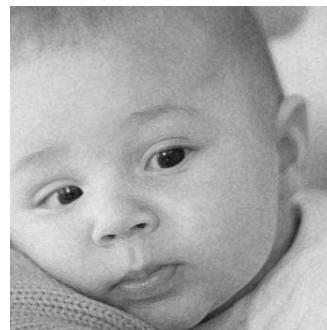


Bringing The Issues Home

Janice A. Freedman, MPH
Executive Director, North Carolina Healthy Start Foundation



North Carolina Infant Mortality

North Carolina has made tremendous progress over the last 15 years in reducing the rate of babies who die in their first year of life. The current (2002) state rate of 8.2 deaths per 1,000 live births is a historic low. However, the primary causes of infant mortality today—preterm and low birthweight births—are still somewhat of a mystery. While the rate of babies dying is decreasing, the rate of those born too early or too small is increasing.

It is possible to list the significant risk factors for preterm birth and low birthweight. However, it is more difficult to identify the women who will give birth too early for their babies to be healthy. But that doesn't mean that nothing is being done or that we can't do anything. In fact, much is being done, yet at the same time people are often isolated from knowing what is being accomplished in other parts of the state. Hence, this report.

The goals of this report are to:

- Showcase some of the local successes and range of creativity of community-based and hospital-based programs in North Carolina along with the lessons learned from the Foundation's Community Grants Program
- Provide new and updated information related to prematurity and low birthweight
- Foster communication between the many individuals and organizations who are dedicated to improving the birth outcomes of babies born in our state
- Offer ideas about direction for future work of the North Carolina Healthy Start Foundation and other public-private partners who support community-based initiatives focused on improving perinatal health

Improving the Health and Well-being of Our Mothers and Babies

The North Carolina Healthy Start Foundation is a private non-profit agency which has been nationally recognized for its efforts to reduce infant death and illness and to improve the health of young children in North Carolina. Established in 1990, the Foundation coordinated the activities of the Governor's Commission on Reduction of Infant Mortality until it ended in 1995. It currently conducts statewide bilingual, public education campaigns and advises state and local policy makers. Until 2002, the Foundation funded an innovative Community Grants Program, awarding nearly \$4 million to public and private agencies the majority of counties.

Since the end of the governor's commission, communication between and coordination of the myriad of activities at the state, regional, or local level has been inconsistent. We believe, however, that there is wonderful work going on at the community level that is too valuable to remain a secret.

This report includes highlights from a May 2003 summit on prematurity and low birthweight, "Bringing The Issues Home," presented by the North Carolina Healthy Start Foundation. Funding for the summit was provided by the North Carolina Department of Health and Human Services, Division of Public Health, Women's and Children's Health Section and the North Carolina Area Health Education Center.

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N.C. Prematurity And Low Birthweight

Paul A. Buescher, PhD

Head, Statistical Services Unit, State Center for Health Statistics – North Carolina



**North Carolina
Infant Mortality**

In 1988, North Carolina had nearly the highest infant mortality rate in the country. Since then the rate has declined by more than a third and now stands at the lowest level to date. Several public health efforts have contributed to this reduction, such as: expansion of Medicaid eligibility for pregnant women (Baby Love Program) to 185% of federal poverty level and case management services related to it; the Governor's Commission on Reduction of Infant Mortality; the Back to Sleep campaign; and teenage pregnancy prevention and smoking cessation programs. Certainly there have been important medical advances too that have changed birth outcomes such as surfactant and surgical treatment for congenital heart disease.

Patterns

From 1988 to 2001, there has been a steady decline in infant mortality for both whites and blacks. Concomitant to this decline have been other reductions. The percentage of births to women with late or no prenatal care has declined, especially for black women. Also the adolescent pregnancy rate has declined (15- to 17-year-olds account for 4% of all pregnancies). At the same time the percent of women who smoke during pregnancy has decreased. This is one risk behavior where black women do better than white women—because the smoking rate among black women is substantially lower.

If we look at the percentage of deaths by age of death, nearly half of infant deaths occur in the first day of life. Many of these babies are extremely premature. In fact births less than 500 grams account for nearly one-third of all infant deaths (approximately 300 per year in North Carolina). If you look at the infant mortality rate, nearly three-fourths of the deaths occur in the first 28 days.

The major determinants of infant mortality rate include preterm birth/low birthweight (50%), birth defects (33%) and birthweight-specific mortality rates (the rate at which babies born at different birthweights survive). The total impact of low birthweight is even higher than the above rate because some of the babies with birth defects were also low birthweight.

Trends in Low Birthweight

As infant mortality has gone down, prematurity and low birthweight have gone up. Reporting of birthweight on birth certificates is nearly 100% reliable; however, reporting of gestational age (prematurity) is less so.

Approximately 9% of live births are under 2,500 grams (approximately 5.5 pounds) and around 14% are less than 36 completed weeks of gestation. Of the babies born less than 2,500 grams, approximately 70% were also preterm. Since 1988, there has been a steady increase in low birthweight rates. The rate of increase is even greater for births less than 1,500 grams (about 3 pounds 5 ounces). The percentage of live births less than 500 grams (accounts for nearly a third of infant deaths) is also increasing significantly.

Since 1988 we also have observed a strong upward trend in rate of multiple births. This is associated with assisted reproductive technologies and other factors. The rate of multiple

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births has increased overall from 2.5% to nearly 3.5% of all births. We do know that more than half of all multiple births are low birthweight, which has a strong impact on low birthweight rates.

Another factor why low birthweight rates have increased while infant mortality rates have decreased is the survival of babies at different birthweights. Linking live birth and infant death certificates to measure birthweight-specific mortality allows an analysis of infant death according to birthweight and maternal characteristics (prenatal care, education, etc.). Since 1988, there has been a large improvement across almost the entire birthweight spectrum in the percentage of babies who have survived at each birthweight. This is a major factor in the overall decrease in infant mortality.

Contributing Factors

Looking beyond prenatal care some of the contributing factors to low birthweight are:

- Multiple births
- Maternal diseases
- Poor nutrition
- Infectious disease
- Smoking
- Drug use
- Environmental factors

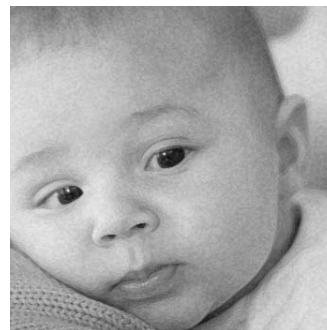
Summary

- North Carolina's infant mortality rate has continued to decline despite an increasing rate of low birthweight babies
- Preterm delivery is the major cause of low birthweight
- Low birthweight is a significant cause of infant mortality and infant morbidity
- An increasing multiples birth rate has strongly contributed to the increase in low birthweight
- Preventing low birthweight requires going beyond just health care interventions during pregnancy
- Prenatal care is not the cure-all for these problems, although it is very important

Preterm Birth Prevention Strategies

Kevin Ryan, MD, MPH

Chief, Women's and Children's Health Section, N.C. Division of Public Health



**North Carolina
Infant Mortality**

What causes preterm birth? We really do not have a very good sense of this. The *New York Times* recently asked a leading researcher why research into prevention of premature births has been so disappointing. His reply was that if he knew the answer, “we would be having this Q-and-A in Stockholm and I would be about to pick up the big prize.”

In the absence of a cohesive theory of the causes of poor birth outcomes, researchers have looked empirically for effective interventions. In the late '80s some thought if we were able to get all women into early prenatal care we could make the problem go away. While we have been successful in getting more women into prenatal care early, that has not been “the” inoculation. It was not the payoff some proponents thought it would be.

There have been a lot of medical interventions in the last decade or two. Bed rest, hospitalization, home uterine monitoring, drugs to stop preterm labor, bacterial vaginosis treatment—and they have all been disappointing. None of our efforts have been the magic bullet. It is fair to say that when it comes to what causes preterm births ... we have more questions than answers.

The problem of poor birth outcomes is complex and multifaceted. Addressing it requires a multifaceted approach. There are important global approaches, targeted approaches, clinical approaches and community approaches. There are primary prevention strategies and secondary strategies to mitigate the harm that results from a preterm birth. And there are preconceptional and post-conceptional approaches. What we can say is that we all own the problem.

Global Interventions

• Preconceptional Health

The most important prenatal visit may be the one that doesn't happen. This is the time before a woman gets pregnant when she should question “What can I do to improve my health and have the best opportunity for a good birth outcome?” Important preconceptional health issues are:

- General health issues: good diet, fitness, no smoking, no drug use
- Optimal chronic disease control: diabetes, hypertension, etc.
- Folic acid, folic acid, folic acid (once for each form ... natural, fortified and multivitamin)

• Lifelong Healthy Behaviors

- Good nutrition as a child
- Good access to preventive health care
- Physical fitness
- No smoking
- No substance abuse
- Good nutrition

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• Family Planning

Perhaps our most effective direct strategy to prevent preterm birth is to reduce unintended pregnancies and the poor birth outcomes associated with them. The goal is to empower people to have pregnancies when they want them—i.e., when they feel physically, economically and socially prepared to bring a child into the world. In North Carolina the most important family planning issue right now is the state's application to the federal Medicaid agency for a family planning waiver. We are proposing to increase the eligibility level for family planning services to 185% of federal poverty level, just like it is for pregnant women and infants. We need to get that waiver and implement the opportunities it would afford us.

We also need to think a little differently about family planning services. Too often when we provide clinical family planning services we think of it as a clinical encounter, but we really need to recognize that the goal is to prevent an unintended pregnancy. For women who are at a high risk for contraceptive failure we need to customize our approach to ensure they are empowered to avoid an unintended pregnancy.

Targeted Interventions

• Smoking Prevention and Cessation

These are almost certainly the most powerful interventions to prevent preterm low birthweight.

• Alcohol and Substance Abuse Prevention/Cessation

It is not clear how much of increased risk is due to the actual substance and how much is due to other adverse socioeconomic factors often associated with substance abuse.

• Prenatal Care

Although early entry into prenatal care has not proven to be the “magic bullet” some were hoping it would be, optimal prenatal care does play an important role in helping each woman maximize her chance of a good pregnancy outcome.

• Risk-Appropriate Intrapartum Care

We know that very low birthweight babies do considerably better if they are born at tertiary care centers. North Carolina has traditionally been pretty successful in working out this problem of regionalized referral.

• Multiple Pregnancies

North Carolina is experiencing increasing numbers of multiple pregnancies and they contribute to the state's increasing prematurity and low birthweight rates. At least half of all twins will be born early and small; for higher-order multiple pregnancies, in excess of 90% will be premature.

The Future

There are many questions we need to ask and research further, including:

- What roles might stress/racism/anxiety/depression play?
- How can communities support healthy pregnancies?
- What role does genital tract infection play?
- What role might inflammation play?

North Carolina leads the way in very important emerging research. In a study described as “groundbreaking,” Dr. Paul Meis of Wake Forest University Baptist Medical Center has reported on the results of a multi-center study supported by the National Institutes of Health. The study showed that weekly injections of a form of progesterone reduced the chance of preterm births by 34% in 306 high-risk women. The trial was stopped early because of the pronounced positive effect of the intervention. The study is currently awaiting publication. Discussions are already active among practitioners about how best to implement the study's findings.

The problem of prematurity and low birthweight has been a very difficult one to address, for North Carolina and for the nation as a whole. It is important that we come together to meet like this, to review the evidence, consider our opportunities and renew our efforts. Although there is much we do not know, it is clear that there is much we know to do. For those of us who feel that a good birth outcome is the best foundation for a healthy childhood and that good health in childhood supports academic achievement in school, economic prosperity in the job market and good health throughout life, it is critical that we continue to work to address this issue.

N.C. Infant Mortality At A Glance

North Carolina Healthy Start Foundation



North Carolina Infant Mortality

1. Infant mortality has decreased 35% since 1988 when North Carolina had the nation's highest infant mortality rate (12.6 to 8.2/1,000)
2. Infant mortality rate is currently 8.2/1,000 live births (2002), the lowest in the state's history
 - 5.9/1,000 for white babies and 14.2/1,000 for other races
3. In 2000, the state spent \$27 million in Medicaid for the health care costs related to low birthweight babies in their first year of life
4. Leading causes of infant mortality:
 - Prematurity and low birthweight
 - Birth defects
 - SIDS (Sudden Infant Death Syndrome)
5. Risk factors and maternal characteristics of all births:
 - 8.9% of babies were born low birthweight or very low birthweight (7.3% white babies, 13.2% babies of other races)
 - 83.9% of all mothers began prenatal care in the first trimester (86.8% white women, 76.3% women of other races)
 - 14% of all mothers smoked during pregnancy (15% white women, 11.2% women of other races)
 - 23.1% of births were to women with less than a high school education (21.7% white women, 23.8% women of other races)
 - 4.2% of all births were to mothers less than 18 years old (3.2% white women, 7% women of other races)
6. 13 counties account for half of the state's infant deaths: Mecklenburg, Wake, Cumberland, Guilford, Forsyth, Pitt, Gaston, Onslow, Durham, Robeson, Buncombe, Randolph and Wayne

In 2000, the state spent \$27 million of its Medicaid budget for the health care costs related to low birthweight and babies in their first year of life.

The Prematurity Price Tag Beyond The Neonatal Intensive Care Unit

Families of premature and low birthweight babies may face many unexpected expenses once their babies come home. While every situation is unique, here is a list of possible expenses during a preemie's first year, regardless of who pays ... parent, private insurer, hospitals or state/federal government.

Home Nurse Visits\$660

(6 at \$110/visit) to help family adjust
when baby comes home

NICU Follow-up Assessments \$450

(3 at \$150/visit)

Early Intervention Visits \$2,400

(2/month at \$100/visit) medical and
developmental follow-up and to help
parents learn how to meet their
child's special needs, obtain and
coordinate services

Physical Therapy \$3,600

(2/month at \$150/visit) assists
with rolling, sitting, crawling,
developmental milestones, body
positioning

Speech Therapy \$1,800

(1/month at \$150/visit) assists with
oral, feeding and swallowing
concerns, language development

Occupational Therapy\$3,600

(2/month at \$150/visit) facilitates eye
contact, adaptations to sitting
devices, upper extremity control

Doctor Visits \$5,200

(weekly at \$100/visit)

Ophthalmologist\$200

(2 visits at \$100/visit)

Travel to Appointments\$1,598

30 miles/visit (148 trips) at \$.36/mile

Lost Income\$24,840

Teacher with BA and 5 years
experience less childcare costs

Hospital-grade Breast Pump \$360

(6 months at \$60/month)

Nebulizer\$200

Pulse Oximeter\$2,700

(6 months at \$450/month)

Oxygen\$3,000

(6 months at \$500/month)
home and portable

Apnea Monitor\$4,500

(12 months at \$375/month)

Synagis®\$6,300

vaccine for RSV protection
(\$600-\$2,000 per shot)
based on weight (Oct-April only)

Special Formula\$1,350

(9 months at \$150/month)

Preemie Diapers\$104

14¢ more than newborn
(8/day for 3 months)

Preemie Car Seat Insert\$30

Preemie Clothes\$200

TOTAL \$63,092

Not Included

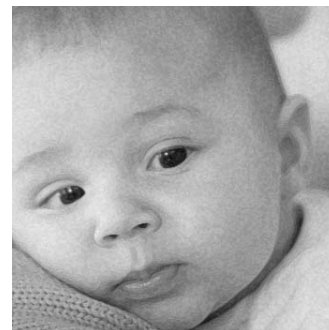
Hospitalization? Surgery? Prescriptions?
Emotional drain? Fatigue? Impact on other kids?
Special education?

2003 North Carolina Healthy Start Foundation

Medicaid Costs Associated With Low Birthweight

Paul A. Buescher, PhD

Head, Statistical Services Unit, State Center for Health Statistics - North Carolina



North Carolina Infant Mortality

The number of children born at low weight is a serious and increasing problem in North Carolina. Despite the fact that the infant mortality rate fell by 20% between 1990 and 2001, the percentage of live-born children who weighed less than 2,500 grams increased by 13% (from 8% to 9% of live births). Most low-weight births occur because of preterm delivery. The percentage of low-weight births resulting from deliveries of more than a single child has been increasing and is now more than 23%.

The costs of health care for low-weight infants are substantial. We cannot measure the amount directly from birth records, because they provide no cost information. But by linking birth certificates to Medicaid-paid claims records, the State Center for Health Statistics has been able to relate low birthweight to Medicaid expenditures. Each birth certificate is matched to Medicaid newborn hospitalization records to identify Medicaid births, and the Medicaid ID number is used to track expenditures for those infants up to one year of age. The following table presents results for live births in 2000.

One-year Medicaid Expenditures for Babies Born in 2000

Birthweight	Medicaid Births	Average Cost/Child	Total Medicaid Costs
< 1,500 grams (g)	1,043	\$59,017	\$61,555,215
1,500-2,499 g	4,106	\$9,037	\$37,107,568
>2,500 g	44,039	\$3,318	\$146,111,885
Total	49,188	\$4,976	\$244,774,668

More than 40% of the infants born to North Carolina residents in 2000 were to Medicaid recipients. The percentage of these infants weighing less than 2,500 grams at birth was 10.5% (5,149 babies), which is higher than the overall state average of 8.8%. The average Medicaid expenditure for children born weighing less than 1,500 grams is dramatically higher than for children born weighing more. Considering that approximately 25% of very low birthweight babies die as infants (most within the first week), the average expenditure would be higher still if only the survivors of infancy were considered.

These Medicaid statistics probably understate the true costs of low birthweight in North Carolina. Medicaid pays a smaller portion of the amount billed by providers than most other insurance carriers. Nevertheless, these data dramatically underscore the large health care expenditures associated with low birthweight in North Carolina, and emphasize the need to find effective ways to reduce low birthweight and preterm delivery.

Acknowledgment: This is a slightly modified version of an article published in the July/August 2001 issue of the "North Carolina Medical Journal," with the data updated here to the year 2000.

Considering that approximately 25% of very low birthweight babies die as infants, the average expenditure would be higher still if only the survivors of infancy were considered.

2000 Medicaid Costs - First Year of Life and Hospital Costs

Average Cost of 2000 N.C. Medicaid Births By Birthweight Group, Through 365 Days

Birthweight - grams	Number of Births	Average Cost	Total Cost	Birthweight - lbs/oz.
< 500 grams	87	\$27,048	\$2,353,181	< 1 lb 1 oz
500 - 1,499 grams	956	\$61,927	\$59,202,034	1 lb 1 oz - 3 lbs 5 oz
1,500 - 2,499 grams	4,106	\$9,037	\$37,107,568	3 lbs 5 oz - 5.5 lbs
2,500+ grams	44,039	\$3,318	\$146,111,885	> 5.5 lbs

Average Cost of 1999 N.C. Medicaid Births By Birthweight Group, Through 365 Days

Gestational Age	Number of Births	Average Cost	Total Cost	Maximum
< 25 weeks	179	\$51,075	\$9,142,432	\$297,256
25 - 26 weeks	194	\$70,148	\$13,608,745	\$439,546
27 - 29 weeks	382	\$54,487	\$20,813,942	\$886,871
30 - 32 weeks	723	\$22,783	\$16,472,311	\$273,555
33+ weeks	45,022	\$3,412	\$153,633,606	\$419,701
All Medicaid Births	46,500	\$4,494	\$213,671,036	—
Full Term Births Only 37-40 weeks	34,663	\$3,055	\$105,893,512	\$419,701

2000 Hospital Charges All Births in North Carolina Hospitals

	Number of Births	Percent of Births	Average Cost	Total Charges	Percent of Charges
Healthy Newborn	77,776	68%	\$825	64,177,950	15%
Sick Newborn	37,134	32%	\$9,460	351,282,448	85%

- The average hospital discharge costs for a sick baby is almost 12 times for that of a healthy newborn
- The average charge of an extremely immature newborn is 74 times that of a healthy newborn
- If these 37,134 sick babies had been born healthy it would have saved \$330,381,198 in hospital charges alone

Report updated by the N.C. Healthy Start Foundation, April 2003

Original report prepared by the State Center for Health Statistics and the UNC Cecil G. Sheps Center for Health Sciences Research, January 31, 2001