

1. Introduction/Rationale

Racial/ethnic disparities in infant mortality constitute a critical public health problem. North Carolina (NC) ranks 45th in the US, with 8.5 infant deaths per 1,000 live births compared to the current US rate of 6.6 per 1,000 live births. Among minorities in NC, the rate is even higher, 13.9 per 1,000 live births.

2. Purpose

This study seeks to examine predictors of neonatal and postneonatal mortality among infants born to black, white, and Hispanic women.

3. Methods

DATA
Data were obtained from the North Carolina linked birth/infant death files from 1999 to 2007.

OUTCOME VARIABLE

Infant death (0 and 364 days) was considered as neonatal mortality (0 - 27 days) or postneonatal mortality (28 – 364 days).

RACE/ETHNICITY

Maternal race/ethnicity was classified as non-Hispanic black, non-Hispanic white and Hispanic.

PREDICTORS

Maternal age, marital status, education tobacco use, parity, prenatal care, medical problems experienced during pregnancy, child's gender, gestational age, birth weight.

STATISTICAL ANALYSIS

Descriptive statistics and logistic regression models were constructed to estimate the effect of maternal and infant characteristics on infant mortality across the three racial/ethnic groups.

4. Results

Table 1. Adjusted Odds Ratios (95% CI) for Infant Mortality

	Neonatal Mortality (n = 4696)	Postneonatal Mortality (n = 2323)
Maternal Race/Ethnicity		
Hispanic	1.03 (0.96, 1.11)	1.26 (1.14, 1.39)
Hispanic	0.98 (0.88, 1.12)	0.67 (0.57, 0.79)
White	1.00	1.00
Maternal age, years		
18-24	0.94 (0.85, 1.05)	0.96 (0.81, 1.16)
25-34	1.00	1.00
35-44	0.94 (0.86, 1.01)	0.66 (0.59, 0.73)
45-54	0.65 (0.62, 1.09)	0.66 (0.56, 0.77)
Maternal Education, years		
<9	1.15 (0.96, 1.35)	1.73 (1.42, 2.11)
9-11	1.06 (1.01, 1.18)	1.61 (1.41, 1.83)
12	1.00 (1.01, 1.18)	1.18 (1.06, 1.33)
13-15	0.90 (0.7, 1.09)	0.68 (0.52, 0.89)
>15	0.90 (0.7, 1.09)	1.08 (0.99, 1.21)
Unmarried	1.00	1.00
Utilization of prenatal care		
Intermediate	1.02 (0.94, 1.11)	1.02 (1.01, 1.23)
Inadequate	1.43 (1.29, 1.58)	1.07 (1.03, 1.36)
Number of previous live births		
0	1.00	1.00
1-3	0.94 (0.87, 1.02)	1.44 (1.23, 1.67)
>3	1.05 (0.96, 1.15)	1.24 (0.98, 1.57)
Live births now dead		
1	1.35 (1.15, 1.57)	1.24 (0.98, 1.57)
2	1.05 (0.86, 1.28)	0.93 (0.72, 1.19)
Prior low birth weight or premature		
Infant	0.75 (0.63, 0.88)	0.93 (0.72, 1.19)
Arrested	0.94 (0.76, 1.16)	0.97 (0.76, 1.25)
Other medical problems	0.86 (0.61, 1.22)	0.86 (0.61, 1.15)
Labor and delivery complications	1.20 (1.13, 1.28)	1.13 (1.04, 1.24)
Male infant	1.21 (1.11, 1.34)	1.31 (1.20, 1.41)
Infant birth weight, grams		
Very low, <1500	66.74 (56.74, 78.51)	30.6 (18.57, 13.14)
Low, 1500 - 2499	6.32 (5.51, 7.25)	3.28 (2.88, 3.74)
Normal, 2500 - 4000	1.00	1.00
High, > 4000	0.56 (0.42, 0.76)	0.54 (0.42, 0.68)
Infant gestational age, weeks		
Very premature, < 33	3.74 (3.20, 4.37)	1.37 (1.12, 1.69)
Premature, 33-37	1.52 (1.32, 1.75)	1.26 (1.12, 1.43)
Term, 38-42	1.00	1.00
Postterm, > 42	0.73 (0.54, 1.14)	1.62 (0.79, 1.31)

Key Findings

- No significant racial/ethnic differences were found in neonatal mortality.
- Infants born to black mothers had an increased risk for postneonatal mortality.
- Infants born to Hispanic mothers were significantly less likely to die during the postneonatal period.

Increased risk for neonatal mortality was associated with

- inadequate prenatal care
- having experienced prior death of a living child
- labor and delivery complications
- VLBW and LBW infants and
- Early gestational age

Increased risk for postneonatal mortality was associated with

- lower educational levels
- intermediate and inadequate prenatal care
- tobacco use
- labor and delivery complications
- VLBW and LBW infants
- early gestational age

Table 2. Adjusted Odds Ratios (95% CI) for Neonatal Mortality by Maternal Race/Ethnicity

	Black	White	Hispanic
Maternal age, years			
<18	0.64 (0.76, 1.17)	0.99 (0.78, 1.26)	0.91 (0.60, 1.37)
18-24	0.98 (0.87, 1.11)	0.88 (0.79, 1.10)	0.86 (0.76, 1.21)
25-34	0.92 (0.77, 1.09)	0.94 (0.78, 1.10)	1.03 (0.72, 1.46)
>34	0.92 (0.77, 1.09)	0.94 (0.78, 1.10)	1.03 (0.72, 1.46)
Maternal education, years			
<9	1.06 (0.75, 1.51)	1.06 (0.78, 1.43)	1.17 (0.84, 1.64)
9-11	0.99 (0.85, 1.15)	1.10 (0.94, 1.29)	1.09 (0.77, 1.55)
12	1.04 (0.93, 1.16)	1.17 (1.04, 1.32)	0.98 (0.64, 1.39)
13-15	0.95 (0.73, 1.25)	0.87 (0.72, 1.06)	0.83 (0.42, 1.54)
>15	1.02 (0.91, 1.14)	1.07 (0.96, 1.21)	0.94 (0.77, 1.145)
Unmarried	1.00	1.00	1.00
Utilization of prenatal care			
Intermediate	1.04 (0.93, 1.17)	0.98 (0.86, 1.14)	1.00 (0.81, 1.25)
Inadequate	1.35 (1.17, 1.56)	1.06 (1.39, 1.86)	1.32 (0.71, 1.72)
Number of previous live births			
0	1.00	1.00	1.00
1-3	0.85 (0.76, 0.96)	1.01 (0.90, 1.14)	1.05 (0.83, 1.33)
>3	0.96 (0.85, 1.10)	1.15 (1.08, 1.32)	1.06 (0.82, 1.37)
Live births now dead			
1	1.18 (0.96, 1.46)	1.61 (1.24, 2.10)	1.51 (0.96, 2.40)
2	0.88 (0.76, 1.02)	0.92 (0.82, 1.04)	0.61 (0.23, 1.54)
Tobacco use			
Prior low birth weight or premature infant	0.78 (0.63, 0.99)	0.71 (0.52, 0.95)	0.73 (0.41, 1.32)
Arrested	0.96 (0.73, 1.31)	0.90 (0.63, 1.31)	0.89 (0.46, 1.74)
Other medical problems	0.91 (0.76, 1.35)	1.01 (0.90, 1.54)	0.81 (0.45, 1.02)
Labor and delivery complications	1.17 (1.05, 1.29)	1.27 (1.15, 1.41)	1.06 (0.87, 1.30)
Male	1.22 (1.1, 1.38)	1.21 (1.10, 1.41)	1.31 (1.21, 1.42)
Infant birth weight, grams			
Very low, <1500	73.52 (55.83, 98.87)	48.77 (39.4, 62.87)	13.24 (8.79, 20.45)
Low, 1500 - 2499	6.63 (4.41, 17.17)	5.72 (4.72, 6.93)	12.24 (8.66, 17.21)
Normal, 2500 - 4000	1.00	1.00	1.00
High, > 4000	0.79 (0.41, 1.55)	0.57 (0.41, 0.79)	0.21 (0.05, 0.86)
Infant gestational age, weeks			
Very premature, < 33	3.65 (2.81, 4.74)	4.19 (3.35, 5.27)	2.75 (1.94, 4.09)
Premature, 33-37	1.52 (1.07, 1.77)	1.19 (1.23, 1.86)	1.01 (0.76, 1.36)
Term, 38-42	1.00	1.00	1.00
Postterm, > 42	0.81 (0.39, 1.64)	0.63 (0.37, 1.06)	1.40 (0.65, 3.03)

Key Findings

- Infants born to white women were at higher risk for neonatal deaths if their mothers had only high school education, had more than 3 children and experienced a previous child loss.
- Inadequate prenatal care was associated with an increased risk for neonatal mortality across all three racial/ethnic groups.
- Labor and delivery complications increased the risk of neonatal deaths among black and white women.

Table 3. Adjusted Odds Ratios (95% CI) for Postneonatal Mortality by Maternal Race/Ethnicity

	Black	White	Hispanic
Maternal age, years			
<18	0.61 (0.60, 1.09)	1.07 (0.61, 1.43)	1.24 (0.73, 2.06)
18-24	0.88 (0.57, 0.81)	0.90 (0.52, 0.70)	0.88 (0.72, 1.34)
25-34	0.89 (0.53, 0.87)	0.92 (0.46, 0.77)	0.87 (0.51, 1.51)
>34	0.89 (0.53, 0.87)	0.92 (0.46, 0.77)	0.87 (0.51, 1.51)
Maternal education, years			
<9	1.86 (1.26, 2.77)	2.06 (1.52, 2.81)	1.60 (0.83, 2.77)
9-11	1.38 (1.14, 1.68)	1.84 (1.52, 2.22)	1.69 (0.97, 2.96)
12	0.99 (0.94, 1.18)	1.34 (1.14, 1.57)	1.34 (0.75, 2.37)
13-15	1.00	1.00	1.00
>15	0.78 (0.46, 1.24)	0.70 (0.50, 0.97)	0.39 (0.05, 3.01)
Unmarried	0.88 (0.75, 1.03)	1.26 (1.10, 1.45)	1.11 (0.85, 1.46)
Utilization of prenatal care			
Intermediate	1.00	1.00	1.00
Inadequate	0.91 (0.85, 1.16)	1.23 (1.06, 1.44)	1.18 (0.88, 1.56)
Number of previous live births			
0	1.00	1.00	1.00
1-3	1.32 (1.11, 1.56)	1.6 (1.38, 1.86)	1.21 (0.86, 1.69)
>3	1.54 (1.54, 2.19)	2.02 (1.72, 2.38)	1.36 (0.94, 1.95)
Live births now dead			
1	1.06 (0.75, 1.48)	1.67 (1.18, 2.36)	0.48 (0.15, 1.54)
2	1.61 (1.38, 1.95)	2.47 (1.28, 4.76)	1.12 (0.44, 2.81)
Tobacco use			
Prior low birth weight or premature infant	0.95 (0.61, 1.35)	0.88 (0.59, 1.34)	1.57 (0.85, 2.92)
Arrested	0.92 (0.64, 1.31)	0.88 (0.58, 1.34)	1.57 (0.85, 2.92)
Other medical problems	0.86 (0.55, 1.33)	1.18 (0.84, 1.68)	1.55 (0.78, 3.05)
Labor and delivery complications	1.07 (0.84, 1.24)	1.00 (0.87, 1.14)	0.91 (0.67, 1.22)
Male	1.22 (1.10, 1.41)	1.20 (1.11, 1.34)	1.11 (1.10, 1.45)
Infant birth weight, grams			
Very low, <1500	11.79 (8.59, 16.2)	8.16 (6.88, 11.31)	17.68 (8.87, 32.88)
Low, 1500 - 2499	2.95 (2.41, 3.61)	3.23 (2.73, 3.99)	4.97 (3.36, 7.36)
Normal, 2500 - 4000	1.00	1.00	1.00
High, > 4000	0.97 (0.65, 1.46)	0.96 (0.63, 0.63)	0.27 (0.11, 0.75)
Infant gestational age, weeks			
Very premature, < 33	1.14 (0.88, 1.64)	1.62 (1.19, 2.21)	1.16 (0.61, 2.24)
Premature, 33-37	1.34 (1.11, 1.60)	1.33 (1.11, 1.60)	1.38 (0.94, 2.04)
Term, 38-42	1.00	1.00	1.00
Postterm, > 42	0.92 (0.58, 1.44)	1.04 (0.74, 1.46)	1.14 (0.56, 2.39)

Key Findings

- Younger maternal age and lower educational levels were associated with postneonatal deaths for black and white women, but not Hispanic.
- A previous child loss, being unmarried and having labor/delivery complications increased the risk for postneonatal mortality only among white women.
- Intermediate and inadequate levels of prenatal care were associated with postneonatal deaths in white and Hispanic mothers, respectively.
- Infants born to smokers were more likely to die during the postneonatal period compared to those born to non-smokers.

5. Conclusions

Public health policies are needed that recognize these continuing racial/ethnic disparities and support research and practice aimed at the early initiation of prenatal care and access to risk-appropriate obstetric and neonatal services and intervention programs that support mothers of low birth weight and preterm infants throughout the first year of life.