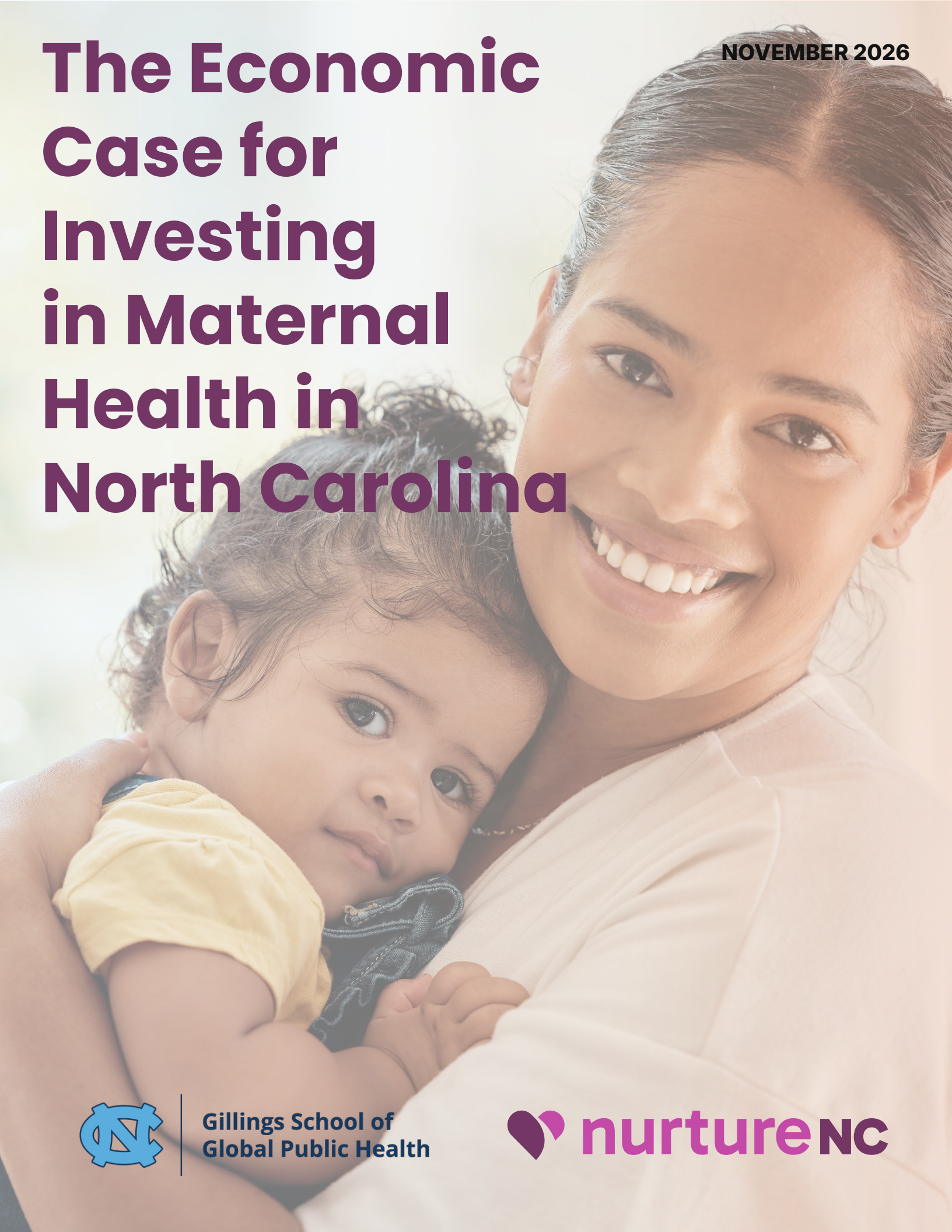
The Economic Case for Investing in Maternal Health in North Carolina

NOVEMBER 2026



Gillings School of Global Public Health

nurture NC

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ACKNOWLEDGMENTS

This report was developed by the **University of North Carolina Systems Strengthening Hub for Public Health** in collaboration with the **East Carolina University College of Nursing**. The Systems Strengthening Hub for Public Health is dedicated to advancing the capacity and resilience of public health systems through innovative and collaborative systems-informed approaches. The Hub supports communities and organizations in navigating complex public health challenges by fostering learning, partnership, and coordinated action to improve health outcomes. Its work is grounded in system dynamics, collaboration science, and decision support science, with an emphasis on translating insight into coordinated action and measurable impact.

This work was made possible through generous support from Nurture NC and the **University of North Carolina Gillings School of Global Public Health**. Nurture NC is a cross-sector initiative dedicated to improving maternal and infant health across North Carolina by bringing together partners to advance action on three priority areas: strengthening the maternal health workforce, closing gaps in rural healthcare access, and driving public policy optimization.

Vital statistics data from the North Carolina Department of Health and Human Services, Division of Public Health, Office of Vital Records were used in this analysis. The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the North Carolina Department of Health and Human Services, Division of Public Health.

Suggested Citation: Simon, J., O'Leary, M., Young, K., Frisch, C., Manandhar, A., Odihi, D., Guta, M., Saxer, K., & Hassmiller Lich, K. (2026). The economic case for investing in maternal health in North Carolina. University of North Carolina Gillings School of Global Public Health, Systems Strengthening Hub for Public Health.

EXECUTIVE SUMMARY

Preventable adverse maternal and infant outcomes - such as the death of the mother or infant, low birth weight or preterm births - take both a human and economic toll in the United States and North Carolina. Mothers and infants in North Carolina have higher mortality rates than the national average[1], and 87% of North Carolina's pregnancy-related deaths are considered preventable.[2] North Carolina infants die at a higher rate than the national average, and we continue to receive a D+ grade from the March of Dimes for the state's preterm birth rate.[1]

There is evidence of a relationship between a mother's risk of death and the number of prenatal care visits: Maternal mortality rates are lower for women who receive 10 or more prenatal care visits.[3] In North Carolina, nearly one in five mothers do not receive an adequate number of prenatal visits.[1] Access and proximity to care are critical to promoting maternal and infant health.

These preventable poor outcomes don't fall evenly across populations in the state. Mothers and babies who are Black, live in rural areas, or are covered by Medicaid are more likely to die or have worse birth outcomes than those who are White, live in urban areas, or are commercially insured.[4]

Beyond the tragic loss of human life, this report makes the case that poor maternal and infant health outcomes in **North Carolina also carry a substantial, quantifiable economic cost, borne by families, insurers, employers, and the state as a whole.**

Our approach builds on the 2024 Heartland Forward report, *The Economic Case for Investing in Maternal Health,* which quantified the economic burden of select adverse maternal and infant health outcomes across four heartland states.[3] We bring a similar research focus to North Carolina, estimating the state's economic burden across three categories:
1) direct excess medical costs associated with preterm and low birth weight births,
2) non-medical costs due to travel and time burdens for families accessing out-of-county care
3) workforce productivity losses associated with preterm birth.

Using standardized economic methodology, we also calculate the societal loss from maternal and infant deaths. Where possible, we report North Carolina-specific estimates using state vital statistics data; where that was not feasible, we apportioned established national estimates based on North Carolina's share of relevant cases (detailed in our methodology appendix).

Our findings show that the total economic burden of select adverse maternal and infant health outcomes in North Carolina is estimated at $1.03 billion annually, including $988.4 million in excess healthcare spending due to preterm and low birth weight births, $22.5 million in non-medical travel and time costs to access out-of-county prenatal and delivery care, and $21.7 million in lost workplace productivity due to preterm birth.

We also estimate the overall societal loss to North Carolina from preventable maternal deaths and infant deaths above the state's goal to be **$1.18 billion ($255.6 million from maternal deaths and $921.8 million from infant deaths).**

While these figures may initially seem overwhelming, they show the tremendous opportunity and substantial economic benefits that improved maternal and infant health outcomes could deliver. For example, reduction in preterm birth and low birth weight rates to national goals **would save North Carolina public and private payers and families over $415 million a year in health care spending,** equivalent to roughly $126,000 in avoided costs per averted preterm or low birth weight birth. This savings is more than half of what the state spends on its entire mental health, developmental disability, and substance use services system ($816.8 million for the 2026-2027 fiscal year).[5]

A recent national poll found that nearly 90% of registered voters across political party, region, and age agree that maternal health must improve.[6] Multiple policy and investment opportunities are available to drive progress, many of which are already gaining support and funding. For example, strengthening the maternal health workforce by expanding and better integrating midwives and doulas can improve birth outcomes.[7-10] The connection between maternal mortality risk and the number of prenatal care visits underscores the importance of timely access to care and the availability of maternal health services close to where families live.[3,11] Expanding innovative care delivery models, particularly in rural communities, can further increase access to essential maternal health services. In addition, policies that address basic needs, such as health insurance coverage and economic supports, can improve outcomes for both mothers and infants.[12-16]

Looking forward, this report is phase 1 of ongoing economic analyses. Phase 2 will provide more specificity on the economic return on specific investments to improve birth outcomes in North Carolina, including the costs and expected returns of select targeted interventions. These analyses will further inform the business case for maternal health and help guide those future strategic investments.

The following sections highlight our findings in more detail and suggest investments for North Carolina policymakers, insurers, and employers.

INTRODUCTION

North Carolina's maternal and infant health outcomes lag behind national averages for the United States (U.S.).[1] The rate of women dying from pregnancy-related complications in North Carolina is nearly 30% higher than the national rate and worsening, and almost all of these deaths (87%) are preventable.[1,2] Infant mortality rates in NC are over 20% higher than the national average and North Carolina continues to receive a D+ grade from the March of Dimes for the state's preterm birth rate.[1]

Lack of prenatal care is a well-established risk factor for maternal and infant mortality.[3,17] There is evidence of a relationship between a mother's risk of death and the number of prenatal care visits: Maternal mortality rates are lower for women who receive 10 or more prenatal care visits.[3] In North Carolina, nearly one in five mothers do not receive adequate prenatal care, beginning prenatal care in the fifth month of pregnancy or later or having less than 50% of the appropriate number of visits.[1]

The burden of poor maternal outcomes falls disproportionately across our population. Black mothers are almost twice as likely to die as white mothers. Rural mothers are almost three times more likely to die than their counterparts in urban areas. Mothers covered by Medicaid are more than twice as likely to die as those covered by other insurance.[2]

While the state has seen improvements in infant outcomes, deep disparities persist. Black babies are still almost three times as likely to die as white babies.[4] Babies in rural areas are 12% more likely to die than babies from urban areas.[4] Babies born to mothers covered by Medicaid are more likely to die or be born prematurely than babies born to mothers on commercial insurance.[4]

Access and proximity to maternal health care are critical elements in keeping mother and baby healthy, yet access to care, especially in North Carolina's rural areas, remains a



challenge. Across the state, up to 18 rural hospitals have closed entirely or closed their obstetric units over the past 12 years[18] and 28 of North Carolina's 100 counties lack obstetric clinicians or delivery facilities entirely.[19] Almost 40% of North Carolina counties are categorized as either maternity care deserts (18%) or low access to maternity care (19%), affecting 61,000 women and 4,000 births annually.[20]

Lack of access limits the ability of mothers to receive care, forces families to travel long distances for basic prenatal and delivery care, and is associated with worse birth outcomes, a burden that falls hardest on rural and low-income families.[11]

Maternal health in North Carolina is also an economic issue. Poor maternal health contributes to poor infant and child health, disrupts workforce participation, strains health systems, and hinders the long-term economic growth of the state. The aim of this report is to estimate the economic impact of select adverse pregnancy outcomes in North Carolina, including preterm birth, low birth weight, and maternal and infant mortality. The methodology drew on a 2024 Heartland Forward report that quantified the savings from preventing adverse maternal and infant health outcomes in the heartland region of the United States and outlined an action plan to strengthen local maternal health systems.[3] The report prompted regional action, including the passage of the Healthy Moms, Healthy Babies Act in Arkansas[21], which expanded Medicaid maternal health coverage to increase access to care, with movement for similar legislation in surrounding states.

The outcomes quantified in this report are largely preventable. Approximately nine out of ten (87%) pregnancy-related deaths in North Carolina from 2018-2021 were deemed preventable by the state's Maternal Mortality Review Committee.[2] Preterm birth and low birth weight are similarly linked to modifiable risk factors, including inadequate prenatal care, chronic disease management, and access to high-quality maternal health services, that are directly responsive to policy and workforce investment.[22]

Multiple policy and investment opportunities exist to improve maternal and birth outcomes, many of which are described in Nurture NC's Framework for Action, and are already gaining momentum and initial investments.

Incorporating midwives and doulas in maternity care can improve birth outcomes, including reducing cesarean birth, low birth weight and preterm births, and increasing postpartum visits.[7-10] Many states have established successful models for financing, delivering, and reimbursing doula and midwifery services[23] from which North Carolina can learn. North Carolina is working to expand and advance midwifery care through participation in the Midwifery Policy Collective co-convened by the Institute for Medicaid Innovation and



funded by the Pritzker Children's Initiative. NC Medicaid Managed Care, the Rural Health Transformation Program, and philanthropic funding are supporting efforts to expand the doula workforce.

Beyond workforce development and financing, closing North Carolina's maternal health access gaps requires attention to where care is available, not just who provides it. Progress in closing care gaps is advancing through initial investments from the Rural Health Transformation Program and additional investments to accelerate innovative ways to deliver maternal care, like the Perinatal Access to Care and Health in North Carolina (PATCH-NC) model.[24] These efforts can be expanded through additional investment.

Policies that provide insurance coverage and basic economic support for mothers and infants can also improve outcomes. A coordinated awareness campaign is promoting uptake of concrete supports, like those offered through North Carolina Medicaid Managed Care Value Added Benefits. Other maternal and infant economic support interventions are expanding nationally and have been shown to increase prenatal care and reduce low birth weight, preterm births, hospital readmissions, NICU admission, and health care costs.[12-16]

By quantifying the economic impact of preventable adverse maternal and infant outcomes, this report provides the foundation for greater and more strategic investment and action in maternal and infant health that would lead to healthier families and a stronger North Carolina.



PURPOSE

We estimate the economic impact of select adverse pregnancy outcomes for mothers and infants across North Carolina through direct medical costs to payers and families, non-medical costs borne by families due to traveling out-of-county for care, and broader workforce costs. Specifically, we explore:

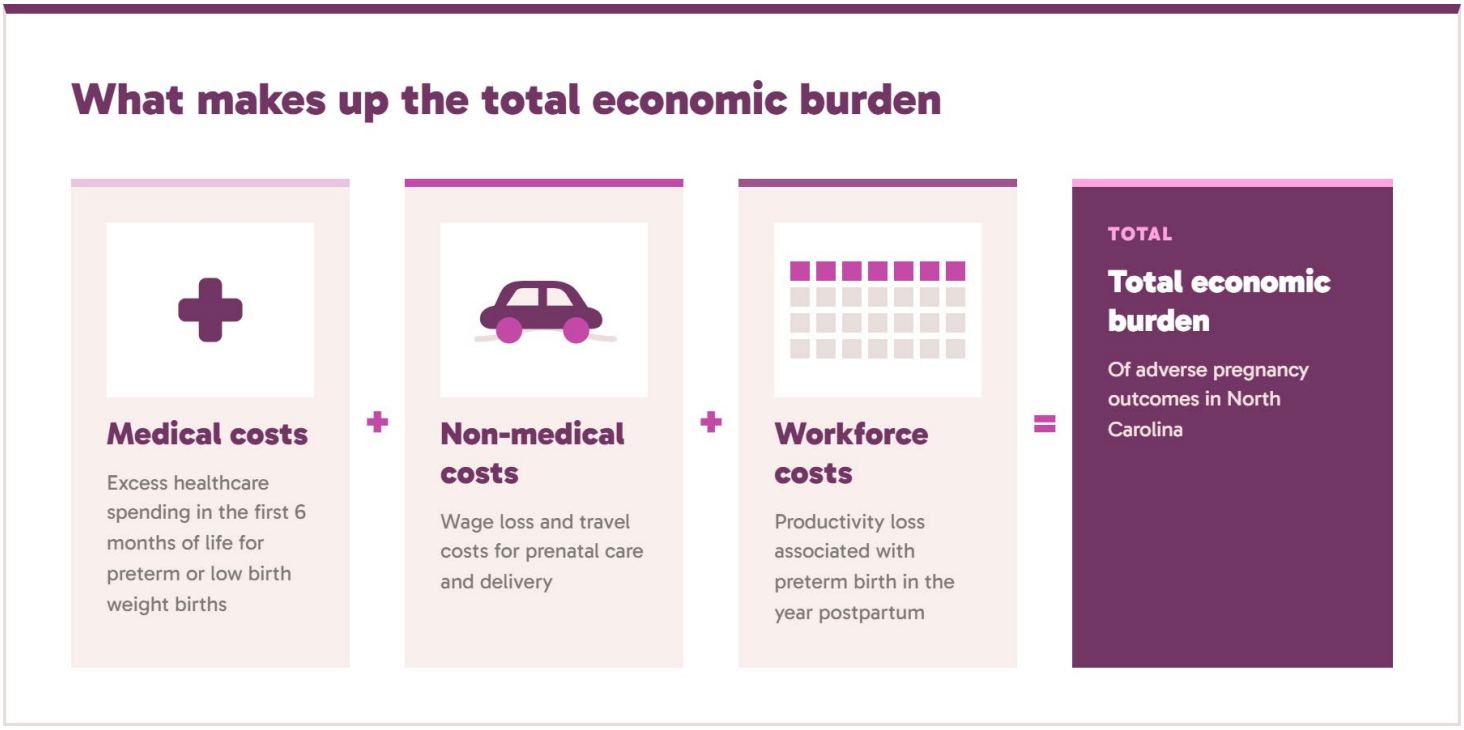
1. **Medical costs:** What is the economic impact of adverse pregnancy outcomes (preterm and low birth weight births) to payers and families across North Carolina?

2. **Non-medical costs:** What additional costs, such as wage loss and travel costs, do North Carolina families bear to access out-of-county prenatal care and delivery facilities?

3. **Workforce costs:** What productivity losses (e.g. absenteeism, disability) do North Carolina employers and families experience as a result of preterm birth?

Taken together, these estimates represent the **total economic burden** shared by families, payers, employers, and communities associated with largely preventable adverse maternal and infant health outcomes.

Lastly, we estimate the **societal loss to North Carolina from preventable maternal deaths** and infant deaths above the state's goal to give policymakers a dollar measure of the value of preventing these deaths.



MEDICAL COSTS

Preterm and low birth weight infants have higher medical needs and require more costly care than babies born full-term or at healthy weights. In 2025, 10.8% of babies in North Carolina were born preterm, a proportion that has remained stagnant over the past decade, and 9.3% were born with low birth weight.[1,4] Preterm birth rates are highest among North Carolina Medicaid beneficiaries (12.3%) relative to other payers.[4] Nationally, in the first 6 months of life, full-term infants incur average healthcare spending of $8,670, compared to $103,646 for preterm infants, and normal birth weight infants incur $9,177, compared to $155,751 for low birth weight infants.[25]

To quantify the burden for North Carolina families and payers, we estimated the excess healthcare costs linked to preterm birth and low birth weight in North Carolina by applying spending estimates from Beam et al.[25] broken down by gestational age and birth weight, to North Carolina birth outcome data from 2021-2024 and subtracting the cost of births that were both full-term and normal birth weight. To avoid double-counting of the same infants, given these two categories frequently overlap, we assigned infants born preterm and low birth weight to their higher-cost category.

We found that excess healthcare spending associated with preterm and low birth weight births within the first 6 months of life accumulates to an average of $988.4 million a year in North Carolina.

The March of Dimes has set a goal of reducing the preterm birth rate to less than 5.5% nationwide by 2030.[26] Applying this same target rate to both outcomes in North Carolina would require a reduction of 5.2 percentage points for preterm birth (from 10.8%) and 3.8 percentage points for low birth weight (from 9.3%). If achieved, **we estimate North Carolina public and private payers and families could save over $415 million a year, equivalent to roughly $126,000 in avoided costs per averted preterm or low birth weight birth.**

NON-MEDICAL COSTS

Beyond direct medical costs, families bear additional out-of-pocket expenses they may not always plan for or be able to afford. One such expense is the time and money required to travel long distances to receive perinatal care. While this travel could be for many reasons, a primary contributor is the lack of local, affordable prenatal and maternity care. In 28 of North Carolina's 100 counties, there are no facilities (hospitals or birth centers) or clinicians (physicians or midwives) providing deliveries, indicating a high need for birth-related travel.[19]

Longer travel distances to maternity care are associated with worse, and more costly, health outcomes. A North Carolina-specific study found that increased travel time and distance to obstetric care were linked to higher rates of cesarean delivery, severe maternal morbidity, preterm birth, and gestational diabetes, even after adjusting for age, race, and insurance status.[11]

To estimate the frequency and cost of pregnancy-related travel, we used North

Carolina birth data to identify births where the maternal county of residence differed from the county of birth. We calculated driving distance and time between residence and birth county centroids, and then applied the IRS standard mileage rate and Bureau of Labor Statistics wage data to estimate transportation and opportunity costs (i.e., wage loss). These costs were scaled using prenatal visit counts to capture the estimated cumulative cost of travel across prenatal care and delivery.

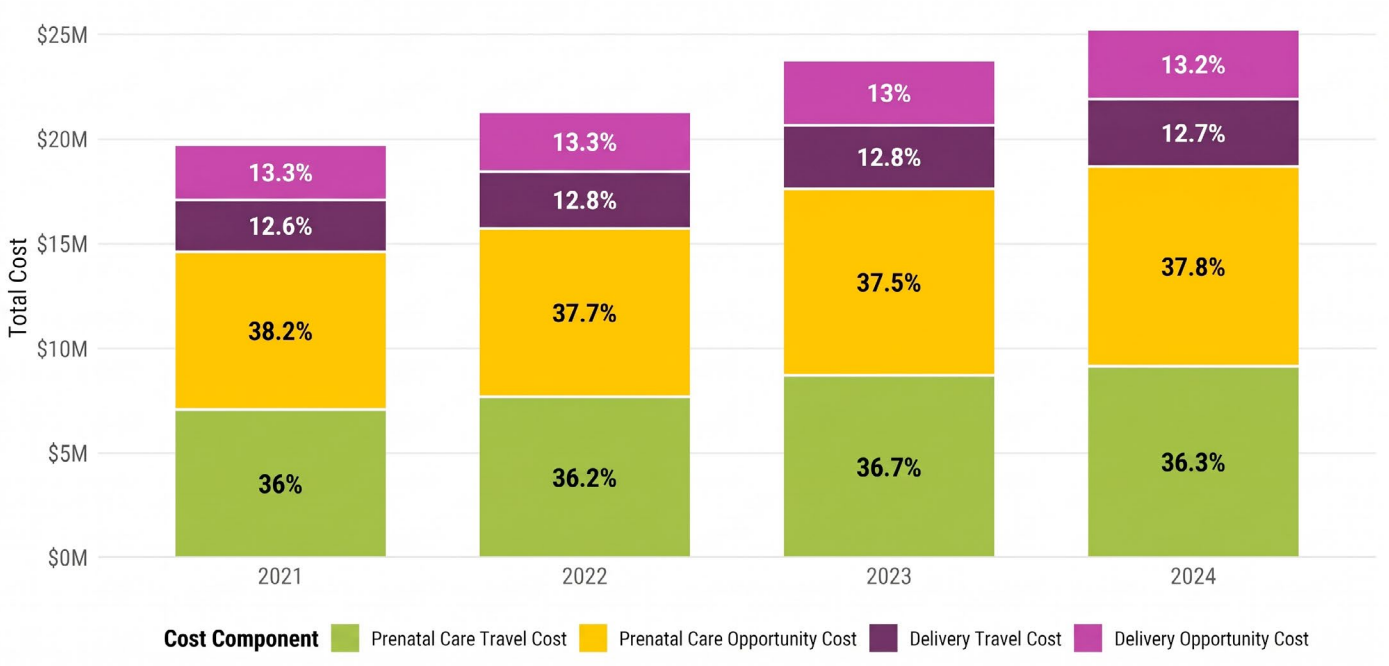
Our analysis found that an average of 38% of women give birth out-of-county in North Carolina, traveling an average of 49 miles (approximately 68 minutes) for care, and incurring an average of $488 in non-medical expenses per family.

This estimate assumes that 25% of a family's prenatal care visits take place in the delivery county, reflecting that some prenatal care likely occurs closer to home (full sensitivity analysis with different assumptions about the frequency of out-of-county prenatal visits is available in the methodology appendix). The average distance traveled for out-of-county births remained relatively stable across all four years of our analysis, while the percentage of individuals traveling for care and the total cost of this travel increased year over year, pointing to a consistent and growing financial burden that targeted investment in local maternity care access could meaningfully reduce. Traveling out-of-county for delivery and a portion of prenatal care **amounts to a statewide cost of $22.5 million per year.**

Notably, these non-medical costs are not distributed evenly across the state (Table 1). Families in Medicaid Region 6 (eastern North Carolina) bear a disproportionate share of this burden, accounting for roughly 35% of total statewide non-medical costs each year, despite being just one of six Medicaid regions statewide.

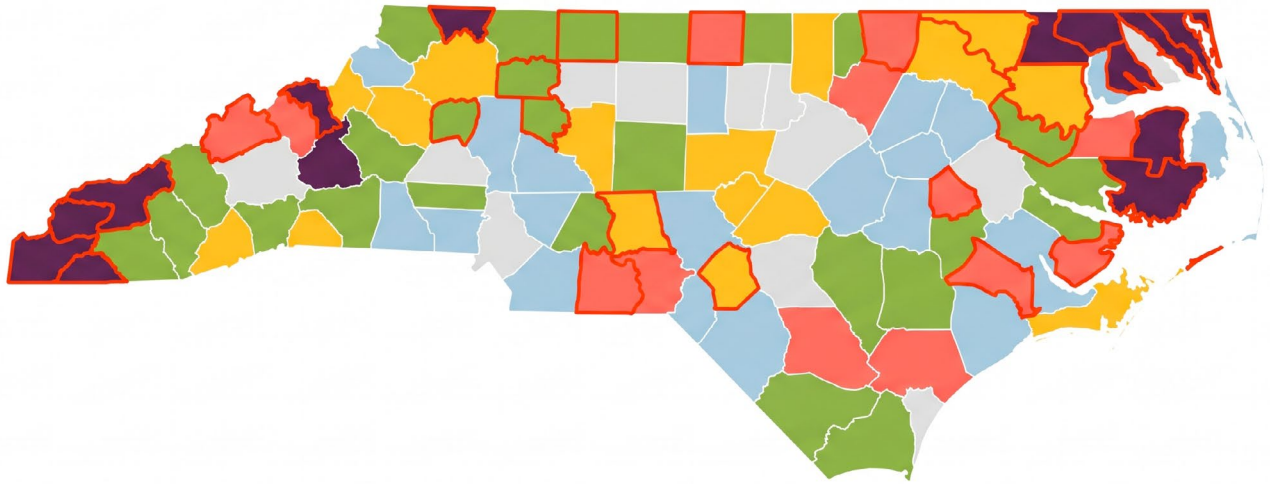
What Makes Up The Non-Medical Cost for Out-of-County Births?

Cost components using the 25% prenatal care visit assumption, 2021-2024



Average Distance Traveled For All Deliveries

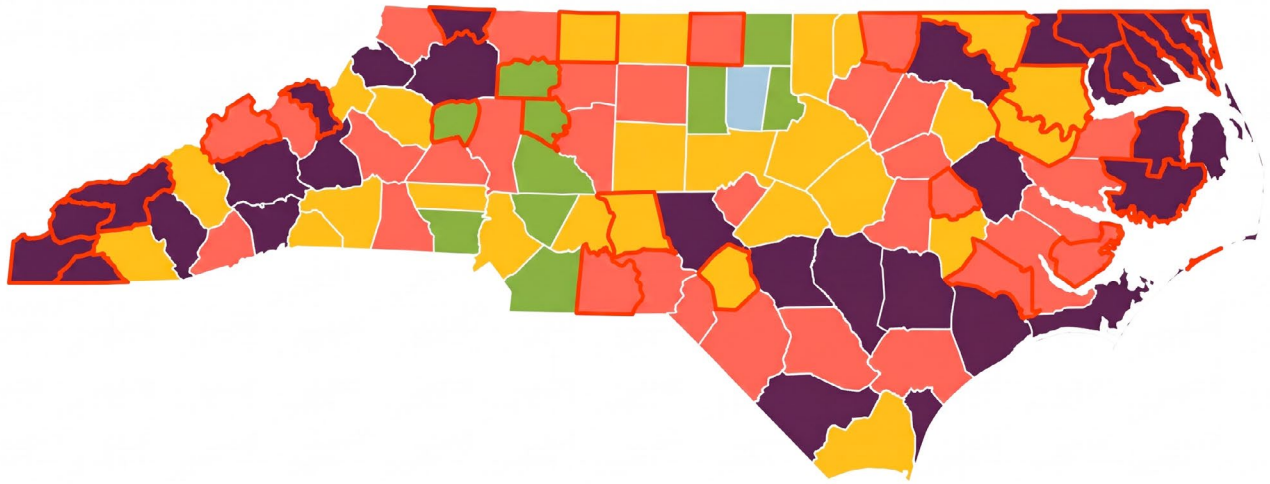
All Deliveries, North Carolina, 2021-2024



In-county deliveries are assigned 0 miles. Red outlines identify counties with no hospitals or birth centers and no physicians or midwives providing deliveries.

Average Distance Traveled For Out-of-County Delivery

Out-of-County Deliveries Only, North Carolina, 2021-2024



Red outlines identify counties with no hospitals or birth centers and no physicians or midwives providing deliveries.



Table 1. Average Non-Medical Cost of Out-of-County Delivery by Medicaid Region, 2021-2024

Medicaid Region	Average Delivery Cost Per Person	Average Prenatal Cost Per Person	Average Annual Total Cost	Share of Statewide Cost
1	$123	$347	$2,136,487	9.50%
2	$99	$305	$2,851,194	12.67%
3	$81	$231	$2,839,256	12.62%
4	$87	$254	$3,424,784	15.22%
5	$114	$306	$3,372,570	14.99%
6	$268	$792	$7,873,227	35.00%

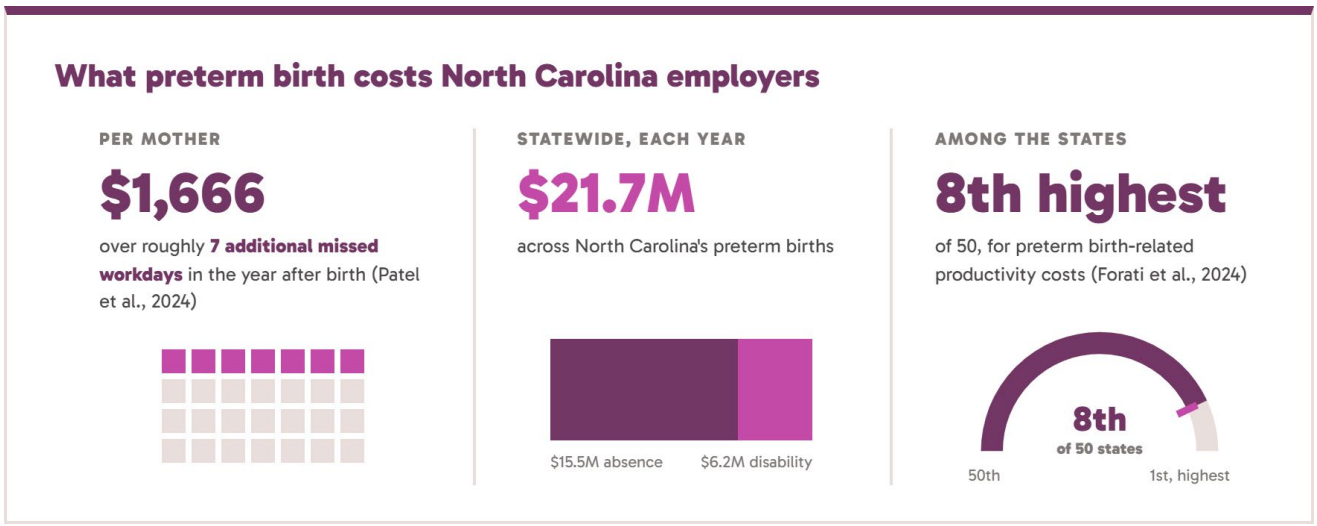
WORKFORCE COSTS

Women make up 51.6% of the state's population, and 59% (2.7 million) participate in the workforce.[27] While that share has grown in recent years, North Carolina ranked 36th among states for women's workforce participation as of 2016.[28] Poor maternal health outcomes are associated with reduced workforce participation, which carries an economic cost for employers and state economies.[3,29,30]

Adverse birth outcomes contribute to workforce costs through the recovery and caregiving demands placed on affected parents.

Mothers of preterm infants often experience a more complex postpartum recovery, and their infants typically require more outpatient and inpatient care in their early years, increasing the risk of long-term intellectual and developmental disabilities, including ADHD, cerebral palsy, and asthma.[31] Together, these demands can lead to more medical appointments, more time away from work, and, in some cases, disability leave.

These factors have a quantifiable impact for North Carolinians. In the year following birth, mothers of preterm infants lose an average of



7 additional workdays to medical absenteeism and disability – on top of the roughly 48 days mothers of full-term infants lose to the same causes – resulting in an average of $1,666 per mother in additional lost productivity costs.[30] For North Carolina specifically, applying these per-case cost estimates to North Carolina's preterm birth counts, we found annual productivity losses of $15.5 million from preterm birth-related absenteeism and $6.2 million from preterm birth-related disability, totaling $21.7 million per year. Heartland Forward's 2024 report ranks North Carolina 8th highest among all states for preterm birth-related workplace productivity costs, a recurring cost that is largely preventable through prenatal investments that reduce preterm birth risk, and postpartum supports that ease its financial impact on families and employers.[3]

SOCIETAL LOSS FROM MATERNAL AND INFANT MORTALITY

Maternal and infant deaths are tragedies that come with tremendous loss to families, communities, and societies. While one can never fully capture the elements of loss associated with a death, there are standard economic methodologies of estimating the societal loss from early deaths. We use a measure economists call "willingness to pay", which is a standard way of placing a dollar value on reducing the risk of death, based on research into how much society, on average, is willing to invest to prevent a death.[32] Added up across populations, willingness to pay to prevent a death becomes the value of a statistical life. Multiplying this value by the number of deaths, or multiplying a value per year of life by the years of life lost, gives the societal loss. This is not a judgment about what any individual life is "worth," but a tool that lets us estimate the societal loss associated with maternal and infant deaths.

Measuring societal loss

Willingness to pay is a measure of what people would give up to lower their own small chance of dying, through safer cars, cleaner air, better care. Added up across a population, it becomes the **value of a statistical life (VSL)**, the figure federal agencies use to weigh health and safety policies. We use it to estimate the **societal loss** associated with preventable maternal and infant deaths.

AN EXAMPLE

$137	each, that 100,000 people would be willing to pay for a safety measure
1 in 100,000	lower risk of death for each, about one death avoided in the group
$13.7M	their spending, added up: the value of a statistical life

It is

small risk reductions added up across many people; a benchmark for possible investment

It is not

a price tag on any individual, money that changes hands, or lost earnings

VSL: U.S. Department of Transportation, 2024 ($13.7 million).

SOCIETAL LOSS FROM MATERNAL MORTALITY

We estimate the societal loss from maternal deaths in North Carolina to be $293.8 million annually, or $881.4 million over three years from 2018-2020. North Carolina's Maternal Mortality Review Committee found that 87% of pregnancy-related deaths in those years were preventable.[33] Applying that share, **we estimate the societal loss from preventable maternal deaths in North Carolina (roughly 21 deaths per year) to be $255.6 million annually.** Nationally, this value averaged $9.14 billion annually over the same period, for a three-year total of $27.4 billion.[3]

To estimate this value, we drew on a national study of maternal deaths, where the value of years of life lost was calculated by multiplying a population-average value of a statistical life year by the years of life lost to early death, based on 2018-2020 national mortality data from the Centers for Disease Control and Prevention (CDC).[34] To estimate North Carolina's share of this value, we applied North Carolina's proportion of total maternal deaths nationally in each year, according to CDC's National Vital Statistics System. Maternal mortality data use definitions that differ in scope. A **maternal death**, the category in national data we used, is a death during pregnancy or up to 42 days postpartum from causes related to or aggravated by pregnancy. A **pregnancy-related death**, used in North Carolina's Maternal Mortality Review Report, is a death during pregnancy or up to one year postpartum related to or aggravated by pregnancy. National estimates of the value of years of life lost were available only for maternal deaths, so our estimate covers this narrower definition and likely understates the full societal loss from preventable deaths related to pregnancy.

Maternal mortality

87%

preventable

of pregnancy-related deaths in North Carolina (2018–2020); an estimated 64 of 73 maternal deaths

The societal loss of preventable maternal deaths in North Carolina is **over $255 million a year.**

SOCIETAL LOSS FROM INFANT MORTALITY

Societal loss from infant deaths carries an even greater value than maternal deaths, both because more infants die each year than mothers, and because each infant death represents many more years of life lost. Rather than estimating the societal loss of all infant deaths that occur, we estimated societal loss of infant deaths above the Healthy North Carolina 2030 goal rate of 6 deaths per 1,000 live births.[35] On average, North Carolina experiences an estimated 803 infant deaths per year under current conditions, compared to about 735 if the state reached this goal, a difference of roughly 67 infant deaths avoided each year. By applying the 2024 U.S. Department of Transportation's Value of a Statistical Life[36], **we estimate the societal loss from these potentially avoidable infant deaths to be $921.8 million annually.**

Because this measure is typically based on studies of working-age adults, and research suggests that society often places a higher value on preventing a child's death[37], the societal loss associated with infant death may be higher than our primary estimate. To address this, we also calculated a range: if infant deaths are valued at 1.5 to 2.9 times the standard value, the annual societal loss would rise to between $1.38 billion and $2.67 billion.

Infant mortality

67

infant deaths avoided annually

if North Carolina reaches Healthy NC 2030's goal infant mortality rate of 6 deaths per 1,000 live births

The societal loss associated with these avoidable deaths is **over $921 million a year.**

SUMMARY AND FUTURE DIRECTIONS

Our findings make clear that adverse maternal and infant health outcomes carry a substantial and ongoing cost to North Carolina, not just in the loss experienced by families, but in dollars borne by insurers, employers, and the state as a whole.

Combining average annual excess medical costs from preterm birth and low birth weight, non-medical costs from out-of-county prenatal care and deliveries, and workplace costs tied to preterm birth, the total economic burden in North Carolina amounts to an estimated $1.03 billion annually.

The good news is that it doesn't have to be this way. The majority of these poor outcomes are preventable; the potential for cost savings is substantial, and the opportunities for intervention are plentiful. There is near-universal support for improving maternal health and birth outcomes, and the size of the economic costs and societal loss of adverse birth outcomes described in this report suggests the time is ripe to advance comprehensive supports for families.

Momentum and initial investment in evidence-based strategies to improve maternal and infant health are already underway, and North Carolina can build on them, including expanding the midwife and doula workforce, launching innovative ways to deliver maternal care in rural areas, and optimizing policies to meet people's basic needs. Further investment can accelerate these efforts, as well as other initiatives.

This report, which quantifies the economic burden of adverse maternal and infant health outcomes and offers direction for investment, is phase 1 of ongoing economic analyses. Future investments in maternal and infant health must be strategic. Phase 2 will provide analyses on the economic return of promising identified interventions to improve maternal health and birth outcomes in North Carolina. These analyses will further inform the business case for maternal and infant health and help guide those future strategic investments.

This report's findings point to a clear conclusion: North Carolina's maternal and infant health crisis is not just a health issue, but an economic one. Healthier families and babies are not just a moral imperative. They are among the most concrete and cost-effective investments North Carolina can make in its people, workforce, and its future.





METHODOLOGY APPENDIX

This analysis estimates the economic burden of select adverse maternal and infant health outcomes in North Carolina across three categories: direct medical costs, non-medical costs, and workforce/productivity costs. Below, we describe the data sources, calculations, and key assumptions underlying each estimate, along with limitations relevant to interpreting the results.

MEDICAL COSTS

We estimated excess healthcare spending associated with preterm birth and low birth weight using per-infant spending estimates from Beam et al., a retrospective cohort study of approximately 763,000 commercially insured infants nationwide (Aetna claims data, 2008–2016), reporting healthcare expenditures over the first 6 months of life by gestational age and birth weight bands.[25]

We classified North Carolina births from 2021-2024 into gestational age and birth weight bands using state vital statistics data, then applied Beam et al.'s band-specific spending estimates. Because preterm birth and low birth weight frequently co-occur in the same infants, each infant was assigned to a single, higher-cost category to avoid double-counting excess costs across both classifications. For each birth year, we calculated excess spending as total spending for infants born preterm or low birth weight, minus total spending for all other infants, then averaged the four years. All spending estimates from Beam et al. were reported in 2016 USD and have been adjusted for inflation in this report to 2024 USD. To estimate savings under the March of Dimes goal of a 5.5% preterm birth rate[26], we reduced the number of infants assigned to the preterm category and to the low birth weight category each to 5.5% of births and recalculated excess spending for each year. Savings are the difference between baseline and scenario excess spending in 2024 USD, averaged across the four years; savings per averted case divides total savings by the number of preterm and low birth weight births averted.

Key limitations: Beam et al.'s estimates are drawn from a commercially insured population. In North Carolina, Medicaid covers approximately 49% of live births[38], and this analysis does not independently verify that national commercial-claims estimates generalize to North Carolina's payer mix. However, research indicates that the hospital costs for Medicaid and private insurers are comparable in magnitude even if reimbursement levels vary.[39] While the exact numbers we report (based on Beam et al.'s estimates) do not directly represent spending on Medicaid-covered births, the assumptions that earlier gestational age and lower birth weight are associated with increased spending remain consistent across insurers. In addition, per-infant spending in the underlying data is highly right-skewed; a small number of extremely preterm, high-cost cases pull the mean well above the median, so aggregate cost estimates should not be read as representative of a "typical" preterm or low birth weight case. Beam et al.'s methodology also assumes no additional healthcare spending for births beyond full term (e.g., late-term or post-term births); this analysis relies on the same assumption, which may or may not hold in practice. Lastly, the savings scenario applies the March of Dimes goal for preterm birth to low birth weight births as well, and assumes the reduction is proportional across all gestational and birth weight bands.

NON-MEDICAL COSTS

We estimated the frequency and cost of birth-related travel using North Carolina 2021-2024 vital statistics data to identify births where the mother's county of residence differed from the county of birth. We calculated driving distance and time between residence and birth county centroids using the Open Source Routing Machine (OSRM). We then applied the IRS standard mileage rate and Bureau of Labor Statistics state-level average hourly wage data (Table 2) to value round trip transportation and wage losses. These costs were scaled using prenatal visit counts from North Carolina vital statistics data and aggregated across the full course of prenatal care and delivery. Because this estimate uses year-specific IRS mileage rates and BLS wage data, dollar figures reflect values for each respective year in our analysis window (2021-2024), rather than a single common dollar-year.

Table 2. Average Hourly Wage and IRS Mileage Rate by Year

Year	North Carolina Average Hourly Wage ($)	IRS Standard Mileage Rate ($/mile)
2021	25.53	0.560
2022	27.03	0.605
2023	28.71	0.655
2024	30.02	0.670



Key limitations: County-level travel status is a proxy for actual burden as some in-county births still involve substantial travel in large or rural counties, and some out-of-county births reflect only short trips across county lines. Our data are also limited to births occurring within North Carolina. Some North Carolina residents living near the state border may choose to deliver in neighboring states such as Virginia or South Carolina, particularly if a closer facility is located just across the border. These out-of-state births would not appear in our data, potentially undercounting both the frequency and distance of birth-related travel for residents of North Carolina's border counties. Additionally, OSRM computes routes using a fixed snapshot of OpenStreetMap road-network data. Because OpenStreetMap is continuously and independently edited, distance estimates can differ modestly depending on the date the underlying data was retrieved. Finally, vital statistics data does not indicate what share of prenatal appointments for families delivering out-of-county actually occur in the delivery county itself. Some appointments are likely closer to home even when delivery is not – for example, through telehealth visits, local health departments, or through local providers who offer prenatal care but do not have a local delivery facility.[40] We suggest 25% of prenatal care appointments occurring at the delivery facility as a plausible benchmark, since prenatal imaging appointments in particular may be more likely to occur at the delivery facility. To address this uncertainty, we present a sensitivity analysis below (Table 3) applying a range of potential scenarios for the share of prenatal appointments assumed to occur in the delivery county.

Table 3. Sensitivity of Non-Medical Costs to the Assumed Share of Out-of-County Prenatal Visits, 2021-2024

Assumed Share of Prenatal Visits Occurring Out of County	Average Cost per Birth	Average Annual Total Cost
0%	$125	$5,824,093
25%	$488	$22,497,518
50%	$850	$39,170,944
75%	$1,212	$55,844,370
100%	$1,574	$72,517,796

WORKFORCE COSTS

Preterm birth-related productivity loss. This finding is grounded in a retrospective cohort study of MarketScan Commercial Claims and Health and Productivity Management data for individuals aged 18-55 with an inpatient delivery (2016-2021), which found that mothers of preterm infants lost an average of 7 additional workdays and incurred $1,666 in indirect costs to employers (related to medical absenteeism and disability, see Table 4) in the year following birth, relative to full-term births.[30] All cost estimates from Patel et al. were reported in 2021 USD and have been adjusted for inflation in this report to 2024 USD. We applied these per-case estimates to state-level preterm birth counts from 2021-2024 and calculated annual averages.

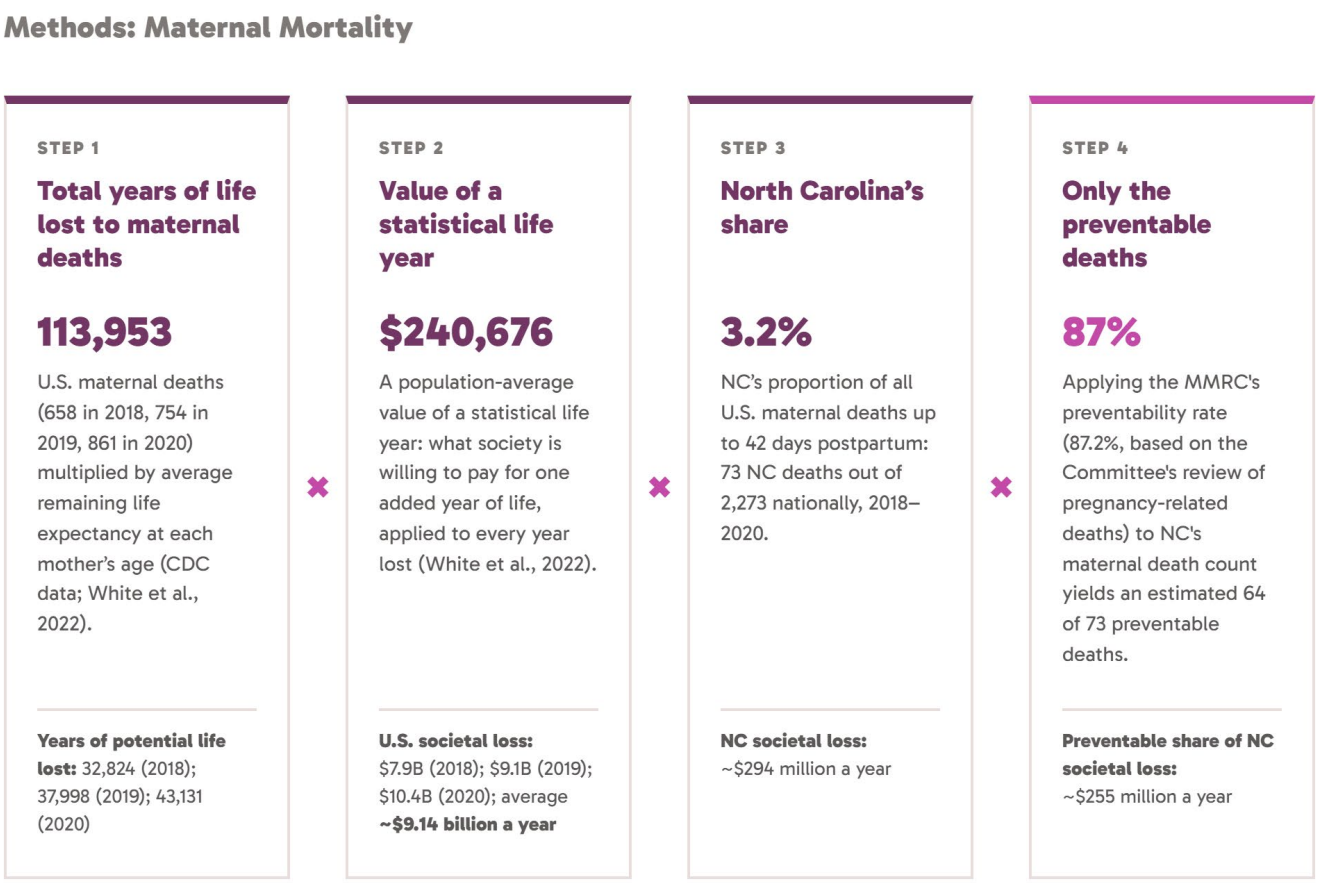
Key limitations: As with the medical cost estimates, the underlying Patel et al. study population is limited to individuals with employer-sponsored commercial insurance. Medicaid-covered births, which represent roughly 49% of North Carolina births, are not represented.[38] Because low-wage workers are disproportionately represented among Medicaid enrollees and are also less likely to have access to paid leave or flexible work arrangements, the true productivity and absenteeism burden for this population may differ in ways this analysis cannot capture. Additionally, this estimate only represents productivity loss for the person who gave birth; fathers, partners, or other caregivers who may also miss work due to a preterm birth are not reflected in this figure. Finally, this figure reflects the cost from the employer perspective (lost productivity), not out-of-pocket family costs, and should not be interpreted as lost wages to families.

Table 4. Definitions and Estimated Costs of Workplace Productivity Loss Associated with Preterm Birth[30]

Outcome	Definition	Additional Workdays Lost (Preterm vs. Full-Term)	Additional Productivity Cost (Preterm vs. Full-Term), adjusted to 2024 $
Medical-related absenteeism	Missed work time associated with medical care and recovery following delivery	4.2 days	$1,187
Disability	Missed workdays associated with a short- or long-term disability claim	2.8 days	$479

SOCIETAL LOSS FROM MATERNAL AND INFANT MORTALITY

Maternal mortality. We estimated the societal loss associated with maternal mortality using White et al.'s (2022) analysis of maternal deaths nationally, which calculated the value of years of life lost by multiplying a population-average value of a statistical life year ($240,676; non-specified dollar year) by years of life lost to early death, based on 2018-2020 CDC mortality data.[34] We estimated North Carolina's share of this value by applying the state's proportion of total U.S. maternal deaths (up to 42 days postpartum) in each year. We then applied North Carolina's Maternal Mortality Review Committee's finding that 87% of pregnancy-related deaths in North Carolina from 2018-2020 were preventable, to estimate the portion of this value specifically associated with potentially preventable maternal deaths.[33]



Key limitations: Maternal mortality statistics based on vital records are subject to known undercounting and misclassification in part because it can be difficult to attribute a death during the perinatal period to a pregnancy-related cause.[2,41] Apportioning national totals by North Carolina's share of deaths assumes North Carolina deaths are, on average, economically comparable to the national average; it does not account for state-specific differences in life expectancy or earnings. Additionally, the 87% preventability rate reflects North Carolina's Maternal Mortality Review Committee's assessment of pregnancy-related deaths (occurring up to 1 year postpartum). We applied this rate to the maternal death count (occurring up to 42 days postpartum) used in our societal loss calculation, consistent with White et al.'s (2022) case definition.[34] Because these two death classifications differ in scope, applying the

pregnancy-related preventability rate to the narrower maternal death count is an approximation; a preventability rate specific to the 42-day maternal death definition is not available. Lastly, North Carolina's Maternal Mortality Review Committee has since released a report that includes pregnancy-related deaths through 2021, but we did not incorporate its findings because the national estimate we apportion[34] covers maternal deaths from 2018 to 2020. North Carolina recorded 53 maternal deaths in 2021 and 33 maternal deaths in 2022 according to national vital statistics data, compared with an average of 24 per year in the years we analyzed (2018 to 2020). Because our estimate reflects the 2018 to 2020 deaths, it likely understates the value for more recent years.

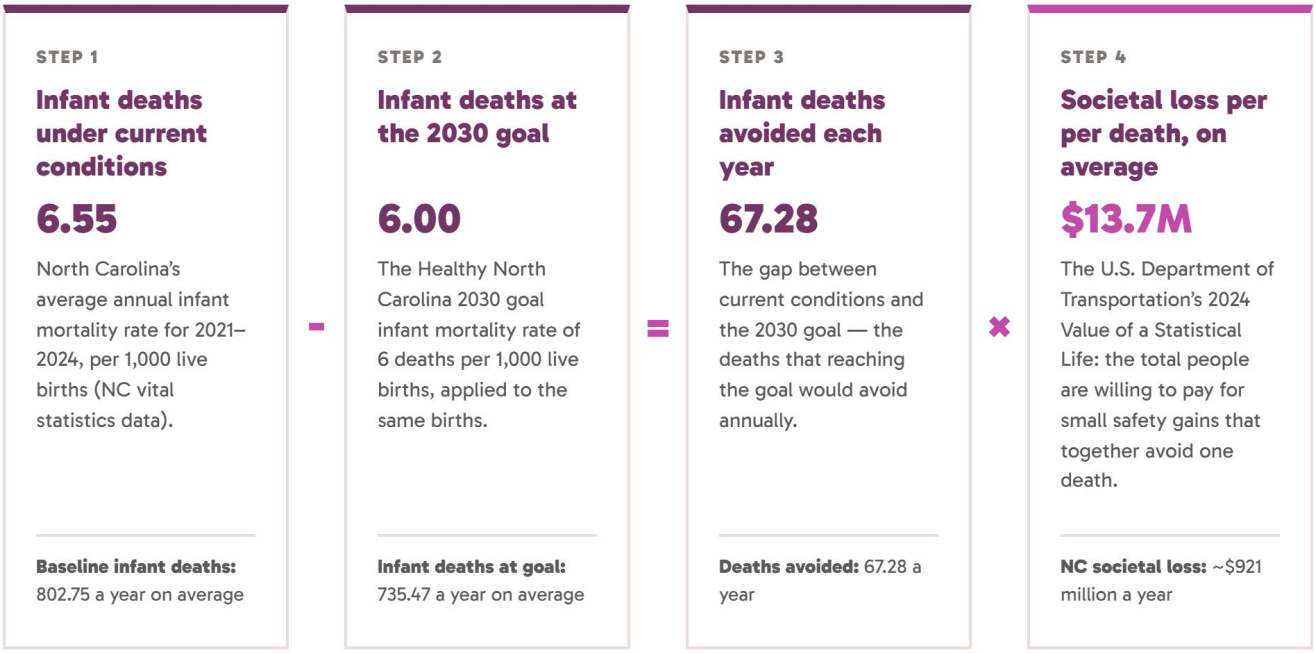
Infant mortality. We estimated the societal loss associated with potentially avoidable infant mortality in North Carolina by first calculating an average annual infant mortality rate for 2021-2024 (6.55 per 1,000 live births) using North Carolina vital statistics data. We then compared average annual infant deaths under baseline conditions (803) to average annual infant deaths under the Healthy North Carolina 2030 goal infant mortality rate of 6 deaths per 1,000 live births (735), yielding an estimated 67 infant deaths avoided annually. We valued these avoided deaths using the U.S. Department of Transportation's 2024 Value of a Statistical Life (VSL; $13.7 million). Because the Department of Transportation's VSL estimates are derived primarily from studies of working-age adults, we also applied Robinson et al.'s guidance[37] suggesting that most child-specific VSL estimates run at least 1.5 times higher than the adult figure, with some up to 2.9 times as high. We provide a sensitivity range alongside our primary estimate in Table 5.

Table 5. Societal Loss from Infant Mortality Under Alternative VSL Multipliers

Child VSL Multiplier	Adjusted VSL	Infant Deaths Avoided Annually	Annual Societal Loss
1.0x (adult VSL, primary estimate)	$13,700,000	67	$921,783,950
1.5x	$20,550,000	67	$1,382,675,925
2.0x	$27,400,000	67	$1,843,567,900
2.9x	$39,730,000	67	$2,673,173,455

Key limitations: The VSL estimate reflects the economic value of avoided deaths under a specific target scenario (i.e., the Healthy North Carolina 2030 goal rate), not the total value of all infant deaths currently occurring in North Carolina. The child-to-adult VSL multiplier is not well established, and our use of these multipliers should be treated as a sensitivity range rather than a precise estimate. Additionally, this approach does not adjust for life expectancy or discount outcomes in future years, and reflects a national, population-average VSL rather than one specific to North Carolina's population or income levels.

Methods: Infant Mortality



TOTAL ECONOMIC BURDEN

To estimate North Carolina's total annual economic burden from adverse maternal and infant health outcomes, we summed the estimates across all three categories: excess medical spending, non-medical/travel costs, and workforce productivity losses. Non-medical/travel costs are reported in each year's nominal dollars (2021–2024); medical and workforce costs are adjusted to 2024 dollars. Because the non-medical/travel estimate is not adjusted for inflation, the combined total likely understates the true burden if expressed entirely in 2024 dollars.



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