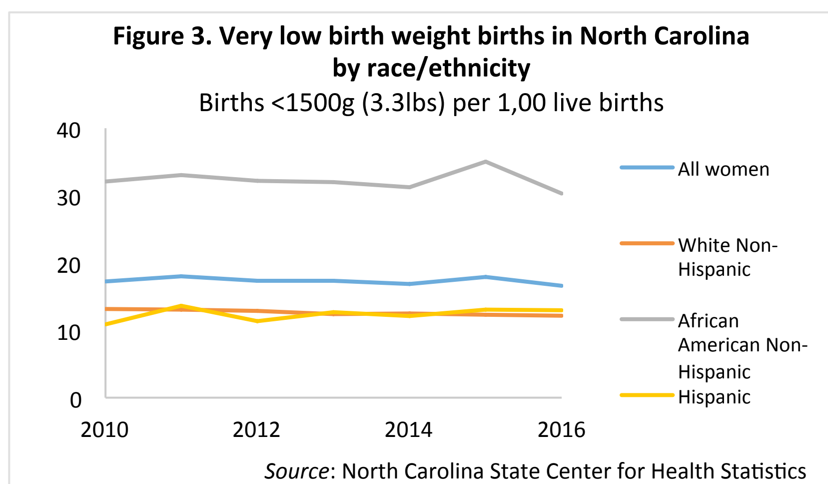
The pregnancy-related mortality ratio has rapidly increased nationally over the past 30 years and has fluctuated a great deal over the past 15 years in North Carolina (Figure 2). Prior to 2008, pregnancy-related deaths affected a greater proportion of African American women compared to other racial and ethnic groups. However, since 2009, white women have experienced a higher ratio of pregnancy-related mortality. The ratio for Hispanic, American Indian, and other Asian women has remained low, though some years have seen increased ratios. The direct causes of pregnancy-related mortality include cardiovascular diseases, infection, hemorrhage, cardiomyopathy, thrombotic pulmonary embolism, cerebrovascular



accidents, and hypertensive disorders during pregnancy.[8] It has been estimated that as much as 40 percent of pregnancy-related deaths are preventable.[9]

Similar to pregnancy-related deaths is the measure of maternal deaths, which are those that occur during pregnancy or within 42 days of the end of the pregnancy due to causes related to or aggravated by the pregnancy, as defined by the Centers for Disease Control and Prevention.[10] The primary underlying causes that lead to these deaths are cardiovascular and coronary conditions, infection, hemorrhage, and mental health conditions. These deaths are typically reported as a maternal mortality rate, or the number of maternal deaths per 100,000 live births. This rate is often similar to the pregnancy-related mortality ratio and the two are often used interchangeably. Both are important for understanding why women die from problems related to their pregnancy and how they can be prevented.

Low birthweight (LBW) births are those weighing less than 5.5 pounds. Premature birth and fetal growth restrictions are the largest contributors to low birthweight (LBW) births[11] and account for approximately 8.2 percent of births in the United States.[12] Very low birthweight (VLBW) births, defined as those less than 1500 grams (or <3.3 pounds), affects 1.4 percent of all births.[12] In North Carolina, VLBW births affect African American infants at more than



twice the rate of white infants, a trend that has remained true for over 6 years (Figure 3). VLBW births remained steady for white and Hispanic women from 2010 to 2016.

The root causes of LBW, VLBW, and preterm births largely reflect poor maternal health as a result of poverty, discrimination, and systemic racism.[13] Risk factors for LBW and VLBW births include maternal behaviors such as smoking and drinking alcohol, in addition to other factors such as low socioeconomic status, domestic violence, uterine infections, and inadequate maternal weight gain. LBW and VLBW infants are at a greater risk of respiratory complications, bleeding of the brain, digestive system damage, eye damage, infection, and more.[11] The harmful effects are not limited to infancy, however, and long-term problems such as diabetes, heart disease, and high blood pressure have been documented later in life for individuals born LBW or VLBW.[11]

Morbidity and mortality among maternal and child populations is detrimental to families and communities. Understanding the current trends, as well as direct and indirect causes of adverse maternal and child health outcomes, is essential to developing strategies to improve them. Improving maternal and child health outcomes is especially important among African American women and children, who experience more adverse outcomes by many measures, compared to women that belong to other racial and ethnic groups.

Health System Structures Pose Barriers to Equity

The laws, policies, and procedures that govern the operation of organizations, institutions, and local, state, and national governments determine how health services can be accessed and used. These important social and structural elements can serve as barriers

or facilitators to optimum health outcomes. This section will examine how policy-level decisions can affect the health of mothers and children in North Carolina by exploring connections to three elements of access to health care - health insurance, hospitals, and the health care workforce.

Health insurance is a notable example of how health systems can affect health. Eligibility for health insurance is primarily defined by state and federal policies, and these determine who can access coverage and services, and at what cost. Table 1 shows that in North Carolina, most of the total population has employer-sponsored health insurance or is the dependent of someone with employer-sponsored insurance, followed by Medicaid, Medicare, non-group coverage such as through the Health Insurance Marketplace, and other types of group coverage such as through the military or Veterans Affairs. In 2016, over 1 million individuals were uninsured in North Carolina, representing 11 percent of the population.

Table 1. Health Insurance Coverage of the Total Population in North Carolina, 2016[14]

Insurance Type	*Percent*	*Number of People*
Employer-sponsored	45	4,570,000
Medicaid	18	1,787,900
Medicare	15	1,478,000
Non-group coverage	9	863,500
Other public	3	281,800
Uninsured	11	1,087,000

Data show that lack of insurance due to ineligibility or cost disproportionately affects communities of color[15] and contributes to worse health outcomes.[16,17] The passage of the Affordable Care Act (ACA) in 2010 greatly reduced the number of uninsured nonelderly Americans, from 44 million in 2013, prior to its full implementation, to below

28 million in 2016.[18] In 2017, the Kaiser Family Foundation conducted an analysis of U.S. Census Bureau survey data, which revealed that 75 percent of uninsured individuals lived in a family with one or more full-time worker, and 45 percent of uninsured adults cited high costs as their reason for being uninsured.[18] The unaffordability of health insurance after the ACA's implementation is, in large part, the result of a 2012 Supreme Court ruling in the case *National Federation of Independent Business (NFIB) v. Sebelius.*[19] The decision ruled, in part, that the decision on whether or not to expand Medicaid coverage should be left with individual states, and that it was constitutionally coercive for the federal government to mandate expansion for all states.

This important decision resulted in what is commonly referred to as the "coverage gap" in states that have not expanded Medicaid. Individuals in the coverage gap are simultaneously ineligible for Medicaid coverage and ineligible for subsidies in the Health Insurance Marketplace that would put the cost of health insurance within financial reach. In North Carolina, there are an estimated 626,000 people in the coverage gap, accounting for over half of the state's uninsured population.[20] Since the 2012 decision, 34 states and the District of Columbia have expanded Medicaid, and an additional three states will be voting on the issue in their 2018 election.[21]

While Medicaid expansion can vary by state, the central tenet is to increase access to Medicaid coverage by eliminating categorical eligibility requirements, which bar certain groups of individuals from coverage regardless of their income. For example, North Carolina parents must earn below 43% of the Federal Poverty Level[22] – amounting to $667 in monthly income for a family of three[23,24] – in order to be eligible for coverage in 2018. Meanwhile, childless adults are categorically ineligible for Medicaid regardless

of their income. As a result, parents and childless adults are the two demographics of the population that would benefit the most from Medicaid expansion.[25]

For many low-income mothers, these systems and policies mean they can obtain access to Medicaid only when pregnant, and lose access after 60 days postpartum.[26,27] Despite evidence pointing to the need for a continuum of care,[28,29] these systemic factors erect barriers for low-income women who are in many ways the most vulnerable.

Hospital locations and characteristics. Hospitals serve as the crux of our health care delivery system. They are where most people go to receive care for routine or urgent services, and where most people go at the onset of labor. In fact, childbirth was the leading reason for hospital stays in 2011.[30] When access to hospitals – and the supplies and trained health professionals they supply – is limited, this can affect the frequency of care administered, thereby playing a role in maternal and child health outcomes.

Data from the Cecil G. Sheps Center for Health Services Research indicate that nine North Carolina hospitals closed between 2005 and August 2018 (Figure 4), with two closures occurring in 2017 alone.[31] As North Carolina's hospitals and their accompanying maternity wards continue to close, this poses additional challenges to communities that may have to navigate difficult roads and travel long distances to receive routine care, including prenatal care, particularly at risk-

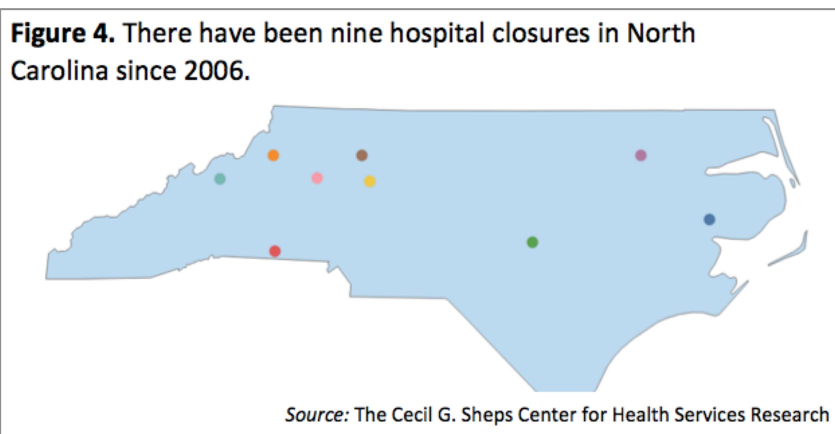
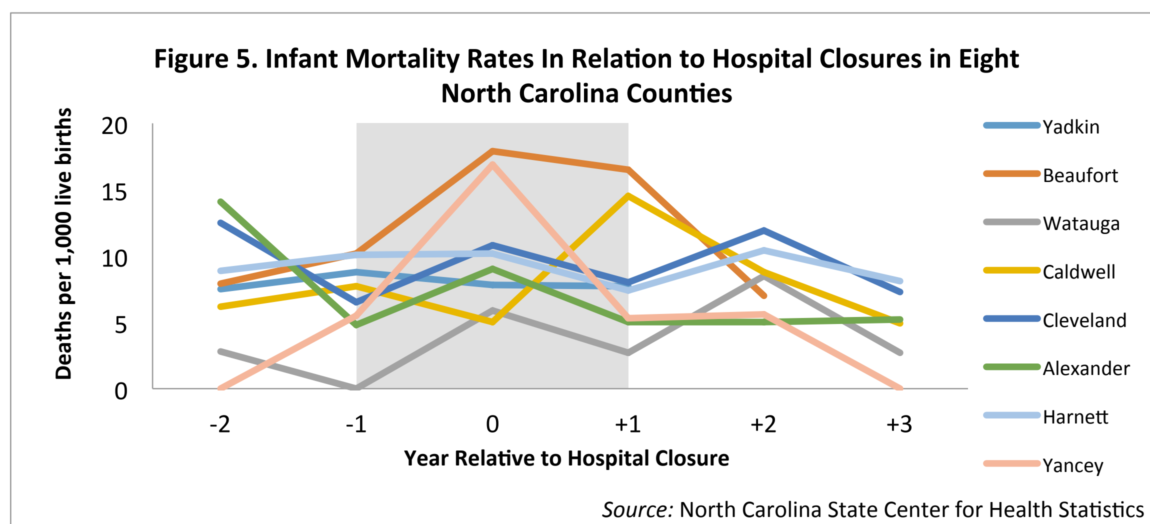


Figure 4. There have been nine hospital closures in North Carolina since 2006.

Source: The Cecil G. Sheps Center for Health Services Research

appropriate facilities. Research shows that when the distance to appropriate facilities increases, so, too, does the risk for obstetric complications.[32]

Hospital and maternity ward closures serve as a barrier to optimal maternal and child health. Figure 5 displays county-level data for eight North Carolina counties that have experienced hospital closures since 2005 for which post-closure data are available for comparison.[31,33] One hospital closure in Blowing Rock, North Carolina is located along the border of two counties, Watauga and Caldwell, however this represents one closure. These data cannot definitively attribute spikes in infant mortality to hospital closures, and many are based on small, and therefore unstable, sample sizes.[33] However, examining data shortly before and after closures suggest that in the immediate aftermath of a hospital closure, typically in the same year or one year later, many counties experience noticeable increases in their infant mortality rate, as seen in Figure 5 below.



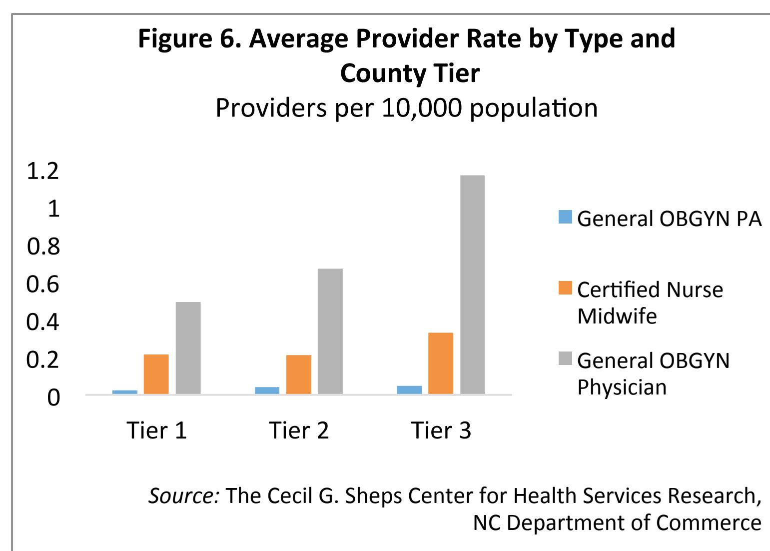
Closures of rural hospitals have become increasingly common, particularly in states such as North Carolina, which have chosen not to expand Medicaid. This is the product of two phenomena. First, states that have not expanded Medicaid have

measurably higher uninsured populations.[20,34,35] A 2018 report by the U.S. Census Bureau found that for states that expanded Medicaid prior to January 2017, the average uninsured rate was 6.5 percent compared to 12.2 percent in states that did not expand.[36] Second, when hospitals care for a larger proportion of uninsured patients, this means a larger proportion of the hospital's services are uncompensated by insurance companies, thereby challenging a hospital's ability to remain in business. In contrast, hospitals in states that have expanded Medicaid generally serve populations with lower uninsured rates, and with more patients receiving Medicaid, this allows hospitals to be reimbursed for the services they provide.[37,38] In a study published in 2018, researchers examined the rates of hospital closures in expansion and non-expansion states by comparing the pre-expansion period (2008 to 2012) to more recent years (2015 to 2016). They found that non-expansion states experienced an increase in hospital closures (0.43 additional closures per 100 hospitals; $p < .05$) while expansion states experienced a decrease in hospital closures (0.33 fewer closures per 100 hospitals; $p < .05$).[39] This suggests that many hospital closures are preventable through the expansion of Medicaid,[39] and action taken to keep them open, in turn, may positively affect the health of the communities they serve.

Hospitals serve as essential resources, particularly in rural communities. However, there is some evidence that a hospital's patient volume directly influences the quality of care provided.[40] This is especially true when complex surgical care is needed.[41] While rural hospitals may be an important first-line of care for many, the ability to refer a high-risk pregnancy or complicated labor to a hospital with greater resources and expertise can make substantial differences in the quality of care delivered. This is demonstrated through fewer instances of pregnancy-related mortality[41] and neonatal

mortality[42] at high-volume hospitals. Thus, while hospitals themselves are important, their proximity to hospitals with greater capacity can mean the difference between life and death for many mothers and infants.

Health professionals. Access to appropriate types of providers can create challenges to care, particularly in rural areas. North Carolina's maldistribution of providers, where there are higher ratios of providers in urban areas compared to rural areas, contributes to the disparities that manifest in outcome measures. Figure 6 illustrates the geographical disparities in the types of maternal health-related providers by county tier. Tier 1 counties have high rates of poverty and are typically rural, whereas Tier 3 counties have higher median household incomes, lower unemployment rates, and are typically urban. Tier 1 counties are predominantly in eastern North Carolina (Figure 7), where the greatest proportion of African Americans in the state live.[43] This population also experiences the poorest maternal and child health outcomes by many measures (Figures 1-3). The lower rate of providers per population in counties with higher rates of poverty suggests that a lack of access to appropriate providers may be another driver of adverse maternal and child health outcomes in North Carolina.



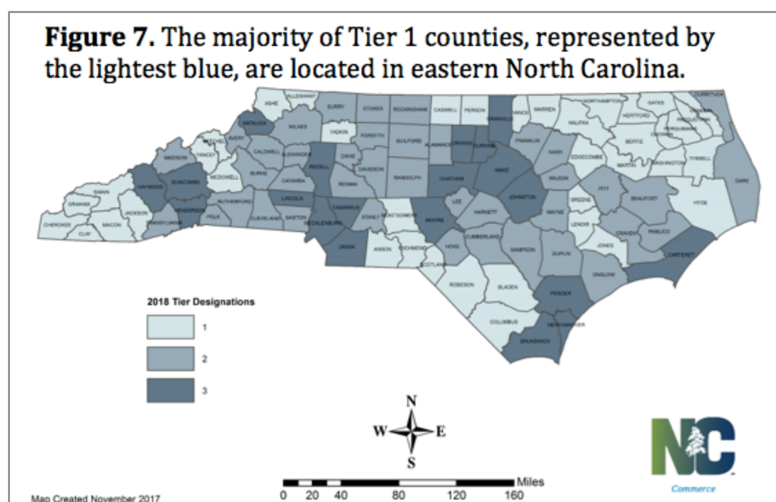


Figure 7. The majority of Tier 1 counties, represented by the lightest blue, are located in eastern North Carolina.

Cultural competence is another important component of the health workforce and has gained increased recognition as a strategy to reduce health disparities. Cultural competence refers to the skills, knowledge, attitudes, and behavior a pregnant woman may have about pregnancy or birth should guide the care she receives. A health professional's ability to understand and respond to a woman's unique needs can affect the patient's trust and satisfaction with the provider and health system as a whole. It is often said that cultural competence cannot be taught in a classroom. Instead, one way to promote a culturally competent health workforce is to recruit health professionals with diverse racial and ethnic backgrounds.[44]

While North Carolina's health workforce has become increasingly diverse over time, data suggest that minorities are still underrepresented in the workforce.[45] A 2012 analysis by the Sheps Center revealed that 17 percent of North Carolina's health workforce is nonwhite, while 33 percent of residents are nonwhite. These differences are most notable among Hispanic practitioners, with one provider for every 348 Hispanic-identified individuals, and African American practitioners, with one provider for every 106 African American-identified individuals. One study from a national survey found that while black physicians account for 4 percent of physicians in the United States, they cared for 25 percent of African American patients; similarly, while 5 percent of

physicians are Hispanic, they care for 23 percent of Hispanic patients.[46] These findings led researchers to suggest that black and Hispanic physicians serve communities with predominantly black and Hispanic identities, and that health care consumers have a preference for providers of their same identity when the option is available. These and other findings suggest that patient-provider racial concordance has a positive effect on the patient's clinical experience,[47] and that increasing the diversity of health care professionals is in the best interest of those seeking care.

Structures Beyond the Health System Pose Barriers to Health

In addition to the structural barriers that exist in the health system, many barriers to maternal and child health exist in society's broader systems. Families today face a barrage of challenges, ranging from unaffordable childcare to inadequate wages to a lack of affordable housing. This section explores how systems beyond health care – including poverty, jobs, housing, childcare, and workplace policies – affect family prosperity and, as a result, maternal and child health.

Poverty. The percentage of North Carolina's population living in poverty averaged 14.3 between 2015 and 2017.[48] This is based on the Supplemental Poverty Measure (SPM), a figure often used in addition to the official poverty measure because its poverty threshold better represents the current cost of basic needs such as food, housing, clothing, and utilities.[49] In contrast, the outdated official measure determines its poverty threshold based on three times the inflation-adjusted cost of a minimum food diet in 1963 and does not fully capture the types of income and expenditures a family may have.[48,50] While the two rates are often similar, the SPM poverty rate is typically higher because of these

methodological differences. These discrepancies are not trivial, however, and one percentage point can alter the eligibility of thousands of low-income families to access a wide range of means-tested programs, including Medicaid, Children's Health Insurance Program (CHIP), Head Start, Supplemental Nutrition Assistance Program (SNAP, formerly "Food Stamps"), and many more.[48]

Disaggregated national data reveal that poverty is more prevalent among non-White individuals, with 21 percent of Black individuals, 18 percent of Hispanic individuals, and 10 percent of Asian individuals experiencing poverty compared to 8.7 percent of non-Hispanic whites.[51] Across all racial and ethnic demographics, women experience higher rates of poverty compared to men.[51,52] While the poverty rate provides some insights into economic wellbeing, it is necessary to closely examine the obstacles to economic justice.

Jobs. Most families living in poverty are working but earn wages that are insufficient to help them meet their basic needs.[53] The Economic Policy Institute estimates that in 2017, 11 percent of workers in the United States earned poverty-level wages, meaning that a family with one full-time year-round worker would remain below the federal poverty guideline for their family size. For a family of four, this would mean earning below $24,600 in annual income[54], or under $11.83 per hour for 40 hours per week. However many workers earn below that amount. In 2017, as many as 4.5 percent of North Carolinians, amounting to 82,000 workers, earned the federal minimum wage of $7.25 per hour or less, a pay rate in effect since 2009.[55] National data reveal that 63 percent of workers earning the minimum wage or below are women.[55]

The proliferation of low-wage jobs[56] in combination with slow wage growth[57] hurts North Carolina's mothers and children. These seemingly unrelated economic forces

negatively affect families' abilities to live prosperous lives and plan for their future. Instead, families are left with few options but to accept jobs for little compensation. With wages that have not kept up with inflation, this means more North Carolinians struggle to pay for basic needs for which costs continue to increase, including housing and childcare.

Affordable housing has become a national crisis, and North Carolina is no exception.[58] Affordable housing is defined by housing that costs no more than 30 percent of a family's gross income.[59] Many families face a housing cost burden, and many live in sub-standard housing as a way to overcome high costs. In North Carolina, an estimated 43 percent of renters are unable to afford a modest 2-bedroom apartment, and over 500,000 people in the state pay over half of their income on housing.[60] Barriers to affordability lead families to resort to overcrowded and inadequate housing options. In a statewide study conducted by UNC-Chapel Hill's Center for Urban and Regional Studies, researchers examined renter-occupied housing units and found that over 5,000 lacked complete plumbing facilities, and nearly 15,000 lacked complete kitchen facilities.[61] These and other poor housing conditions have been linked to health issues including lead poisoning, psychological stress, respiratory infections, and injury due to unsafe structures[62] that place maternal, infant, and child populations at risk for adverse outcomes.

Childcare is yet another barrier families experience. In 2017, the cost of high-quality childcare was a median $832 per month per infant or toddler at market rate in North Carolina.[63] This is greater than the cost of rent for a two-bedroom apartment, which averages $796 at Fair Market Value in the state.[64] As a result, many families make the decision to forgo potential income in order to avoid paying the high cost of childcare. In

survey findings published by the Center for American Progress, 77 percent of participants with children under age 5 indicated that childcare considerations had a negative impact on their career by preventing them or an immediate family member from accepting a job or promotion, working fewer hours, or not being able to pursue new skills.[65] Prohibitively high childcare costs prevent workers from gaining new employment or advancing their skillset, further holding back the economic potential of families.

Workplace policies. Finally, the lack of paid family leave options mean that many women have to make the difficult choice between nursing their newborn and keeping their job. In 2012, 41 percent of workers lacked access or eligibility to Family Medical Leave Act (FMLA) benefits, which provides 12 week of unpaid leave and job protection.[66] Forty-six percent of respondents eligible for FMLA did not use the benefit due to the unaffordability of taking unpaid leave, according to a study prepared for the U.S. Department of Labor.[66] That this important option, allowing women to recover from childbirth and tend to their newborn, is inaccessible to many highlights the economic injustices women face, particularly those in low-income families.

Paid leave, childcare, housing, jobs, and poverty represent a small sample of the factors that affect the lives of North Carolinians. Many are tied to the choices of policymakers at all levels, however the effects are experienced widely and affect the everyday decisions and sacrifices that families must make to get by.

Strategies to address barriers to healthy maternal and child populations begin with the investment of public dollars

Public investments, contrary to being seen as a burden on the free market, can have positive effects on the greatest number of people. Spending on health, education, infrastructure, and more, are investments in human capital; they create public services, which contribute to the equitable redistribution of income.[5] These investments enable people and families to more fully participate in their communities and to the economy, and thereby increase the capacity for future public investments.

Public Spending Invests in Infrastructure and Human Capital

Public spending is the use of government funds to provide public goods and services such as education, roads and highways, parks, safe drinking water, waste management, and public health. For federal, state, and local governments, taxes are the primary source of revenue for public spending.[67] In fiscal year 2016-2017, the federal government generated 48 percent of its revenue through individual income taxes, 35 percent through payroll taxes, 9 percent through corporate income taxes, and the remaining 8 percent on excise, estate, and other types of taxes.[68] In North Carolina's 2016-2017 fiscal year, individual income taxes accounted for 53 percent of the state's general fund revenue while 31 percent came from sales and use tax, 6 percent from corporate income and franchise tax, 3 percent from alcohol and tobacco tax, 4 percent from non-taxes such as investment income, and 3 percent from other types of taxes.[69] Threats to these important sources of government income come in the form of tax rate decreases and other changes to the tax system. Tax rate decreases of any form decrease government revenue, and in order to balance their budgets, states must decrease their spending on important services.

While public spending can improve equity, tax systems can undermine equity. Regressive tax systems are those that tax lower-income people at a higher rate than higher-income people. A 2018 analysis by the Institute on Taxation and Economic Policy showed that in North Carolina, the lowest 20 percent of wage earners – those earning less than $17,800 in family income – were taxed an effective rate[70] of 9.5 percent compared to the 6.4 percent effective tax rate for the top 1 percent of earners – those earning more than $477,500 in family income.[71]

One feature of North Carolina's tax system that exacerbates the burden on lower-income families is the flat rate system whereby individuals at all income levels are charged the same rate on their personal income. Table 2 displays tax rates in North Carolina since 2008, illustrating the shift from the graduated tax rate system in effect prior to 2013 whereby those with higher incomes were taxed a higher marginal rate, in addition to the gradual decline in the flat rate since 2014. As of 2018, the annual loss in state revenue as a result of the cumulative changes in the tax code will total $3.5 billion.[73]

Table 2. North Carolina Personal Income Tax Rates[72]

Year	Rate(s)
2019	5.25%
2017-2018	5.499%
2015-2016	5.75%
2014	5.8%
2008-2013	6%, 7%, 7.75%

Increased public investments across sectors leads to improved health outcomes

Compared to other higher income countries, the United States spends the greatest proportion of money, as a percentage of gross domestic product (GDP), on health care, yet has worse health outcomes across all age groups.[74,75] While this seems to suggest that

higher spending does not improve health outcomes, there is more to this story that explains these trends.

It is widely understood by the health community that social factors affect health.[76] In addition, social service spending can have positive effects on public health because they target the root causes of many factors that can exacerbate health problems.[74,75] These services include investments in housing, unemployment, disability benefits, and other supports. Other higher income countries have long-recognized the need to invest in these services.[74,75] For example, in an analysis of health and social services spending among OECD (Organization for Economic Cooperation and Development) countries, researchers found that a higher ratio of social service spending to health service spending is linked with improved population health outcomes including life expectancy, infant mortality, maternal mortality, and low birth weight.[74]

In addition to national spending, these trends remain true at the individual state level, with increased social service spending linked to improved population health outcomes. For example, after adjusting for demographic characteristics and economic factors, one study identified a wide range of investment across state spending for social services and health care services. Researchers found that states with higher ratios of social and public health spending compared to health spending have better population health outcomes, including lower rates of infant mortality as well as adult asthma and type 2 diabetes.[77] Thus, investments that improve the factors that are known to impact health can in turn improve outcomes, particularly for maternal and child populations.

Studies examining the types of social spending that have the greatest impact highlight opportunities for investments. Many studies that compare health care spending

to social service spending include public health spending as social service expenditures, because much of public health spending focuses on addressing social determinants, unlike health care spending. Moreover, public health interventions conducted by local health departments are associated with improvements in population health outcomes.[78,79] Public health departments are an important component of the safety net and deliver essential services including immunizations and infectious disease control, health education, smoking cessation, and much more. While evidence from the literature does not show that public health spending in itself can reliably help to reduce health disparities, targeted programming can reduce disparities in health outcomes across racial and ethnic groups.[80]

Despite evidence that public health investments improve health outcomes, these services are often cut due to competing priorities. However, there is a large body of evidence to support the need for increased investments in interventions that work. One systematic review of over 50 studies examined various types of public health interventions and their return on investment (ROI), or net benefit, and cost-benefit ratio (CBR).[81] The study found that public health intervention through legislative action had the highest median ROI across studies, however all studies revealed that public health interventions result in substantial cost saving, with a median ROI of 14.3 and a median CBR of 8.3. While these values do not fully capture the benefits and cost-savings in the long-term, they reveal the considerable benefits of public health interventions even after accounting for the costs invested.

Research examining the linkages between government spending and population health demonstrate the strong positive correlation between life expectancy and public

spending on education.[82] Thus, investments in human capital through quality education and training translate into better long-term health outcomes because they improve labor market opportunities, which in turn improve access to health care and promote healthier behaviors.

In a 2012 report, the Institute of Medicine cited strategies to promote population health and prevent disease and injury.[4] The report highlights specific areas – including transportation, housing, food, and parks and recreation – that affect where individuals and families live, work, and play. Among the strategies are the need to ensure access to quality water, food, air, and other essential resources; improve the social and physical environments of communities; and pass and enforce laws and policies that protect and prioritize health. These findings, taken together with trends in national and state spending presented in the following pages, indicate that increasing spending beyond the traditional scope of health services is necessary to improve the health of communities.

Public investments that provide supports for low-income families play a key role in health and promote health equity

Social policies –including Medicaid, SNAP, and WIC – serve as important safety net programs by supporting millions of North Carolinians each year. This section will describe the benefits, and positive effects these programs have on their beneficiaries.

Medicaid is funded through federal-state partnerships and, in North Carolina, provides health care coverage to over 2 million low-income children, pregnant women, seniors, and people with disabilities.[83] In addition to the mandatory benefits, North Carolina Medicaid services include dental care, vision services, prescription drugs,

medical equipment such as wheelchairs and glucose monitors, home health services, and more, thus providing comprehensive care for those who are eligible to receive it. Medicaid eligibility varies by state.[84] In North Carolina's non-Medicaid expansion environment, eligibility is limited to certain categories of individuals who are subject to income and resource tests. Table 3 below illustrates income eligibility by group.

Table 3. North Carolina Medicaid Income Eligibility Guidelines[85]

Group	*Eligibility (Percent FPL)*
Children	216%
Pregnant Women	201%
Parents	43%
Childless Adults	0%
Seniors & People with Disabilities	100%

The inflation-adjusted investments in North Carolina's Medicaid services for children and families have remained somewhat constant, and have slightly declined, over the past eight years (Figure 8). However, overall enrollment over the past decade has steadily increased by 53 percent.[86] Over the past five years, the enrollment increase has largely been due to an increase in the number of children in North Carolina's Children's Health Insurance Program (CHIP) who became eligible for Medicaid as a result of the ACA. While children make up the majority of North Carolina's Medicaid beneficiaries, they represent one quarter of expenditures; instead, the majority of Medicaid expenditures go towards the aged, blind, and disabled eligibility groups.[86]

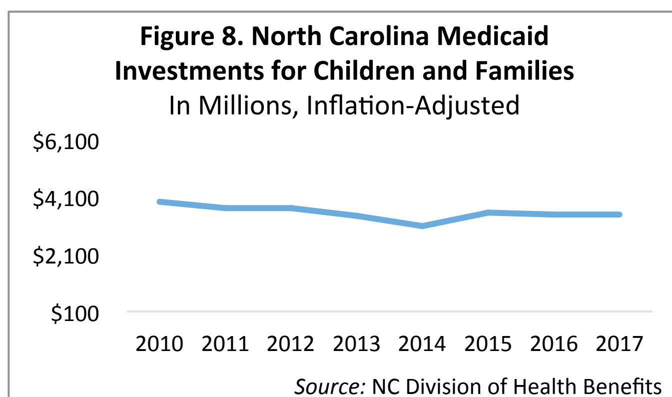


Figure 8. North Carolina Medicaid Investments for Children and Families
In Millions, Inflation-Adjusted

Source: NC Division of Health Benefits

In a 2013 landmark study conducted in Oregon, uninsured, low-income, able-bodied adults were selected in a lottery to be able to apply to receive Medicaid coverage.[87] Researchers examined the financial and health effects of the program on individuals in the study approximately two years after the lottery. Through over 12,000 survey responses, they found that people with Medicaid coverage had statistically significantly higher rates of medication use for the treatment of diabetes and depression, fewer diagnoses of depression, greater use of preventive care, and report an improved health-related quality of life compared to one year earlier, as compared to the uninsured group. The study also found that those with Medicaid coverage had lower out-of-pocket spending for medical expenses, fewer incidences of medical debt, and reported fewer instances where they needed to borrow money to pay bills or skip a payment. These findings demonstrate the positive health effects that Medicaid has on adults with low incomes given the opportunity to receive coverage through Medicaid as compared to remaining uninsured, and the measurable results after only two years.

The Supplemental Nutrition Assistance Program (SNAP), formerly called "food stamps", is a federal food assistance program that provides help for families who earn low incomes, seniors, and people with disabilities. In 2017, the program provided assistance to an average of 1.5 million North Carolinians, or over 700,000 families. The benefit in North Carolina averaged a modest $119 per person per month, or $246 per

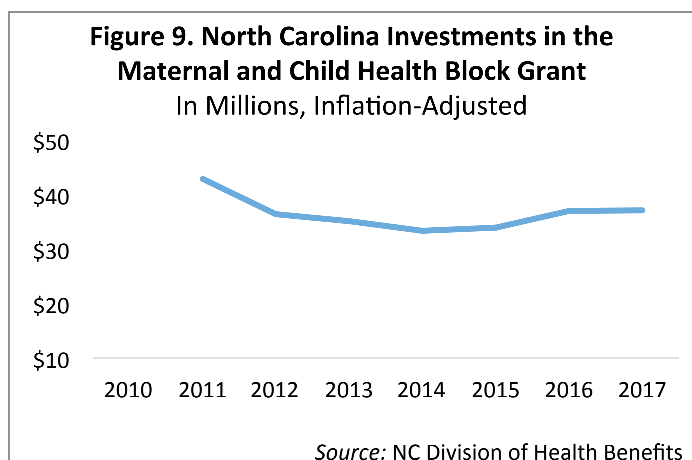
household per month in fiscal year 2016.[88] Households that receive SNAP benefits are less likely to experience food insecurity, defined as lacking consistent access to nutritious food, after six months of being enrolled in the program. Additionally, they reap the benefits of consistent access to nutritious foods including improved current and long-term health, reduced psychological stress, and reduced health care costs.[89]

Eligibility for SNAP is based on both income and work requirements. Depending on household size, the gross monthly income cannot exceed 130 percent of the Federal Poverty Guidelines and net monthly income cannot exceed 100 percent; these values also determine the maximum monthly benefit amount.[90] In addition, the program requires that adults who do not meet exemptions are registered for work, accept a job if offered, or participate in an employment and training program. Children and pregnant women are exempt from these requirements, as are seniors and individuals with a physical or mental disability. Changes were proposed earlier in 2018 that would impose more stringent work requirements; however SNAP proponents have highlighted likely harm to children and families, as well as the realities of the labor market as criticisms of the proposed changes.[91]

The Women, Infants, and Children (WIC) is a federal program that provides nutritional support to eligible pregnant and postpartum women, breastfeeding women who have had a baby in the past 12 months, and children up to five years of age. Recipients must earn an income below 185 percent of the Federal Poverty Guidelines, and be identified as nutritionally at-risk by a health professional. In North Carolina, the WIC program serves 270,000 women, infants, and children each month.[92] The program has contributed to dramatic declines in adverse outcomes including perinatal death.[93] It

has also been linked to decreases in the incidence of low birth weight and pre-term births by 3.3 percent and 3.5 percent, respectively. Additionally, between 1980 and 1992, 16 percent fewer children were diagnosed with an iron deficiency while enrolled in the program. WIC helps to fill a necessary gap in the health and nutrition for vulnerable low-income pregnant and nursing women and their children.

Title V funds, also known as the Maternal and Child Health Block Grant, is jointly funded through state and federal funds and serves as a key support for promoting health among maternal and child populations. Services covered under the block grant fall into four main categories: direct health services, enabling services, population based services, and infrastructure building services. State requests for funds must be based, in part, on a needs assessment and based on those findings states must identify strategies to meet their objectives. In 2016, the North Carolina Title V program reached over 800,000 people including pregnant women, infants under one, children, adolescents, and children with special health care needs.[94] While these funds are small compared to other programs (Figure 9), investments are leveraged to increase access and improve care for low income and disenfranchised families, promote health equity, and address social determinants.[95]



Medicaid, SNAP, WIC, and Title V are only a few examples of the programs that serve maternal and child populations in North Carolina. These and other publicly funded

programs serve as a safety net by assisting individuals and families who have low incomes with essential services. These programs not only provide services to meet health care and nutritional needs, but also work to address many of the factors that influence overall health. These include the transportation assistance that Medicaid offers its beneficiaries, breastfeeding support for WIC recipients, employment and training supports for those receiving SNAP, and home visits offered to postpartum women through the Title V program. While these services are effective at addressing many determinants of health, there are additional legislative approaches that can be used to better support families and promote equity, many of which are described below.

Summary and Policy Recommendations

In order to create sustainable improvements in health, economic justice, and family wellbeing, changes at many levels are necessary. Implementing these changes requires recognition of the positive impact that state spending can have on the health of North Carolina's mothers and children, in addition to the connectivity of other relevant sectors, such as jobs, housing, and more.

1. **Increase access to affordable quality health care for all, because healthy infants and children need healthy parents**. In addition to traditional health care, improving access to ancillary services such as childbirth education classes, mental health services, breastfeeding support, and parenting support groups are essential for providing parents with the tools they need to help their family do well. Many of the legislative tools to accomplish this are already in use in many other states and have been shown to be effective, including:

a. Increasing access to Medicaid and the essential services it provides to families with low incomes by expanding Medicaid to all low-income individuals. Additionally, reject proposed work requirements, which take away health care from those who need it most, pose administrative hurdles, and fail to account for the job market by forcing workers into low-paying jobs.[96]

b. Lengthening the period for which a person can receive pregnancy Medicaid to ensure optimal postpartum and interconception care. Currently, women in North Carolina lose pregnancy Medicaid after 60 days postpartum, however problems can arise after this time and care should be provided beyond this arbitrary time frame.

2. **Strengthen families and communities by improving economic opportunities.** When employers support individuals by paying them a living wage and ensuring access to paid leave, parents can better support their family's health and help their infants and children to succeed in all aspects of life. North Carolina can achieve this by passing legislation that would:

   a. Increase the state's minimum wage beyond state employees so that all individuals and families have the economic opportunity to succeed, since current wages are insufficient to keep families out of poverty.

   b. Ensure that all workers have access to paid leave so that individuals can care for themselves and family members in the event of illness and take time off to welcome an infant.

3. **Address social and economic inequities and provide additional support for families who need it so that all families have an equitable chance at health and**

prosperity. Given that so much of an individual's health is determined by factors outside of the health care system, ensuring that other needs are met will go a long way in supporting the needs of all families. Ways to accomplish this include:

a. Committing to ongoing, sustained investments in affordable housing, nutrition programs, safe communities, and increased access to high quality childcare, which serve as the foundation for strong North Carolina families.

b. Increasing access to quality education at all levels and improving access to affordable early childhood education. Early intervention is important for future success, and education is the key to good jobs that help to lift families out of poverty.

References

1. McGinnis JM, Russo P, Knickman J. The case for more policy attention to health promotion. *Health Aff*. 2002;21(2):78-93. doi:10.1377/hlthaff.21.2.78.
2. Centers for Disease Control and Prevention (CDC). *NCHHSTP Social Determinants of Health*.; 2014. https://www.cdc.gov/nchhstp/socialdeterminants/index.html.
3. Adler NE, Cutler DM, Fielding JE, et al. Addressing Social Determinants of Health and Health Disparities A Vital Direction for Health and Health Care. *Vital Dir Heal Heal Care*. 2016:1-16. doi:10.1001/jama.2016.14058.
4. Institute of Medicine Committee on Public Health Strategies to Improve Health. *For the Public's Health: Investing in a Healthier Future*.; 2012. https://www.ncbi.nlm.nih.gov/pubmed/24830052.
5. Hall D. *Why We Need Public Spending*.; 2014. https://www.world-psi.org/en/why-we-need-public-spending-updated.
6. U.S. National Institutes of Health. *What Causes Infant Mortality?*; 2016. https://www.nichd.nih.gov/health/topics/infant-mortality/topicinfo/causes.
7. MacDorman MF, Mathews TF. *Understanding Racial and Ethnic Disparities in U.S. Infant Mortality Rates*.; 2011. https://www.cdc.gov/nchs/data/databriefs/db74.pdf.
8. Centers for Disease Control and Prevention. *Pregnancy Mortality Surveillance System*.; 2018. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-mortality-surveillance-system.htm.
9. Berg CJ, Harper MA, Atkinson SM, et al. Preventability of Pregnancy-Related Deaths: Results of a State-Wide Review. *Obstet Gynecol*. 2005;106(6):1228-1234. doi:10.1097/01.AOG.0000187894.71913.e8.
10. Building U.S. Capacity to Review and Prevent Maternal Deaths. *Report From Maternal Mortality Review Committees : A View Into Their Critical Role*.; 2017. https://www.cdcfoundation.org/sites/default/files/upload/pdf/MMRIAReport.pdf.
11. March of Dimes. *Low Birthweight*.; 2018. https://www.marchofdimes.org/complications/low-birthweight.aspx.
12. CDC National Center for Health Statistics. *Birthweight and Gestation*.; 2017. https://www.cdc.gov/nchs/fastats/birthweight.htm.
13. U.S. HHS Secretary's Advisory on Infant Mortality (SACIM). *Report of the SACIM: Recommendations for Department of Health and Human Services (HHS) Action and Framework for a National Strategy*.; 2013. https://www.hrsa.gov/advisorycommittees/mchbadvisory/InfantMortality/Correspondence/recommendationsjan2013.pdf.
14. The Henry J Kaiser Family Foundation. *Health Insurance Coverage of the Total Population*.; 2016. https://www.kff.org/other/state-indicator/total-population/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D#notes.
15. Artiga S, Fouz J, Damico A. *Health Coverage by Race and Ethnicity: Changes under the ACA*.; 2018. http://files.kff.org/attachment/Issue-Brief-Health-Coverage-by-Race-and-Ethnicity-Changes-Under-the-ACA.

16. Sommers BD, Gawande AA, Baicker K. Health Insurance Coverage and Health — What the Recent Evidence Tells Us. *N Engl J Med*. 2017;377(6):586-593. doi:10.1056/NEJMsb1706645.
17. Institute of Medicine. *Care without Coverage: Too Little, Too Late*.; 2002. http://www.nationalacademies.org/hmd/~/media/Files/Report Files/2003/Care-Without-Coverage-Too-Little-Too-Late/Uninsured2FINAL.pdf.
18. The Henry J Kaiser Family Foundation. *Key Facts about the Uninsured Population*. Vol 2013.; 2016. http://files.kff.org/attachment/Fact-Sheet-Key-Facts-about-the-Uninsured-Population.
19. *National Federation of Independent Business v. Sebelius*. 567 US 519(2012).
20. Buettgens M. *The Implications of Medicaid Expansion in the Remaining States : 2018 Update*.; 2018. https://www.urban.org/sites/default/files/publication/98467/the_implications_of_medicaid_expansion_2001838_2.pdf.
21. The Henry J Kaiser Family Foundation. *Status of State Action on the Medicaid Expansion Decision*.; 2018. https://www.kff.org/health-reform/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-act/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.
22. The Henry J Kaiser Family Foundation. *Medicaid Income Eligibility Limits for Adults as a Percent of the Federal Poverty Level*.; 2018. https://www.kff.org/health-reform/state-indicator/medicaid-income-eligibility-limits-for-adults-as-a-percent-of-the-federal-poverty-level/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.
23. U.S. Department of Health and Human Services. *Poverty Guidelines*.; 2018. https://aspe.hhs.gov/poverty-guidelines.
24. North Carolina Department of Health and Human Services. Medicaid Income Limits: Basic Medicaid Eligibility. 2018. https://files.nc.gov/ncdma/documents/Medicaid/YourRights/Basic_Medicaid_Income_eligibility_chart_2018_04.pdf.
25. Garfield R, Damico A, Orgera K. The Coverage Gap : Uninsured Poor Adults in States that Do Not Expand Medicaid. 2018. http://files.kff.org/attachment/Issue-The-Coverage-Gap-Uninsured-Poor-Adults-in-States-that-Do-Not-Expand-Medicaid.
26. Gifford K, Walls J, Ranji U, Salganicoff A, Gomez I. *Medicaid Coverage of Pregnancy and Perinatal Benefits: Results from a State Survey*.; 2017. http://files.kff.org/attachment/Report-Medicaid-Coverage-of-Pregnancy-and-Perinatal-Benefits.
27. North Carolina Medicaid Division of Health Benefits. *Maternal Support Services (Baby Love Program)*. https://medicaid.ncdhhs.gov/medicaid/get-started/find-programs-and-services/maternal-support-services.
28. Wise PH. Transforming Preconceptional, Prenatal, and Interconceptional Care Into A Comprehensive Commitment To Women's Health. *Women's Heal Issues*. 2008;18(6 SUPPL.):13-18. doi:10.1016/j.whi.2008.07.014.
29. Kerber KJ, Graft-Johnson JE de, Bhutta ZA, Okong P, Starrs A, Lawn JE.

Continuum of care for maternal, newborn, and child health: from slogan to service delivery. *Lancet*. 2007;370:1358-1369. doi:10.1016/S0140-6736(07)61578-5.

30. Agency for Healthcare Research and Quality HC and UP. *Most Frequent Conditions in U.S. Hospitals, 2011*.; 2011. https://www.hcup-us.ahrq.gov/reports/statbriefs/sb162.jsp.
31. The Cecil G. Sheps Center for Health Services Research. *87 Rural Hospital Closures: January 2010 - Present*.; 2018. http://www.shepscenter.unc.edu/programs-projects/rural-health/rural-hospital-closures/#citem_3b75-ca6b.
32. Nesbitt T, Connell F, Hart G, Rosenblatt R. Access to obstetric care in rural areas: effect on birth outcomes. *Am J Public Heal*. 1990;80(7):814-818. doi:10.2105/AJPH.80.7.814.
33. North Carolina Department of Health and Human Services State Center for Health Statistics. *Infant Mortality Statistics*.; 2018. https://schs.dph.ncdhhs.gov/data/vital/ims/2017/.
34. Hoadley J, Alker J, Holmes M. *Health Insurance Coverage in Small Towns and Rural America : The Role of Medicaid*.; 2018. https://ccf.georgetown.edu/wp-content/uploads/2018/09/FINALHealthInsuranceCoverage_Rural_2018.pdf.
35. Cohen RA, Zammitti ESAP, Martinez ME. *Health Insurance Coverage: Early Release of Estimates From the National Health Interview Survey, 2017*.; 2018. https://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201805.pdf.
36. Berchick ER, Hood E, Barnett JC. *Health Insurance Coverage in the United States: 2017 Current Population Reports*.; 2018. https://www.census.gov/content/dam/Census/library/publications/2018/demo/p60-264.pdf.
37. Dranove D, Garthwaite C, Ody C. *The Impact of the ACA' S Medicaid Expansion on Hospitals' Uncompensated Care Burden and the Potential Effects of Repeal*.; 2017. http://www.commonwealthfund.org/~/media/files/publications/issue-brief/2017/may/dranove_aca_medicaid_expansion_hospital_uncomp_care_ib.pdf.
38. Bachrach D, Boozang P, Lipson M. *The Impact of Medicaid Expansion on Uncompensated Care Costs : Early Results and Policy Implications for States*.; 2015. http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2015/rwjf420741.
39. Lindrooth RC, Perraillon MC, Hardy RY, Tung GJ. Understanding the relationship between Medicaid expansions and hospital closures. *Health Aff*. 2018;37(1):111-120. doi:10.1377/hlthaff.2017.0976.
40. Kozhimannil KB, Hung P, Prasad S, Casey M, Mcclellan M, Moscovice IS. Birth Volume and the Quality of Obstetric Care in Rural Hospitals. *J Rural Heal*. 2014;30(4):335-343. doi:10.1111/jrh.12061.
41. Wright JD, Herzog TJ, Shah M, et al. Regionalization of care for obstetric hemorrhage and its effect on maternal mortality. *Obstet Gynecol*. 2010;115(6):1194-1200. doi:10.1097/AOG.0b013e3181df94e8.
42. Menard MK, Kilpatrick S, Saade G, et al. Levels of maternal care. *Am J Obstet Gynecol*. 2015;212(3):259-270. doi:10.1016/j.ajog.2014.12.030.
43. NC Office of Budget and Management. *Population in North Carolina Counties by Race as of July 1, 2016*.; 2017.

https://files.nc.gov/ncosbm/demog/totalbyrace_2016.html.
44. Cohen JJ, Gabriel BA, Terrell C. The case for diversity in the healthcare workforce. *Health Aff*. 2002;21(15):90-102. doi:10.1377/HLTHAFF.21.5.90.
45. McGee V, Fraher E. *The Diversity of North Carolina's Health Care Workforce*.; 2012. http://www.shepscenter.unc.edu/hp/publications/Diversity_Aug2012.pdf.
46. Saha S, Taggart SH, Komaromy M, Bindman AB. Do patients choose physicians of their own race? *Health Aff*. 2000;19(4):76-83. doi:10.1377/hlthaff.19.4.76.
47. Cooper LA, Powe NR. Disparities in Patient Experiences, Health Care Processes, and Outcomes: the Role of Patient–Provider Racial, Ethnic, and Language Concordance. *Commonw Fund*. 2004. https://www.commonwealthfund.org/sites/default/files/documents/___media_files_publications_fund_report_2004_jul_disparities_in_patient_experiences__health_care_processes__and_outcomes__the_role_of_patient_provide_cooper_disparities_in_patient_experiences_.
48. Fox L. *The Supplemental Poverty Measure: 2017*.; 2018. https://www.census.gov/content/dam/Census/library/publications/2018/demo/p60-265.pdf.
49. Jacob A. *The Supplemental Poverty Measure: A Better Measure for Poverty in America ?* Vol 1.; 2012. https://poverty.ucdavis.edu/policy-brief/supplemental-poverty-measure-better-measure-poverty-america.
50. UC Davis Center for Poverty Research. *How Is Poverty Measured in the United States?*; 2018.
51. United States Census Bureau. Age and Sex of All People, Family Members and Unrelated Individuals Iterated by Income-to-Poverty Ratio and Race. 2017. https://www.census.gov/data/tables/time-series/demo/income-poverty/cps-pov/pov-01.html.
52. Berlan M, Harwood M. National Snapshot: Poverty Among Women and Families, 2018. 2018. https://nwlc-ciw49tixgw5lbab.stackpathdns.com/wp-content/uploads/2018/09/National-Snapshot.pdf.
53. Cooper D. *One in Nine U.S. Workers Are Paid Wages That Can Leave Them in Poverty, Even Working Full Time*.; 2018. https://www.epi.org/publication/one-in-nine-u-s-workers-are-paid-wages-that-can-leave-them-in-poverty-even-when-working-full-time/.
54. U.S. Department of Health and Human Services. *2017 Poverty Guidelines*.; 2017. https://aspe.hhs.gov/2017-poverty-guidelines.
55. U.S. Bureau of Labor Statistics. *BLS Reports: Characteristics of Minimum Wage Workers, 2017*.; 2018. https://www.bls.gov/opub/reports/minimum-wage/2017/home.htm.
56. Shierholz H, Gould E. *Why Is Wage Growth so Slow? It's Not Because Low-Wage Jobs Are Being Added Disproportionately*.; 2018. https://www.epi.org/blog/why-is-wage-growth-so-slow-its-not-because-low-wage-jobs-are-being-added-disproportionately/.
57. Economic Policy Institute. *Nominal Wage Tracker*.; 2018. https://www.epi.org/nominal-wage-tracker.
58. Aurand A, Emmanuel D, Yentel D, Errico E, Pang M. *A Shortage of Affordable Homes MARCH 2018 Affordable Homes*.; 2018.

https://nlihc.org/sites/default/files/gap/Gap-Report_2018.pdf.
59. U.S. Department of Housing and Urban Development. *Affordable Housing*. https://www.hud.gov/program_offices/comm_planning/affordablehousing/.
60. North Carolina Housing Coalition. *Our Challenge*.; 2018. https://nchousing.org/.
61. Rohe W, Owen T, Kerns S. *Extreme Housing Conditions in North Carolina*.; 2017. https://nchousing.org/resource/extreme-housing-conditions-in-nc/.
62. Krieger J, Higgins DL. Housing and health: Time again for public health action. *Am J Public Health*. 2002;92(5):758-768. doi:10.2105/AJPH.92.5.758.
63. North Carolina Division of Child Development and Early Education. *Market Rates*.; 2018. https://ncchildcare.ncdhhs.gov/Home/DCDEE-Sections/Subsidy-Services/Market-Rates.
64. National Low Income Housing Coalition. *Out of Reach: North Carolina*.; 2016. https://nchousing.org/resource/out-of-reach-2016-no-refuge-for-low-income-renters/.
65. Halpin J, Agne K, Omero M. *Affordable Child Care and Early Learning for All Families*.; 2018. https://www.americanprogress.org/issues/early-childhood/reports/2018/09/13/457470/affordable-child-care-early-learning-families/.
66. Klerman JA, Daley K, Pozniak A. *Family and Medical Leave in 2012: Technical Report*.; 2014. https://www.dol.gov/asp/evaluation/fmla/FMLA-2012-Technical-Report.pdf.
67. The Urban Institute-Brookings Institution Tax Policy Center. *State and Local General Revenue, Percentage Distribution*.; 2017. https://www.taxpolicycenter.org/statistics/state-and-local-general-revenue-percentage-distribution.
68. United States Office of Budget and Management. *Historical Tables: Percentage Composition of Receipts by Source*.; 2017. https://www.whitehouse.gov/omb/historical-tables/.
69. North Carolina Office of Budget and Management. Revenue. 2017.
70. Center on Budget and Policy Priorities. *Policy Basics: Marginal and Average Tax Rates*.; 2018. https://www.cbpp.org/research/federal-tax/policy-basics-marginal-and-average-tax-rates.
71. Institute on Taxation and Economic Policy. *North Carolina: State and Local Tax Shares of Family Income for Non-Elderly Taxpayers*.; 2018. https://itep.org/whopays/north-carolina/.
72. North Carolina Department of Revenue. *Tax Rate Schedules*.; 2018.
73. Johnson CD, Sirota AF. *BTC Brief: The Cost of Trickle-down Economics for North Carolina*.; 2017. https://www.ncjustice.org/?q=budget-and-tax/btc-brief-cost-trickle-down-economics-north-carolina.
74. Bradley EH, Elkins BR, Herrin J, Elbel B. Health and social services expenditures: Associations with health outcomes. *BMJ Qual Saf*. 2011;20(10):826-831. doi:10.1136/bmjqs.2010.048363.
75. Fairbrother G, Guttmann A, Klein JD, Simpson LA, Thomas P, Kempe A. Higher Cost, but Poorer Outcomes: The US Health Disadvantage and Implications for Pediatrics. *Glob Heal*. 2015;135(6):961-964. doi:10.1542/peds.2014-3298.
76. U.S. Office of Disease Prevention and Health Promotion. *Determinants of Health*.;

2018. https://www.healthypeople.gov/2020/about/foundation-health-measures/Determinants-of-Health.
77. Bradley EH, Canavan M, Rogan E, et al. Variation In Health Outcomes: The Role Of Spending On Social Services, Public Health, And Health Care, 2000-09. *Health Aff*. 2016;35(5):760-768. doi:10.1377/hlthaff.2015.0814.
78. Erwin PC, Greene SB, Mays GP, Ricketts TC, Davis M V. The association of changes in local health department resources with changes in state-level health outcomes. *Am J Public Health*. 2011;101(4):609-615. doi:10.2105/AJPH.2009.177451.
79. Mays GP, Smith SA. Evidence links increases in public health spending to declines in preventable deaths. *Health Aff*. 2011;30(8):1585-1593. doi:10.1377/hlthaff.2011.0196.
80. Singh SR. Public health spending and population health: A systematic review. *Am J Prev Med*. 2014;47(5):634-640. doi:10.1016/j.amepre.2014.05.017.
81. Masters R, Anwar E, Collins B, Cookson R, Capewell S. Return on investment of public health interventions: A systematic review. *J Epidemiol Community Health*. 2017;71(8):827-834. doi:10.1136/jech-2016-208141.
82. Reynolds MM, Avendano M. Social Policy Expenditures and Life Expectancy in High-Income Countries. *Am J Prev Med*. 2018;54(1):72-79. doi:10.1016/j.amepre.2017.09.001.
83. North Carolina Division of Medical Assistance. *North Carolina Medicaid and NC Health Choice: Annual Report for State Fiscal Year 2017*.; 2017. https://files.nc.gov/ncdma/documents/AnnualReports/AnnualReport_SFY2017_20171230.pdf.
84. Centers for Medicare and Medicaid Services. *State Overviews*. https://www.medicaid.gov/state-overviews/index.html.
85. The Henry J Kaiser Family Foundation. *Medicaid in North Carolina*.; 2018. http://files.kff.org/attachment/fact-sheet-medicaid-state-NC.
86. Sutten T. Running the numbers: An overview of North Carolina Medicaid and Health Choice. *N C Med J*. 2017;78(1):58-62. doi:10.18043/ncm.78.1.58.
87. Baicker K, Taubman SL, Allen HL, et al. The Oregon Experiment — Effects of Medicaid on Clinical Outcomes. *N Engl J Med*. 2013;368(18):1713-1722. doi:10.1056/NEJMsa1212321.
88. USDA Food and Nutrition Service. *Supplemental Nutrition Assistance Program: State Activity Report, Fiscal Year 2016*.; 2017. https://fns-prod.azureedge.net/sites/default/files/snap/FY16-State-Activity-Report.pdf.
89. Carlson S, Keith-Jennings B. *SNAP Is Linked with Improved Nutritional Outcomes and Lower Health Care Costs*.; 2018. https://www.cbpp.org/research/food-assistance/snap-is-linked-with-improved-nutritional-outcomes-and-lower-health-care.
90. U.S. Department of Agriculture Food and Nutrition Service. *Supplemental Nutrition Assistance Program (SNAP)*.; 2018. https://www.fns.usda.gov/snap/eligibility#What are the SNAP income limits?
91. Dean S, Bolen E, Keith-Jennings B. *Making SNAP Work Requirements Harsher Will Not Improve Outcomes for Low-Income People*.; 2018. https://www.cbpp.org/research/food-assistance/making-snap-work-requirements-

harsher-will-not-improve-outcomes-for-low.

92. North Carolina Division of Public Health. *WIC Program*.; 2018. https://www.nutritionnc.com/wic/.
93. Carlson S, Neuberger Z. *WIC Works: Addressing the Nutrition and Health Needs of Low-Income Families for 40 Years*.; 2017. https://www.cbpp.org/research/food-assistance/wic-works-addressing-the-nutrition-and-health-needs-of-low-income-families.
94. Association of Maternal and Child Health Programs. *North Carolina Maternal and Child Health Block Grant 2018*.; 2018. http://www.amchp.org/Policy-Advocacy/MCHAdvocacy/2018 State Profiles/North Carolina 2018 updated narrative and SPRANS.pdf.
95. North Carolina Division of Public Health. *Maternal and Child Health Services Title V Block Grant*.; 2018. https://publichealth.nc.gov/wch/doc/NC-FY19-MCHBG-Application-WCHS-Word-Glossary-072318.pdf.
96. Garfield R, Rudowitz R, Musumeci M, Damico A. *Implications of Work Requirements in Medicaid: What Does the Data Say?*; 2018. https://www.kff.org/medicaid/issue-brief/implications-of-work-requirements-in-medicaid-what-does-the-data-say/.