

NORTH CAROLINA

PREGNANCY NUTRITION SURVEILLANCE SYSTEM



1999 ANNUAL REPORT

NORTH CAROLINA PREGNANCY NUTRITION SURVEILLANCE REPORT 1999

Department of Health and Human Services
Division of Public Health
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Nutrition Services Branch
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Raleigh, NC 27699-1914
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December 2001

400 copies of this public document were printed at a cost of \$680.80 or \$1.70 per copy.

This publication is printed on permanent, acid-free paper in compliance with the General Statutes of North Carolina, Chapter 125-11.13.

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Facts in Brief

This report describes the pregnancies of 55,463 low income women who delivered in North Carolina in 1999.

DEMOGRAPHIC BACKGROUND

- More than one-half of all women were unmarried.
- More than a third of the women had less than a high school education.
- The proportion of white women (46%) was lower and the proportion of black women (39%) was higher than the total population of NC women who gave birth in 1999 (71% and 25%, respectively).
- The percentage of pregnancies to Hispanic women in 1999 increased by 20% over 1998.

HEALTH CARE PROFILE

- The majority of women (78%) began prenatal care in the 1st trimester, but only 44% enrolled in WIC during the 1st trimester.
- Adolescents under 18 years of age had the lowest rates for entering prenatal care in the first trimester (68%), in comparison to women 25 years of age and older (83%).
- Hispanic women had the highest rates of inadequate prenatal care (23%), in comparison to white, non-Hispanic women who had the lowest (9%).
- Asian/Pacific Islander adolescents under 18 years of age had the highest rates of inadequate prenatal care (32%) in comparison to white, non-Hispanic adolescents, who had the lowest (13%).
- Among women who had a previous birth, more than 63% of the adolescent women became pregnant within 12 months of the previous delivery, in comparison to all other women (27%).

HEALTH AND NUTRITION BEHAVIORS PROFILE

- White, non-Hispanic adolescents under 18 years of age were nearly five times more likely to smoke cigarettes during their pregnancies than black adolescents (36% vs. 8%).
- The prevalence rates of smoking during pregnancy were higher among Whites (37%) and Native Americans (31%) and lowest among Hispanics (3%) and Asians (5%).
- Nearly 48% of women were overweight or obese (BMI \geq 25) prior to pregnancy, with women 35 years of age or older having the highest prevalence (59%).
- More than one-third of women aged 30 and older were obese (BMI \geq 30) prior to pregnancy.
- Black women had a prevalence rate of low hemoglobin/hematocrit (19%) nearly three times as high as that for white women (7%).
- Almost one-half of the women participating in WIC initiated breastfeeding (47%) in 1999. The highest breastfeeding rate was among the Hispanic women (74%).

Introduction

Nutrition surveillance data is useful for describing the needs or problems of the target population. Surveillance data, because it is collected continuously in the same format, is particularly useful for outcome evaluation. This North Carolina Pregnancy Nutrition Surveillance System (NC-PNSS) report provides data on maternal nutrition, access to health care, pregnancy history, and pregnancy outcome for about 55,000 low-income North Carolina women who delivered their babies during calendar year 1999. The majority of these women participated in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) during either the prenatal or postpartum period. WIC targets low-income women who are at nutritional risk for poor pregnancy outcome and provides supplemental food, nutrition education, and referrals to health and social services programs.

Data Source: Data for the NC-PNSS is collected through three different sources:

1. **WIC automated data processing system.** WIC program data are collected by the WIC agencies located both inside and outside the health departments. The WIC program is funded by the United States Department of Agriculture to the State of North Carolina and the Eastern Band of Cherokee Indians.
2. **Health Services Information System (HSIS).** HSIS provides data from public maternal health clinics. The data on maternal health and pregnancy outcomes are collected at the health department prenatal clinics funded by the Maternal and Child Health Services Block Grant to the State of North Carolina and the Eastern Band of Cherokee Indians. Women in these programs have a family income at or below 185% of the federal poverty level.
3. **Infant birth certificates and fetal death report.** The Vital Records Branch of the State Center for Health Statistics receives and processes current reports of births and deaths. The hospital administrator or person attending a non-hospital delivery is required to file a birth certificate or fetal death report within 10 days after delivery.

North Carolina law requires the filing of a fetal death report for fetal deaths (stillbirths) of 20 or more weeks gestation.

Data Linkage: Records from the WIC and Maternal Health/Pregnancy Outcome program are matched with the live birth and fetal death records and compiled into the NC-PNSS data base containing prenatal and postpartum information on these women and pregnancy outcome information on their infants. The NC-PNSS data base provides prenatal nutritional/health indicators and infant outcomes for each woman.

Contents of the PNSS Report: The NC-PNSS report presents 1999 data on women participating in WIC and health department prenatal clinics. Data are presented for maternal demographic characteristics including age, live-birth order, race, Hispanic origin, marital status, and educational attainment. The report also describes the prevalence of nutrition status and behaviors, access to health care, the women's prenatal care utilization, and their pregnancy outcomes, and infant characteristics (period of gestation, birthweight, multiple births, and breastfeeding). Selected data by mother's county of residence are shown. Interpretation and discussion of the findings are included in the text of the report.

Using the Report and Data: While interpreting the data, caution should be applied when using percentages or rates with fewer than 20 events in the numerator because rates computed from low numbers are subject to serious random error. Similarly, interpreting data with fewer than 100 records in any particular county should be done with caution. If any of the health indicators had missing values, they were excluded before calculating the prevalence or rates.

If data described in this report are compared to preceding year's reports the following changes need to be taken into consideration:

- ◆ The 1999 report has been redesigned to include all the North Carolina county data in a single report. Unlike the preceding year's report, the county-specific data are presented in tabular format for each demographic and pregnancy outcome indicator.

- ◆ WIC currently uses pregravid weight status to determine the appropriate grid for weight gain chart for plotting prenatal weight gain. For the purpose of this report only, weights and heights from the WIC data system were used to calculate each woman's prepregnancy body mass index (BMI). BMI ranges are based on the effect body weight has on disease and death. BMI values for adults are interpreted with one fixed number, regardless of age, using the new clinical guidelines of underweight, normal, overweight, or obese.
- ◆ The new prepregnancy BMI cutoffs and prevalence statistics discussed in this report should not be used to compare BMI prevalence in previous years' PNSS reports or be applied at WIC clinic settings for determining WIC eligibility or for targeting women for WIC in a community setting. The BMI statistics in this report determine the pregravid status of North Carolina women participating in WIC using the new BMI standards. The prevalence of underweight, overweight, or obese can be compared to other similar populations where the new BMI cutoffs have been used.
- ◆ Past reports have used Kessner's index for computing the adequacy of prenatal care, but this report will use the Kotelchuck index ¹ in place of Kessner's index for computing the adequacy of prenatal care utilization.
- ◆ Breastfeeding initiation rates have been analyzed using a different method which will enable more breastfeeding women to be counted appropriately. Past reports have used only the affirmative response of a woman to the question of whether she was currently breastfeeding. In this report all postpartum women who are currently breastfeeding and who report discontinuing breastfeeding are classified as breastfeeding. Because of this, breastfeeding rates reported in earlier year's NC-PNSS report are not comparable to the rate reported in 1999.

1999 Pregnant Women's Profile North Carolina PNSS

Demographic Background	Number	Percent
Mothers under 18 years of age	4935	9
Mothers 35 years of age and older	2798	5
Unmarried mothers	30422	55
Mothers not completing high school	19991	36
White, non-Hispanic mothers	25276	46
Black , non-Hispanic mothers	21409	39
Native American, non-Hispanic mothers	1325	2
Hispanic mothers	6611	12
Asian/Pacific Islander, non-Hispanic mothers	824	1
Pregnancy History	Number	Percent
Mothers with no previous live births	23639	43
Mothers with 3 or more previous live births	5440	10
Mothers with 12 months or less between pregnancies	9174	27
Nutritional and Health Care Profile	Number	Percent
Mothers who smoked during pregnancy	13234	24
Mothers underweight prior to pregnancy *	2881	7
Mothers overweight (BMI >=25) prior to pregnancy*	20913	49
Mothers with iron-deficiency anemia *	4635	12
Mothers with no prenatal care	527	1
Mothers with inadequate prenatal care as determined by Kotelchuck's Index	7502	14
WIC mothers enrolling in WIC in 3rd trimester *	8299	19
Pregnancy Outcome Profile	Number	Percent
Babies with very low birthweight (under 1500 grams)	1190	2
Babies with low birthweight (under 2500 grams)	5498	10
Babies with high birthweight (over 4500 grams)	689	1
Fetal deaths	314	1
Twins or Triplets	1728	3
Mothers breastfeeding at postpartum visit *	22044	47

* Includes only mothers enrolled in WIC.

MATERNAL DEMOGRAPHIC PROFILE

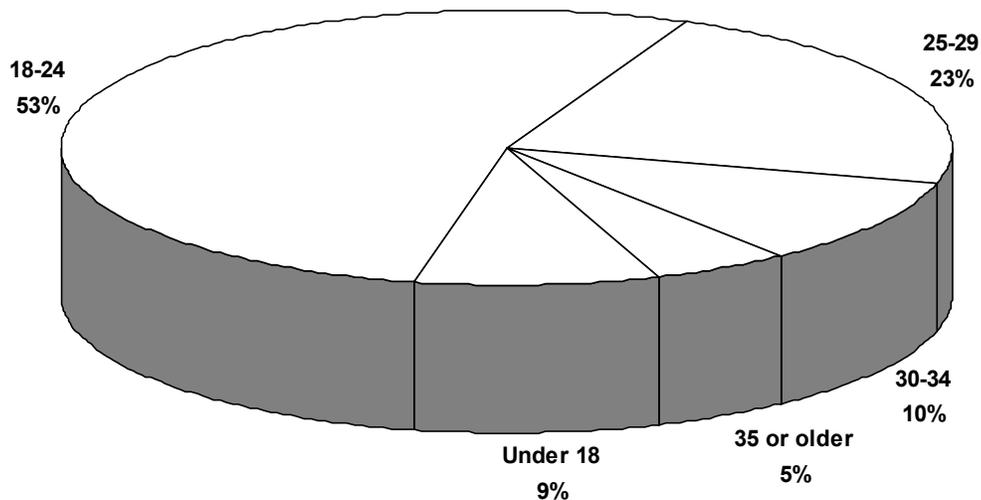
The main demographic variables influencing pregnancy outcome are maternal age, race or ethnicity, marital status, and socioeconomic status.

Maternal Age at Delivery

Women's age at date of delivery was taken from either the birth certificate or fetal death certificate. Over 50% of the women reported through the NC-PNSS were 18 to 24 years of age and 23% were in the 25-29 age group. The "under 18 years" group comprised 9% and 35 or older represented 5% of the total.

Refer to Figure 1 below and for county-specific data, refer to Table 1 on page 9.

Figure 1. Age Distribution of Women Participating in North Carolina WIC and Health Department Prenatal Clinics, 1999



Race and Hispanic Ethnicity

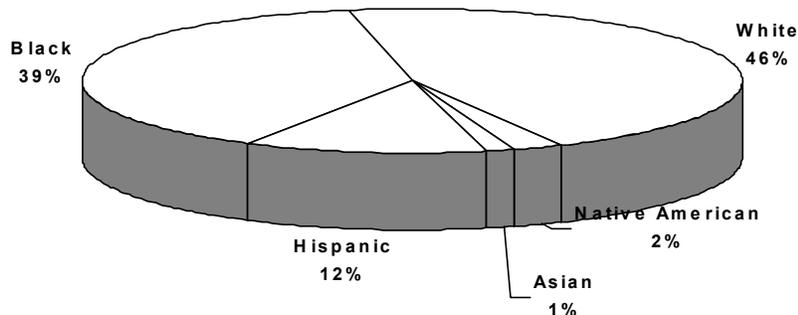
Women's race and Hispanic origin were taken from the vital records. Persons of Hispanic ethnicity may be of any race. Throughout this report, five categories of race and Hispanic ethnicity are used.

- ◆ White, *non-Hispanic*
- ◆ Black, *non-Hispanic*
- ◆ Native American, *non-Hispanic*
- ◆ Asian and Pacific Islander, *non-Hispanic* and
- ◆ Hispanic (of all races).

The racial/ethnicity distribution of women reported through NC-PNSS was similar to the preceding years with the exception of Hispanic women. The percentage of women who were Hispanic increased by 500% since 1991, from 2% to 12%.

Refer to Figure 2 below and Table 2 on page 11 for county-specific race/ethnicity distribution.

Figure 2. Race/Ethnicity of Women Participating in North Carolina WIC and Health Department Prenatal Clinics, 1999



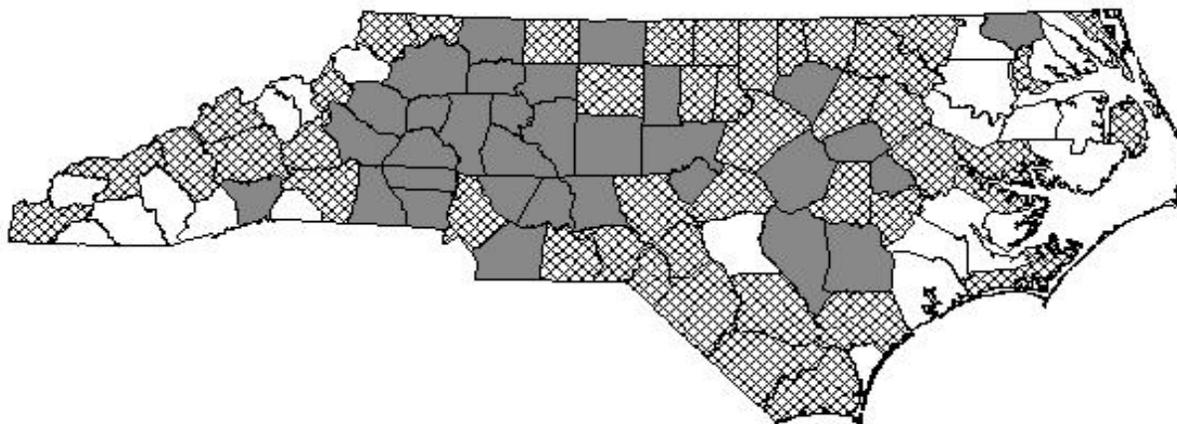
Educational Level

Information on women's education was collected from the vital records. Level of education can be used as a proxy for socioeconomic status.² Thirty-six percent of women in NC-PNSS during 1999 had less than a high school education. The percentage of women with less than a high school education ranged from 16% to 50% among North Carolina counties.

Hispanics had the highest percentage (67%) of women with less than a high school education. The percentage of less than a high school education in white, non-Hispanic women was 34%; Black, non-Hispanic women 30%; Native American non-Hispanic women 39%; and Asian Pacific Islander, non-Hispanic women 34%. Lower education was associated with higher levels of most risk factors presented in this report. Women with less education smoked more, had lower birthweight babies, and were less likely to breastfeed.

Refer to Figure 3 below and Table 3 on page 13 for county-specific educational attainment.

Figure 3. Percent Women Having Below High School Education During Pregnancy, North Carolina Counties 1999



Percent Below High School Education 16-29 30-39 ≥40

Table 1. Women Participating in WIC and Public Prenatal Clinics By Age, 1999

COUNTY	Under 18		18-24		25-29		30-34		35 or older		TOTAL
	#	%	#	%	#	%	#	%	#	%	#
NORTH CAROLINA	4,935	8.9%	29,529	53.2%	12,485	22.5%	5,716	10.3%	2,798	5.0%	55,463
ALAMANCE	85	10.0%	452	53.4%	203	24.0%	70	8.3%	37	4.4%	847
ALEXANDER	28	14.1%	100	50.5%	39	19.7%	22	11.1%	9	4.5%	198
ALLEGHANY	3	5.1%	32	54.2%	15	25.4%	5	8.5%	4	6.8%	59
ANSON	32	12.8%	130	52.0%	48	19.2%	23	9.2%	17	6.8%	250
ASHE	14	7.9%	90	50.8%	34	19.2%	24	13.6%	15	8.5%	177
AVERY	8	7.4%	54	50.0%	28	25.9%	11	10.2%	7	6.5%	108
BEAUFORT	37	9.8%	190	50.1%	84	22.2%	41	10.8%	27	7.1%	379
BERTIE	17	8.7%	102	52.0%	38	19.4%	25	12.8%	14	7.1%	196
BLADEN	27	9.1%	163	55.1%	64	21.6%	30	10.1%	12	4.1%	296
BRUNSWICK	44	9.8%	225	50.2%	99	22.1%	47	10.5%	33	7.4%	448
BUNCOMBE	107	8.3%	652	50.5%	314	24.3%	138	10.7%	81	6.3%	1,292
BURKE	79	13.6%	333	57.2%	86	14.8%	55	9.5%	29	5.0%	582
CABARRUS	79	11.2%	378	53.8%	140	19.9%	73	10.4%	33	4.7%	703
CALDWELL	64	10.6%	339	55.9%	140	23.1%	47	7.8%	16	2.6%	606
CAMDEN	2	7.7%	14	53.8%	3	11.5%	3	11.5%	4	15.4%	26
CARTERET	26	8.4%	163	52.4%	73	23.5%	27	8.7%	22	7.1%	311
CASWELL	12	10.3%	55	47.4%	21	18.1%	21	18.1%	7	6.0%	116
CATAWBA	84	9.4%	504	56.5%	175	19.6%	88	9.9%	41	4.6%	892
CHATHAM	14	5.3%	126	47.7%	73	27.7%	34	12.9%	17	6.4%	264
CHEROKEE	10	5.7%	93	53.4%	38	21.8%	23	13.2%	10	5.7%	174
CHOWAN	19	16.4%	64	55.2%	22	19.0%	7	6.0%	4	3.4%	116
CLAY	1	2.6%	22	57.9%	12	31.6%	2	5.3%	1	2.6%	38
CLEVELAND	76	11.4%	385	57.7%	118	17.7%	59	8.8%	29	4.3%	667
COLUMBUS	52	8.9%	296	50.9%	126	21.6%	67	11.5%	41	7.0%	582
CRAVEN	62	6.7%	548	59.6%	193	21.0%	78	8.5%	39	4.2%	920
CUMBERLAND	218	6.4%	1,893	55.3%	862	25.2%	319	9.3%	131	3.8%	3,423
CURRITUCK	4	6.9%	35	60.3%	12	20.7%	5	8.6%	2	3.4%	58
DARE	9	9.9%	47	51.6%	12	13.2%	19	20.9%	4	4.4%	91
DAVIDSON	82	8.6%	531	56.0%	199	21.0%	88	9.3%	48	5.1%	948
DAVIE	22	11.5%	102	53.1%	47	24.5%	13	6.8%	8	4.2%	192
DUPLIN	39	7.8%	260	52.1%	116	23.2%	58	11.6%	26	5.2%	499
DURHAM	97	6.6%	744	51.0%	346	23.7%	182	12.5%	91	6.2%	1,460
EDGECOMBE	64	11.8%	276	50.8%	115	21.2%	66	12.2%	22	4.1%	543
FORSYTH	174	8.9%	998	50.9%	493	25.2%	206	10.5%	88	4.5%	1,959
FRANKLIN	41	15.1%	138	50.7%	52	19.1%	26	9.6%	15	5.5%	272
GASTON	142	10.6%	749	55.7%	281	20.9%	109	8.1%	63	4.7%	1,344
GATES	6	15.0%	18	45.0%	6	15.0%	9	22.5%	1	2.5%	40
GRAHAM	9	10.6%	43	50.6%	20	23.5%	12	14.1%	1	1.2%	85
GRANVILLE	32	11.3%	137	48.2%	65	22.9%	28	9.9%	22	7.7%	284
GREENE	13	8.2%	89	56.3%	34	21.5%	15	9.5%	7	4.4%	158
GUILFORD	198	7.6%	1,335	51.4%	590	22.7%	302	11.6%	170	6.6%	2,595
HALIFAX	58	11.8%	253	51.3%	107	21.7%	49	9.9%	26	5.3%	493
HARNETT	74	10.7%	339	48.9%	171	24.7%	74	10.7%	35	5.1%	693
HAYWOOD	23	7.2%	168	52.7%	76	23.8%	35	11.0%	17	5.3%	319
HENDERSON	39	7.5%	254	48.8%	138	26.5%	67	12.9%	22	4.2%	520
HERTFORD	27	11.7%	130	56.5%	44	19.1%	19	8.3%	10	4.3%	230
HOKE	54	12.4%	226	52.0%	109	25.1%	33	7.6%	13	3.0%	435
HYDE	2	7.7%	7	26.9%	9	34.6%	4	15.4%	4	15.4%	26
IREDELL	57	8.4%	405	59.6%	137	20.2%	52	7.7%	28	4.1%	679
JACKSON	11	4.9%	111	49.8%	58	26.0%	29	13.0%	14	6.3%	223
JOHNSTON	64	8.7%	379	51.3%	172	23.3%	84	11.4%	40	5.4%	739

Table 1. Women Participating in WIC and Public Prenatal Clinics By Age, 1999

COUNTY	Under 18		18-24		25-29		30-34		35 or older		TOTAL
	#	%	#	%	#	%	#	%	#	%	#
NORTH CAROLINA	4,935	8.9%	29,529	53.2%	12,485	22.5%	5,716	10.3%	2,798	5.0%	55,463
JONES	9	10.3%	44	50.6%	22	25.3%	8	9.2%	4	4.6%	87
LEE	38	8.8%	229	52.8%	100	23.0%	54	12.4%	13	3.0%	434
LENOIR	61	11.8%	289	56.0%	112	21.7%	36	7.0%	18	3.5%	516
LINCOLN	40	10.7%	221	58.9%	75	20.0%	25	6.7%	14	3.7%	375
MACON	15	7.9%	90	47.6%	48	25.4%	26	13.8%	10	5.3%	189
MADISON	12	9.6%	63	50.4%	21	16.8%	21	16.8%	8	6.4%	125
MARTIN	21	9.4%	110	49.3%	59	26.5%	22	9.9%	11	4.9%	223
MCDOWELL	27	8.5%	168	53.2%	77	24.4%	37	11.7%	7	2.2%	316
MECKLENBURG	324	9.7%	1,603	48.1%	760	22.8%	427	12.8%	217	6.5%	3,331
MITCHELL	6	5.5%	53	48.2%	31	28.2%	14	12.7%	6	5.5%	110
MONTGOMERY	21	8.8%	148	61.9%	51	21.3%	13	5.4%	6	2.5%	239
MOORE	45	9.4%	242	50.4%	123	25.6%	45	9.4%	25	5.2%	480
NASH	72	11.2%	331	51.3%	160	24.8%	47	7.3%	35	5.4%	645
NEW HANOVER	78	8.3%	468	49.7%	241	25.6%	105	11.2%	49	5.2%	941
NORTHAMPTON	20	10.6%	104	55.3%	36	19.1%	20	10.6%	8	4.3%	188
ONSLow	75	3.6%	1,356	64.4%	438	20.8%	172	8.2%	65	3.1%	2,106
ORANGE	29	7.3%	186	46.9%	106	26.7%	48	12.1%	28	7.1%	397
PAMLICO	3	3.6%	54	65.1%	15	18.1%	5	6.0%	6	7.2%	83
PASQUOTANK	23	9.2%	144	57.8%	41	16.5%	27	10.8%	14	5.6%	249
PENDER	18	6.3%	148	51.7%	74	25.9%	26	9.1%	20	7.0%	286
PERQUIMANS	6	7.5%	40	50.0%	16	20.0%	12	15.0%	6	7.5%	80
PERSON	19	7.6%	137	54.8%	58	23.2%	20	8.0%	16	6.4%	250
PITT	99	9.1%	589	54.0%	225	20.6%	123	11.3%	55	5.0%	1,091
POLK	3	3.3%	44	48.9%	20	22.2%	18	20.0%	5	5.6%	90
RANDOLPH	92	10.8%	443	52.2%	186	21.9%	92	10.8%	35	4.1%	848
RICHMOND	53	10.8%	271	55.1%	100	20.3%	41	8.3%	27	5.5%	492
ROBESON	157	10.3%	865	57.0%	312	20.6%	120	7.9%	64	4.2%	1,518
ROCKINGHAM	70	10.3%	375	55.2%	144	21.2%	66	9.7%	24	3.5%	679
ROWAN	92	11.3%	410	50.6%	185	22.8%	75	9.2%	49	6.0%	811
RUTHERFORD	45	9.6%	261	55.5%	91	19.4%	55	11.7%	18	3.8%	470
SAMPSON	56	9.7%	308	53.4%	132	22.9%	61	10.6%	20	3.5%	577
SCOTLAND	52	12.6%	229	55.4%	85	20.6%	28	6.8%	19	4.6%	413
STANLY	33	9.0%	202	55.0%	80	21.8%	41	11.2%	11	3.0%	367
STOKES	23	9.3%	119	48.4%	65	26.4%	24	9.8%	15	6.1%	246
SURRY	38	8.0%	254	53.5%	109	22.9%	56	11.8%	18	3.8%	475
SWAIN	16	10.7%	81	54.0%	32	21.3%	14	9.3%	7	4.7%	150
TRANSYLVANIA	14	8.6%	92	56.4%	31	19.0%	20	12.3%	6	3.7%	163
TYRRELL	2	5.7%	21	60.0%	7	20.0%	4	11.4%	1	2.9%	35
UNION	71	10.0%	361	50.7%	163	22.9%	73	10.3%	44	6.2%	712
VANCE	49	10.3%	245	51.5%	105	22.1%	50	10.5%	27	5.7%	476
WAKE	195	7.3%	1,342	50.3%	637	23.9%	318	11.9%	174	6.5%	2,666
WARREN	17	10.3%	87	52.7%	35	21.2%	14	8.5%	12	7.3%	165
WASHINGTON	15	12.8%	51	43.6%	27	23.1%	16	13.7%	8	6.8%	117
WATAUGA	9	4.6%	107	54.3%	52	26.4%	19	9.6%	10	5.1%	197
WAYNE	92	9.0%	555	54.5%	208	20.4%	116	11.4%	47	4.6%	1,018
WILKES	46	9.2%	288	57.6%	110	22.0%	41	8.2%	15	3.0%	500
WILSON	70	11.3%	335	54.1%	132	21.3%	57	9.2%	25	4.0%	619
YADKIN	14	6.0%	117	50.4%	66	28.4%	22	9.5%	13	5.6%	232
YANCEY	9	6.9%	72	55.0%	25	19.1%	19	14.5%	6	4.6%	131

Table 2. Women Participating in WIC and Public Prenatal Clinics By Race/Ethnicity, 1999

COUNTY	White, non-Hispanic		Black, non-Hispanic		Native American, non-Hispanic		Asian, non-Hispanic		Hispanic		TOTAL #
	#	%	#	%	#	%	#	%	#	%	
NORTH CAROLINA	25,276	45.6%	21,409	38.6%	1,325	2.4%	824	1.5%	6,611	11.9%	55,445
ALAMANCE	407	48.1%	250	29.5%	2	0.2%	6	0.7%	182	21.5%	847
ALEXANDER	161	81.3%	18	9.1%	-	0.0%	4	2.0%	15	7.6%	198
ALLEGHANY	55	93.2%	1	1.7%	-	0.0%	-	0.0%	3	5.1%	59
ANSON	58	23.2%	188	75.2%	2	0.8%	1	0.4%	1	0.4%	250
ASHE	163	92.1%	2	1.1%	-	0.0%	-	0.0%	12	6.8%	177
AVERY	104	96.3%	1	0.9%	-	0.0%	-	0.0%	3	2.8%	108
BEAUFORT	137	36.1%	198	52.2%	-	0.0%	-	0.0%	44	11.6%	379
BERTIE	30	15.3%	163	83.2%	2	1.0%	-	0.0%	1	0.5%	196
BLADEN	116	39.2%	158	53.4%	4	1.4%	-	0.0%	18	6.1%	296
BRUNSWICK	302	67.4%	111	24.8%	4	0.9%	-	0.0%	31	6.9%	448
BUNCOMBE	1,002	77.6%	172	13.3%	2	0.2%	10	0.8%	105	8.1%	1,291
BURKE	413	71.0%	49	8.4%	-	0.0%	69	11.9%	51	8.8%	582
CABARRUS	361	51.4%	196	27.9%	2	0.3%	10	1.4%	133	18.9%	702
CALDWELL	522	86.3%	63	10.4%	-	0.0%	1	0.2%	19	3.1%	605
CAMDEN	20	76.9%	6	23.1%	-	0.0%	-	0.0%	-	0.0%	26
CARTERET	247	79.4%	50	16.1%	3	1.0%	1	0.3%	10	3.2%	311
CASWELL	52	44.8%	59	50.9%	-	0.0%	-	0.0%	5	4.3%	116
CATAWBA	539	60.4%	148	16.6%	2	0.2%	73	8.2%	130	14.6%	892
CHATHAM	96	36.5%	73	27.8%	-	0.0%	1	0.4%	93	35.4%	263
CHEROKEE	161	92.5%	7	4.0%	5	2.9%	-	0.0%	1	0.6%	174
CHOWAN	35	30.2%	78	67.2%	-	0.0%	-	0.0%	3	2.6%	116
CLAY	38	100.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	38
CLEVELAND	412	61.8%	225	33.7%	-	0.0%	7	1.0%	23	3.4%	667
COLUMBUS	252	43.3%	266	45.7%	36	6.2%	2	0.3%	26	4.5%	582
CRAVEN	464	50.4%	361	39.2%	5	0.5%	18	2.0%	72	7.8%	920
CUMBERLAND	1,456	42.6%	1,456	42.6%	66	1.9%	78	2.3%	365	10.7%	3,421
CURRITUCK	44	75.9%	10	17.2%	-	0.0%	-	0.0%	4	6.9%	58
DARE	75	82.4%	7	7.7%	-	0.0%	1	1.1%	8	8.8%	91
DAVIDSON	675	71.2%	174	18.4%	4	0.4%	17	1.8%	78	8.2%	948
DAVIE	153	79.7%	19	9.9%	-	0.0%	1	0.5%	19	9.9%	192
DUPLIN	138	27.7%	177	35.5%	-	0.0%	1	0.2%	183	36.7%	499
DURHAM	159	10.9%	1,025	70.3%	4	0.3%	14	1.0%	256	17.6%	1,458
EDGECOMBE	96	17.7%	416	76.8%	2	0.4%	1	0.2%	27	5.0%	542
FORSYTH	516	26.3%	940	48.0%	4	0.2%	7	0.4%	492	25.1%	1,959
FRANKLIN	98	36.0%	141	51.8%	1	0.4%	1	0.4%	31	11.4%	272
GASTON	881	65.6%	365	27.2%	2	0.1%	17	1.3%	78	5.8%	1,343
GATES	16	40.0%	23	57.5%	-	0.0%	-	0.0%	1	2.5%	40
GRAHAM	74	87.1%	1	1.2%	8	9.4%	-	0.0%	2	2.4%	85
GRANVILLE	115	40.5%	156	54.9%	-	0.0%	1	0.4%	12	4.2%	284
GREENE	39	24.7%	91	57.6%	-	0.0%	-	0.0%	28	17.7%	158
GUILFORD	777	30.0%	1,485	57.2%	21	0.8%	93	3.6%	218	8.4%	2,594
HALIFAX	112	22.7%	350	71.0%	25	5.1%	3	0.6%	3	0.6%	493
HARNETT	358	51.7%	251	36.2%	5	0.7%	4	0.6%	75	10.8%	693
HAYWOOD	297	93.1%	8	2.5%	2	0.6%	-	0.0%	12	3.8%	319
HENDERSON	384	74.0%	22	4.2%	4	0.8%	3	0.6%	106	20.4%	519
HERTFORD	46	20.0%	182	79.1%	2	0.9%	-	0.0%	-	0.0%	230
HOKE	124	28.5%	161	37.0%	77	17.7%	8	1.8%	65	14.9%	435
HYDE	11	42.3%	12	46.2%	-	0.0%	-	0.0%	3	11.5%	26
IREDELL	382	56.3%	228	33.6%	1	0.1%	18	2.7%	50	7.4%	679
JACKSON	170	76.2%	6	2.7%	38	17.0%	3	1.3%	6	2.7%	223
JOHNSTON	332	44.9%	219	29.6%	1	0.1%	3	0.4%	184	24.9%	739

Table 2. Women Participating in WIC and Public Prenatal Clinics By Race/Ethnicity, 1999

COUNTY	White, non-Hispanic		Black, non-Hispanic		Native American, non-Hispanic		Asian, non-Hispanic		Hispanic		TOTAL #
	#	%	#	%	#	%	#	%	#	%	
NORTH CAROLINA	25,276	45.6%	21,409	38.6%	1,325	2.4%	824	1.5%	6,611	11.9%	55,445
JONES	39	44.8%	47	54.0%	-	0.0%	-	0.0%	1	1.1%	87
LEE	141	32.5%	139	32.0%	3	0.7%	3	0.7%	148	34.1%	434
LENOIR	154	29.8%	336	65.1%	1	0.2%	2	0.4%	23	4.5%	516
LINCOLN	269	71.7%	51	13.6%	1	0.3%	-	0.0%	54	14.4%	375
MACON	178	94.2%	3	1.6%	-	0.0%	1	0.5%	7	3.7%	189
MADISON	123	98.4%	-	0.0%	-	0.0%	-	0.0%	2	1.6%	125
MARTIN	49	22.0%	170	76.2%	-	0.0%	1	0.4%	3	1.3%	223
MCDOWELL	263	83.2%	22	7.0%	2	0.6%	2	0.6%	27	8.5%	316
MECKLENBURG	609	18.3%	2,043	61.3%	16	0.5%	113	3.4%	550	16.5%	3,331
MITCHELL	107	97.3%	-	0.0%	-	0.0%	-	0.0%	3	2.7%	110
MONTGOMERY	89	37.2%	93	38.9%	1	0.4%	4	1.7%	52	21.8%	239
MOORE	258	53.8%	155	32.3%	9	1.9%	3	0.6%	55	11.5%	480
NASH	209	32.4%	367	56.9%	7	1.1%	1	0.2%	61	9.5%	645
NEW HANOVER	447	47.5%	422	44.8%	10	1.1%	14	1.5%	48	5.1%	941
NORTHAMPTON	32	17.0%	153	81.4%	-	0.0%	-	0.0%	3	1.6%	188
ONslow	1,366	64.9%	452	21.5%	14	0.7%	53	2.5%	219	10.4%	2,104
ORANGE	175	44.1%	138	34.8%	2	0.5%	5	1.3%	77	19.4%	397
PAMLICO	51	61.4%	27	32.5%	-	0.0%	-	0.0%	5	6.0%	83
PASQUOTANK	80	32.1%	162	65.1%	-	0.0%	4	1.6%	3	1.2%	249
PENDER	164	57.3%	87	30.4%	1	0.3%	-	0.0%	34	11.9%	286
PERQUIMANS	45	56.3%	34	42.5%	-	0.0%	-	0.0%	1	1.3%	80
PERSON	126	50.4%	115	46.0%	-	0.0%	-	0.0%	9	3.6%	250
PITT	278	25.5%	708	64.9%	1	0.1%	4	0.4%	100	9.2%	1,091
POLK	76	84.4%	10	11.1%	-	0.0%	-	0.0%	4	4.4%	90
RANDOLPH	616	72.6%	75	8.8%	3	0.4%	5	0.6%	149	17.6%	848
RICHMOND	222	45.1%	236	48.0%	9	1.8%	1	0.2%	24	4.9%	492
ROBESON	245	16.1%	446	29.4%	740	48.7%	3	0.2%	84	5.5%	1,518
ROCKINGHAM	435	64.1%	183	27.0%	5	0.7%	2	0.3%	54	8.0%	679
ROWAN	462	57.0%	249	30.7%	6	0.7%	9	1.1%	85	10.5%	811
RUTHERFORD	358	76.2%	100	21.3%	-	0.0%	1	0.2%	11	2.3%	470
SAMPSON	177	30.7%	215	37.3%	11	1.9%	1	0.2%	173	30.0%	577
SCOTLAND	144	34.9%	210	50.8%	54	13.1%	1	0.2%	4	1.0%	413
STANLY	229	62.4%	83	22.6%	1	0.3%	31	8.4%	23	6.3%	367
STOKES	224	91.1%	13	5.3%	2	0.8%	-	0.0%	7	2.8%	246
SURRY	347	73.1%	22	4.6%	-	0.0%	11	2.3%	95	20.0%	475
SWAIN	79	52.7%	-	0.0%	64	42.7%	-	0.0%	7	4.7%	150
TRANSYLVANIA	146	89.6%	13	8.0%	-	0.0%	-	0.0%	4	2.5%	163
TYRRELL	17	48.6%	13	37.1%	1	2.9%	-	0.0%	4	11.4%	35
UNION	307	43.1%	214	30.1%	5	0.7%	5	0.7%	181	25.4%	712
VANCE	123	25.8%	312	65.5%	1	0.2%	2	0.4%	38	8.0%	476
WAKE	707	26.6%	1,364	51.2%	8	0.3%	56	2.1%	527	19.8%	2,662
WARREN	18	10.9%	129	78.2%	9	5.5%	-	0.0%	9	5.5%	165
WASHINGTON	23	19.7%	92	78.6%	-	0.0%	-	0.0%	2	1.7%	117
WATAUGA	191	97.0%	2	1.0%	1	0.5%	1	0.5%	2	1.0%	197
WAYNE	377	37.0%	503	49.4%	-	0.0%	3	0.3%	135	13.3%	1,018
WILKES	434	86.8%	23	4.6%	1	0.2%	-	0.0%	42	8.4%	500
WILSON	117	18.9%	393	63.5%	-	0.0%	2	0.3%	107	17.3%	619
YADKIN	152	65.5%	15	6.5%	-	0.0%	2	0.9%	63	27.2%	232
YANCEY	123	93.9%	2	1.5%	-	0.0%	1	0.8%	5	3.8%	131

Table 3. Women Participating in WIC and Public Prenatal Clinics By Educational Level, 1999

COUNTY	Under 12 years of School		High School		Over 12 years of School		TOTAL
	#	%	#	%	#	%	#
NORTH CAROLINA	19,991	36.2%	22,548	40.8%	12,761	23.1%	55,300
ALAMANCE	369	43.6%	333	39.3%	145	17.1%	847
ALEXANDER	98	49.5%	85	42.9%	15	7.6%	198
ALLEGHANY	20	33.9%	26	44.1%	13	22.0%	59
ANSON	81	32.4%	123	49.2%	46	18.4%	250
ASHE	65	36.7%	79	44.6%	33	18.6%	177
AVERY	34	31.5%	47	43.5%	27	25.0%	108
BEAUFORT	134	35.4%	185	48.8%	60	15.8%	379
BERTIE	49	25.0%	101	51.5%	46	23.5%	196
BLADEN	91	30.7%	135	45.6%	70	23.6%	296
BRUNSWICK	158	35.3%	181	40.5%	108	24.2%	447
BUNCOMBE	464	36.0%	527	40.9%	298	23.1%	1,289
BURKE	285	49.2%	215	37.1%	79	13.6%	579
CABARRUS	328	46.9%	254	36.3%	118	16.9%	700
CALDWELL	287	47.9%	238	39.7%	74	12.4%	599
CAMDEN	6	23.1%	8	30.8%	12	46.2%	26
CARTERET	98	32.0%	130	42.5%	78	25.5%	306
CASWELL	40	34.5%	49	42.2%	27	23.3%	116
CATAWBA	348	40.0%	371	42.7%	150	17.3%	869
CHATHAM	133	50.4%	88	33.3%	43	16.3%	264
CHEROKEE	53	30.5%	77	44.3%	44	25.3%	174
CHOWAN	37	32.2%	52	45.2%	26	22.6%	115
CLAY	10	26.3%	19	50.0%	9	23.7%	38
CLEVELAND	287	43.0%	287	43.0%	93	13.9%	667
COLUMBUS	203	34.9%	242	41.7%	136	23.4%	581
CRAVEN	203	22.1%	432	47.1%	283	30.8%	918
CUMBERLAND	736	21.5%	1,550	45.3%	1,133	33.1%	3,419
CURRITUCK	21	36.2%	26	44.8%	11	19.0%	58
DARE	28	30.8%	39	42.9%	24	26.4%	91
DAVIDSON	443	46.7%	378	39.9%	127	13.4%	948
DAVIE	80	41.7%	78	40.6%	34	17.7%	192
DUPLIN	226	45.6%	196	39.5%	74	14.9%	496
DURHAM	534	36.8%	478	33.0%	438	30.2%	1,450
EDGECOMBE	176	32.4%	265	48.8%	102	18.8%	543
FORSYTH	858	44.0%	666	34.1%	428	21.9%	1,952
FRANKLIN	122	44.9%	102	37.5%	48	17.6%	272
GASTON	580	43.3%	535	40.0%	223	16.7%	1,338
GATES	16	40.0%	17	42.5%	7	17.5%	40
GRAHAM	25	29.4%	37	43.5%	23	27.1%	85
GRANVILLE	103	36.3%	118	41.5%	63	22.2%	284
GREENE	71	44.9%	62	39.2%	25	15.8%	158
GUILFORD	879	33.9%	952	36.7%	762	29.4%	2,593
HALIFAX	163	33.1%	237	48.1%	93	18.9%	493
HARNETT	229	33.1%	301	43.5%	162	23.4%	692
HAYWOOD	110	34.5%	140	43.9%	69	21.6%	319
HENDERSON	213	41.0%	201	38.7%	105	20.2%	519
HERTFORD	66	28.7%	118	51.3%	46	20.0%	230
HOKE	170	39.1%	176	40.5%	89	20.5%	435
HYDE	5	19.2%	13	50.0%	8	30.8%	26
IREDELL	274	40.4%	285	42.0%	119	17.6%	678
JACKSON	56	25.1%	78	35.0%	89	39.9%	223
JOHNSTON	309	42.5%	281	38.7%	137	18.8%	727

Table 3. Women Participating in WIC and Public Prenatal Clinics By Educational Level, 1999

COUNTY	Under 12 years of School		High School		Over 12 years of School		TOTAL
	#	%	#	%	#	%	#
NORTH CAROLINA	19,991	36.2%	22,548	40.8%	12,761	23.1%	55,300
JONES	19	21.8%	50	57.5%	18	20.7%	87
LEE	190	43.9%	158	36.5%	85	19.6%	433
LENOIR	199	38.6%	206	39.9%	111	21.5%	516
LINCOLN	170	45.3%	145	38.7%	60	16.0%	375
MACON	53	28.0%	89	47.1%	47	24.9%	189
MADISON	44	35.2%	56	44.8%	25	20.0%	125
MARTIN	54	24.2%	120	53.8%	49	22.0%	223
MCDOWELL	116	36.9%	134	42.7%	64	20.4%	314
MECKLENBURG	1,170	35.2%	1,210	36.4%	940	28.3%	3,320
MITCHELL	32	29.1%	43	39.1%	35	31.8%	110
MONTGOMERY	119	49.8%	88	36.8%	32	13.4%	239
MOORE	149	31.2%	220	46.1%	108	22.6%	477
NASH	223	34.7%	309	48.1%	111	17.3%	643
NEW HANOVER	253	26.9%	382	40.6%	305	32.4%	940
NORTHAMPTON	65	34.6%	88	46.8%	35	18.6%	188
ONSLow	341	16.2%	1,052	50.0%	711	33.8%	2,104
ORANGE	149	37.7%	138	34.9%	108	27.3%	395
PAMLICO	20	24.1%	46	55.4%	17	20.5%	83
PASQUOTANK	71	28.5%	90	36.1%	88	35.3%	249
PENDER	103	36.1%	115	40.4%	67	23.5%	285
PERQUIMANS	20	25.0%	39	48.8%	21	26.3%	80
PERSON	77	30.8%	122	48.8%	51	20.4%	250
PITT	382	35.0%	375	34.4%	333	30.6%	1,090
POLK	22	24.4%	49	54.4%	19	21.1%	90
RANDOLPH	401	47.5%	358	42.4%	86	10.2%	845
RICHMOND	175	35.9%	234	48.0%	79	16.2%	488
ROBESON	579	38.2%	677	44.7%	258	17.0%	1,514
ROCKINGHAM	289	42.6%	263	38.8%	126	18.6%	678
ROWAN	361	44.5%	315	38.8%	135	16.6%	811
RUTHERFORD	179	38.2%	207	44.1%	83	17.7%	469
SAMPSON	259	45.0%	218	37.9%	98	17.0%	575
SCOTLAND	144	35.2%	197	48.2%	68	16.6%	409
STANLY	152	41.5%	147	40.2%	67	18.3%	366
STOKES	95	38.6%	116	47.2%	35	14.2%	246
SURRY	234	49.5%	178	37.6%	61	12.9%	473
SWAIN	52	34.7%	63	42.0%	35	23.3%	150
TRANSYLVANIA	44	27.0%	85	52.1%	34	20.9%	163
TYRRELL	10	28.6%	16	45.7%	9	25.7%	35
UNION	349	49.2%	252	35.5%	108	15.2%	709
VANCE	181	38.0%	208	43.7%	87	18.3%	476
WAKE	939	35.4%	905	34.1%	810	30.5%	2,654
WARREN	59	35.8%	67	40.6%	39	23.6%	165
WASHINGTON	32	27.6%	47	40.5%	37	31.9%	116
WATAUGA	44	22.3%	55	27.9%	98	49.7%	197
WAYNE	362	35.6%	431	42.4%	223	21.9%	1,016
WILKES	223	44.6%	184	36.8%	93	18.6%	500
WILSON	273	44.1%	234	37.8%	112	18.1%	619
YADKIN	106	45.9%	85	36.8%	40	17.3%	231
YANCEY	34	26.0%	69	52.7%	28	21.4%	131

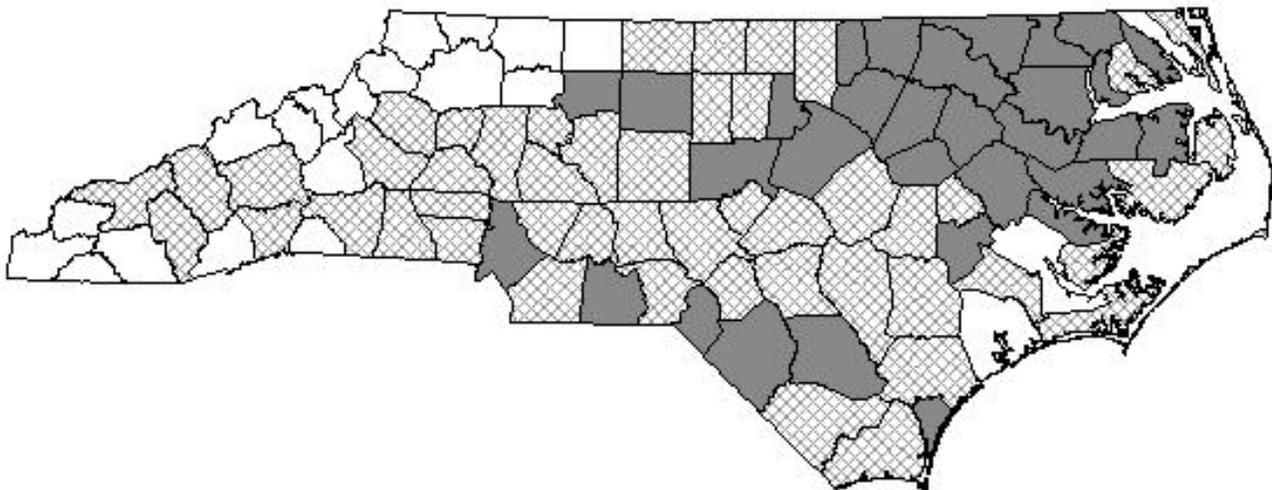
Marital Status

Marital status information was obtained from the vital records. In 1999, for women reported in NC-PNSS, out-of-wedlock births ranged from 20% to 75% of the total births in North Carolina counties, with a statewide average of 55 percent (Figure 4).

Black, non-Hispanic women had the highest rate of out-of-wedlock births (76%). Asian, non-Hispanic women had the lowest proportion of out-of-wedlock births (28%) followed by white, non-Hispanic (40%); Hispanic (45%); and Native American, non-Hispanic (60%).

Refer to Figure 4 below and Table 4 on page 17 for county-specific marital status.

**Figure 4. Percent Women Unmarried During Pregnancy
North Carolina Counties 1999**



Percent Unmarried 20-40 41-60 61-75

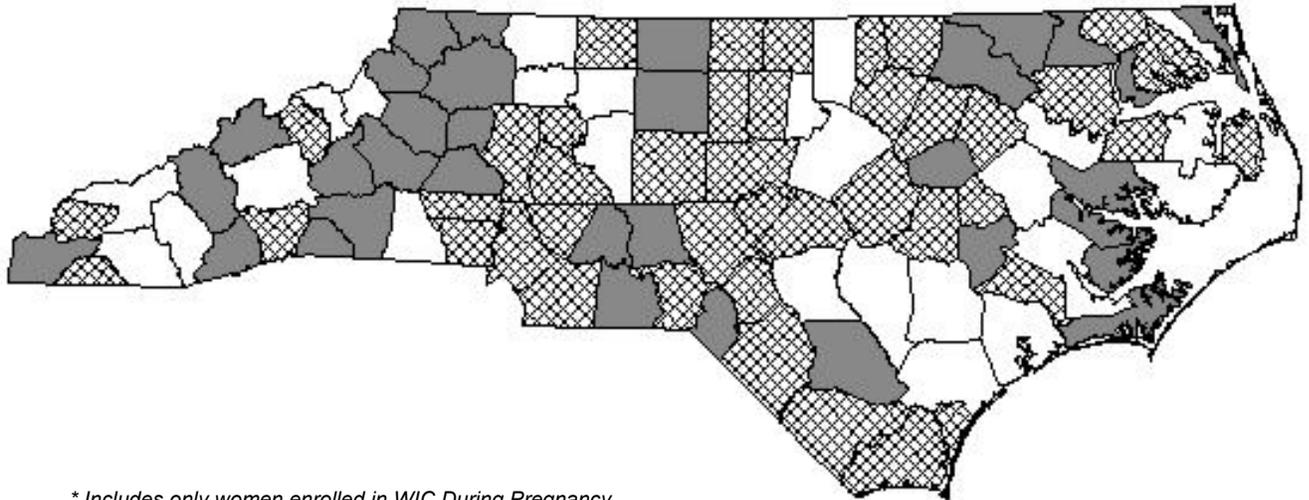
Participation in Other Programs

Pregnant women who participated in WIC represented 40% of all women who gave birth in North Carolina during 1999. WIC legislation allows income eligibility requirements to be met by participation in means-tested programs such as the Medicaid, Food Stamp, and Temporary Assistance for Needy Families (TANF) programs. TANF is known as the Work First Program in North Carolina.

Fifty-six percent of women on WIC in NC during 1999 received Medicaid benefits during pregnancy and 9% received food stamps. Only 6% of women on WIC were on the Work First Program. The county-specific rates of NC-PNSS women who received Medicaid benefits in 1999 ranged from 24% to 92%.

Refer to Figure 5 below for county-specific Medicaid Enrollment Rate.

Figure 5. Proportion of Medicaid Enrollment By Pregnant Women * Participating in WIC, North Carolina Counties 1999



** Includes only women enrolled in WIC During Pregnancy*

Percent Medicaid Enrollment

24-49 50-69 70-92

Table 4. Women Participating In WIC and Prenatal Clinics By Marital Status

COUNTY	Married		Unmarried		Total
	#	%	#	%	#
NORTH CAROLINA	25,031	45.1%	30,422	54.9%	55,453
ALAMANCE	374	44.2%	473	55.8%	847
ALEXANDER	89	44.9%	109	55.1%	198
ALLEGHANY	38	64.4%	21	35.6%	59
ANSON	84	33.6%	166	66.4%	250
ASHE	129	72.9%	48	27.1%	177
AVERY	83	76.9%	25	23.1%	108
BEAUFORT	143	37.7%	236	62.3%	379
BERTIE	61	31.1%	135	68.9%	196
BLADEN	106	35.8%	190	64.2%	296
BRUNSWICK	214	47.8%	234	52.2%	448
BUNCOMBE	646	50.0%	646	50.0%	1,292
BURKE	281	48.3%	301	51.7%	582
CABARRUS	283	40.3%	420	59.7%	703
CALDWELL	299	49.3%	307	50.7%	606
CAMDEN	19	73.1%	7	26.9%	26
CARTERET	141	45.3%	170	54.7%	311
CASWELL	60	51.7%	56	48.3%	116
CATAWBA	398	44.6%	494	55.4%	892
CHATHAM	103	39.0%	161	61.0%	264
CHEROKEE	122	70.1%	52	29.9%	174
CHOWAN	34	29.3%	82	70.7%	116
CLAY	26	68.4%	12	31.6%	38
CLEVELAND	278	41.7%	389	58.3%	667
COLUMBUS	278	47.8%	304	52.2%	582
CRAVEN	568	61.7%	352	38.3%	920
CUMBERLAND	1,932	56.4%	1,491	43.6%	3,423
CURRITUCK	28	48.3%	30	51.7%	58
DARE	45	49.5%	46	50.5%	91
DAVIDSON	471	49.7%	477	50.3%	948
DAVIE	104	54.2%	88	45.8%	192
DUPLIN	217	43.5%	282	56.5%	499
DURHAM	475	32.5%	985	67.5%	1,460
EDGECOMBE	154	28.4%	389	71.6%	543
FORSYTH	667	34.0%	1,292	66.0%	1,959
FRANKLIN	100	36.8%	172	63.2%	272
GASTON	582	43.3%	762	56.7%	1,344
GATES	10	25.0%	30	75.0%	40
GRAHAM	68	80.0%	17	20.0%	85
GRANVILLE	113	39.8%	171	60.2%	284
GREENE	72	45.6%	86	54.4%	158
GUILFORD	953	36.7%	1,642	63.3%	2,595
HALIFAX	156	31.6%	337	68.4%	493
HARNETT	341	49.2%	352	50.8%	693
HAYWOOD	188	58.9%	131	41.1%	319
HENDERSON	303	58.3%	217	41.7%	520
HERTFORD	65	28.3%	165	71.7%	230
HOKE	176	40.5%	259	59.5%	435
HYDE	13	50.0%	13	50.0%	26
IREDELL	274	40.4%	405	59.6%	679
JACKSON	128	57.4%	95	42.6%	223
JOHNSTON	366	49.9%	368	50.1%	734

Table 4. Women Participating In WIC and Prenatal Clinics By Marital Status

COUNTY	Married		Unmarried		Total
	#	%	#	%	#
NORTH CAROLINA	25,031	45.1%	30,422	54.9%	55,453
JONES	44	50.6%	43	49.4%	87
LEE	185	42.7%	248	57.3%	433
LENOIR	172	33.3%	344	66.7%	516
LINCOLN	206	54.9%	169	45.1%	375
MACON	120	63.5%	69	36.5%	189
MADISON	81	64.8%	44	35.2%	125
MARTIN	83	37.2%	140	62.8%	223
MCDOWELL	204	64.6%	112	35.4%	316
MECKLENBURG	1,078	32.4%	2,251	67.6%	3,329
MITCHELL	87	79.1%	23	20.9%	110
MONTGOMERY	113	47.3%	126	52.7%	239
MOORE	214	44.6%	266	55.4%	480
NASH	245	38.0%	400	62.0%	645
NEW HANOVER	360	38.3%	581	61.7%	941
NORTHAMPTON	50	26.6%	138	73.4%	188
ONSLOW	1,610	76.4%	496	23.6%	2,106
ORANGE	172	43.4%	224	56.6%	396
PAMLICO	41	49.4%	42	50.6%	83
PASQUOTANK	86	34.5%	163	65.5%	249
PENDER	153	53.5%	133	46.5%	286
PERQUIMANS	42	52.5%	38	47.5%	80
PERSON	115	46.0%	135	54.0%	250
PITT	369	33.8%	722	66.2%	1,091
POLK	59	65.6%	31	34.4%	90
RANDOLPH	473	55.8%	375	44.2%	848
RICHMOND	206	41.9%	286	58.1%	492
ROBESON	523	34.5%	995	65.5%	1,518
ROCKINGHAM	326	48.0%	353	52.0%	679
ROWAN	349	43.0%	462	57.0%	811
RUTHERFORD	234	49.8%	236	50.2%	470
SAMPSON	271	47.0%	306	53.0%	577
SCOTLAND	133	32.2%	280	67.8%	413
STANLY	198	54.0%	169	46.0%	367
STOKES	152	61.8%	94	38.2%	246
SURRY	285	60.0%	190	40.0%	475
SWAIN	78	52.0%	72	48.0%	150
TRANSYLVANIA	106	65.0%	57	35.0%	163
TYRRELL	11	31.4%	24	68.6%	35
UNION	303	42.6%	409	57.4%	712
VANCE	161	33.8%	315	66.2%	476
WAKE	1,033	38.7%	1,633	61.3%	2,666
WARREN	64	38.8%	101	61.2%	165
WASHINGTON	37	31.6%	80	68.4%	117
WATAUGA	139	70.6%	58	29.4%	197
WAYNE	432	42.5%	585	57.5%	1,017
WILKES	307	61.4%	193	38.6%	500
WILSON	219	35.4%	400	64.6%	619
YADKIN	149	64.2%	83	35.8%	232
YANCEY	95	72.5%	36	27.5%	131

**PREGNANCY
RISK FACTORS
and OUTCOMES**

Maternal Cigarette Smoking

Maternal cigarette smoking during pregnancy is one of the most important risk factors for low birthweight and infant mortality. Pregnancies in women who smoke cigarettes are at increased risk for spontaneous abortion, ectopic pregnancy, birth defects, fetal growth retardation, preterm birth, and neuro-developmental impairment.³ Maternal smoking during pregnancy doubles the risk of delivering a low birthweight infant and is a contributing factor to low birthweight for 20% to 40% of infants born in the United States.⁴

Information on smoking was obtained from both the WIC data and the vital records. Women who smoked at least one cigarette per day during their pregnancy were considered smokers. Table 5 on page 20 shows that 24% of low-income pregnant women in North Carolina who gave birth in 1999 smoked, compared to a national rate of 22%.⁵ County-specific smoking rates ranged from 10% to 51% (Figure 6).

**Figure 6. Percent Women Smoking During Pregnancy
North Carolina Counties, 1999**

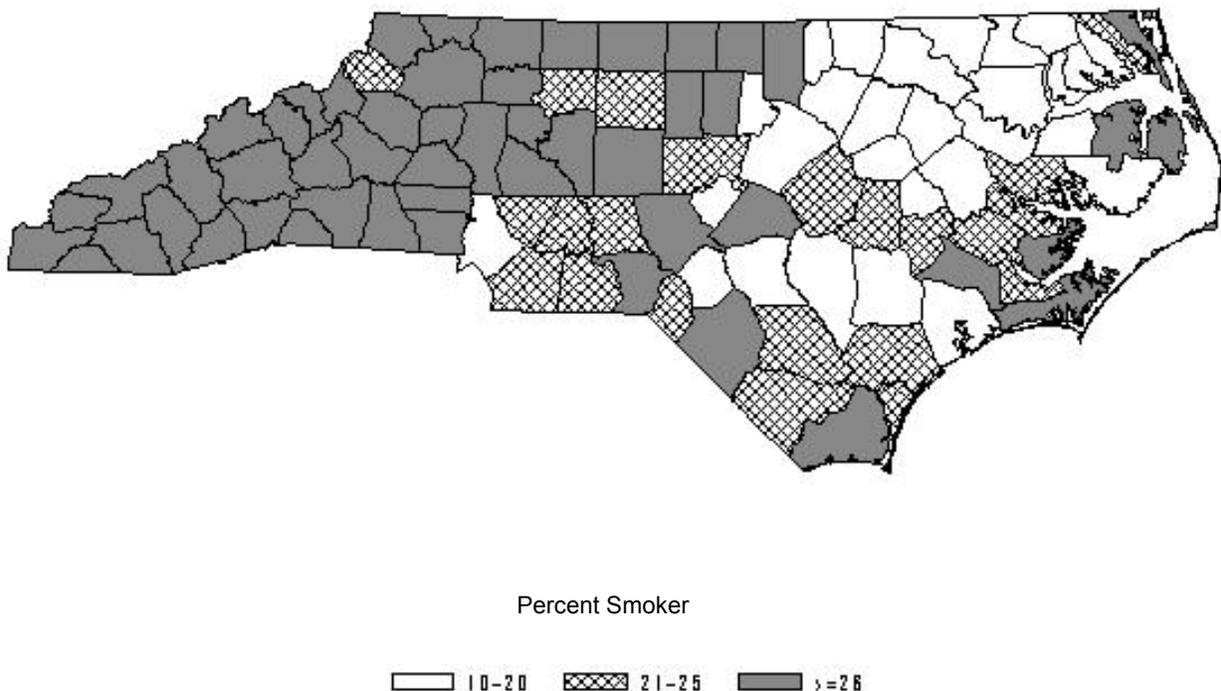


Table 5. Smoking During Pregnancy Among Women in NC-PNSS, 1999

COUNTY	Smokers		Non-smokers		TOTAL
	#	%	#	%	#
NORTH CAROLINA	13,234	23.9%	42,207	76.1%	55,441
ALAMANCE	252	29.8%	595	70.2%	847
ALEXANDER	77	38.9%	121	61.1%	198
ALLEGHANY	26	44.1%	33	55.9%	59
ANSON	53	21.2%	197	78.8%	250
ASHE	52	29.4%	125	70.6%	177
AVERY	31	28.7%	77	71.3%	108
BEAUFORT	85	22.4%	294	77.6%	379
BERTIE	20	10.2%	176	89.8%	196
BLADEN	66	22.3%	230	77.7%	296
BRUNSWICK	150	33.5%	298	66.5%	448
BUNCOMBE	373	28.9%	919	71.1%	1,292
BURKE	193	33.2%	389	66.8%	582
CABARRUS	172	24.5%	531	75.5%	703
CALDWELL	258	42.6%	348	57.4%	606
CAMDEN	6	23.1%	20	76.9%	26
CARTERET	91	29.6%	216	70.4%	307
CASWELL	41	35.3%	75	64.7%	116
CATAWBA	237	26.6%	653	73.4%	890
CHATHAM	59	22.4%	204	77.6%	263
CHEROKEE	59	33.9%	115	66.1%	174
CHOWAN	16	13.8%	100	86.2%	116
CLAY	17	44.7%	21	55.3%	38
CLEVELAND	221	33.1%	446	66.9%	667
COLUMBUS	144	24.7%	438	75.3%	582
CRAVEN	197	21.4%	723	78.6%	920
CUMBERLAND	590	17.2%	2,833	82.8%	3,423
CURRITUCK	16	27.6%	42	72.4%	58
DARE	32	35.2%	59	64.8%	91
DAVIDSON	375	39.6%	573	60.4%	948
DAVIE	76	39.6%	116	60.4%	192
DUPLIN	66	13.2%	433	86.8%	499
DURHAM	207	14.2%	1,250	85.8%	1,457
EDGECOMBE	93	17.1%	450	82.9%	543
FORSYTH	431	22.0%	1,528	78.0%	1,959
FRANKLIN	50	18.4%	222	81.6%	272
GASTON	460	34.3%	883	65.7%	1,343
GATES	7	17.5%	33	82.5%	40
GRAHAM	28	32.9%	57	67.1%	85
GRANVILLE	72	25.5%	210	74.5%	282
GREENE	23	14.6%	135	85.4%	158
GUILFORD	567	21.9%	2,027	78.1%	2,594
HALIFAX	78	15.8%	415	84.2%	493
HARNETT	179	25.8%	514	74.2%	693
HAYWOOD	127	39.8%	192	60.2%	319
HENDERSON	167	32.1%	353	67.9%	520
HERTFORD	41	17.8%	189	82.2%	230
HOKE	86	19.8%	349	80.2%	435
HYDE	4	15.4%	22	84.6%	26
IREDELL	204	30.0%	475	70.0%	679
JACKSON	66	29.6%	157	70.4%	223
JOHNSTON	174	23.6%	564	76.4%	738

Table 5. Smoking During Pregnancy Among Women in NC-PNSS, 1999

COUNTY	Smokers		Non-smokers		TOTAL
	#	%	#	%	#
NORTH CAROLINA	13,234	23.9%	42,207	76.1%	55,441
JONES	28	32.2%	59	67.8%	87
LEE	83	19.1%	351	80.9%	434
LENOIR	116	22.5%	400	77.5%	516
LINCOLN	112	29.9%	263	70.1%	375
MACON	59	31.2%	130	68.8%	189
MADISON	53	42.4%	72	57.6%	125
MARTIN	35	15.7%	188	84.3%	223
MCDOWELL	105	33.2%	211	66.8%	316
MECKLENBURG	497	14.9%	2,833	85.1%	3,330
MITCHELL	36	32.7%	74	67.3%	110
MONTGOMERY	51	21.3%	188	78.7%	239
MOORE	128	26.7%	352	73.3%	480
NASH	132	20.5%	513	79.5%	645
NEW HANOVER	229	24.3%	712	75.7%	941
NORTHAMPTON	22	11.7%	166	88.3%	188
ONSLOW	357	17.0%	1,749	83.0%	2,106
ORANGE	105	26.4%	292	73.6%	397
PAMLICO	27	32.5%	56	67.5%	83
PASQUOTANK	40	16.1%	209	83.9%	249
PENDER	65	22.7%	221	77.3%	286
PERQUIMANS	16	20.0%	64	80.0%	80
PERSON	79	31.6%	171	68.4%	250
PITT	176	16.1%	915	83.9%	1,091
POLK	27	30.3%	62	69.7%	89
RANDOLPH	277	32.7%	571	67.3%	848
RICHMOND	140	28.5%	352	71.5%	492
ROBESON	390	25.7%	1,128	74.3%	1,518
ROCKINGHAM	209	30.8%	470	69.2%	679
ROWAN	230	28.4%	581	71.6%	811
RUTHERFORD	168	36.0%	299	64.0%	467
SAMPSON	97	16.8%	480	83.2%	577
SCOTLAND	96	23.2%	317	76.8%	413
STANLY	91	24.8%	276	75.2%	367
STOKES	112	45.5%	134	54.5%	246
SURRY	175	36.8%	300	63.2%	475
SWAIN	76	50.7%	74	49.3%	150
TRANSYLVANIA	57	35.0%	106	65.0%	163
TYRRELL	13	37.1%	22	62.9%	35
UNION	164	23.0%	548	77.0%	712
VANCE	68	14.3%	408	85.7%	476
WAKE	477	17.9%	2,188	82.1%	2,665
WARREN	24	14.5%	141	85.5%	165
WASHINGTON	17	14.5%	100	85.5%	117
WATAUGA	45	22.8%	152	77.2%	197
WAYNE	239	23.5%	779	76.5%	1,018
WILKES	186	37.2%	314	62.8%	500
WILSON	77	12.4%	542	87.6%	619
YADKIN	77	33.3%	154	66.7%	231
YANCEY	36	27.5%	95	72.5%	131

Maternal Smoking By Race/Ethnicity By Age

Smoking by women over 25 years of age is more strongly associated with an increased risk of preterm delivery, compared with smoking by women aged 25 years or younger.⁶ Women aged 35 years of age and older had the highest rate of smoking (30%). Women under 18 years old smoked at a rate of 20%.

There were dramatic differences in prevalence of smoking by ethnicity (Table 6 on page 23). Whites, non-Hispanic and Native American, non-Hispanic had very high rates of smoking (37% and 31%, respectively), while Asians and Hispanics had relatively low rates of smoking (5% and 3%, respectively). White, non-Hispanic were nearly three times more likely to smoke than black, non-Hispanic women (37% vs. 14%).

White women under age 18 had a high rate of smoking (36%). In contrast, only 8% of Black women under age 18 smoked during their pregnancies. However, the rate of smoking among Blacks increased dramatically with age. For example, Black women aged 35 years and older were more than three times more likely to smoke than Black women under 18 years of age (25% and 8%, respectively, Figure 7).

Figure 7. Prevalence of Smoking by Age by Race/Ethnicity in Women Participating in WIC and Public Prenatal Clinics, North Carolina 1999

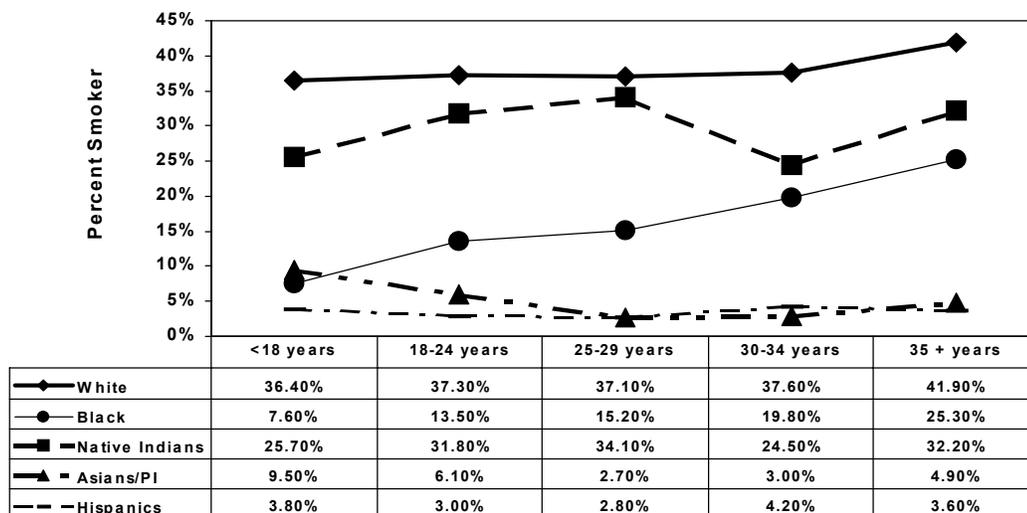


Table 6. Maternal Smoking During Pregnancy By Race/Ethnicity By Age, North Carolina, 1999

Race/Ethnicity	Age Group	Smokers		Non-Smokers		Total
		Count	%	Count	%	Count
White, non-Hispanic	<18 years	743	36.4%	1300	63.6%	2043
	18-24 years	5157	37.3%	8668	62.7%	13825
	25-29 years	2129	37.1%	3604	62.9%	5733
	30-34 years	936	37.6%	1554	62.4%	2490
	35 + years	494	41.9%	684	58.1%	1178
	<SUBTOTAL>	9459	37.4%	15810	62.6%	25269
Black, non-Hispanic	<18 years	171	7.6%	2074	92.4%	2245
	18-24 years	1519	13.5%	9736	86.5%	11255
	25-29 years	681	15.2%	3806	84.8%	4487
	30-34 years	442	19.8%	1795	80.2%	2237
	35 + years	297	25.3%	879	74.7%	1176
	<SUBTOTAL>	3110	14.5%	18290	85.5%	21400
Native American, non-Hispanic	<18 years	39	25.7%	113	74.3%	152
	18-24 years	235	31.8%	504	68.2%	739
	25-29 years	93	34.1%	180	65.9%	273
	30-34 years	25	24.5%	77	75.5%	102
	35 + years	19	32.2%	40	67.8%	59
	<SUBTOTAL>	411	31.0%	914	69.0%	1325
Asian, non-Hispanic	<18 years	7	9.5%	67	90.5%	74
	18-24 years	19	6.1%	293	93.9%	312
	25-29 years	6	2.7%	218	97.3%	224
	30-34 years	4	3.0%	128	97.0%	132
	35 + years	4	4.9%	78	95.1%	82
	<SUBTOTAL>	40	4.9%	784	95.1%	824
Hispanic	<18 years	16	3.8%	400	96.2%	416
	18-24 years	102	3.0%	3274	97.0%	3376
	25-29 years	50	2.8%	1708	97.2%	1758
	30-34 years	32	4.2%	721	95.8%	753
	35 + years	11	3.6%	291	96.4%	302
	<SUBTOTAL>	211	3.2%	6394	96.8%	6605
Total	<18 years	976	19.8%	3954	80.2%	4930
	18-24 years	7032	23.8%	22475	76.2%	29507
	25-29 years	2959	23.7%	9516	76.3%	12475
	30-34 years	1439	25.2%	4275	74.8%	5714
	35 + years	825	29.5%	1972	70.5%	2797
	Total	13234	23.9%	42207	76.1%	55441

North Carolina Pregnancy Nutrition Surveillance System

Maternal Smoking and Level of Education

Level of education was a strong predictor of cigarette smoking (Table 7 on page 25). Women with less than a high school education had a high prevalence of smoking (30%) and were twice as likely to smoke as women with more than 12 years of school (15%). Among all ethnic groups except Hispanics, women who had completed more than 12 years of school had the lowest rates of smoking. Large proportions of white women (51%) and Native American women (44%) with less than a high school education smoked during their pregnancies. Twenty-three percent of Black women with less than a high school education smoked.

Maternal Smoking, Body Mass Index (BMI), and Low Birthweight

Overall, women who smoked cigarettes during pregnancy were more likely to give birth to a low birthweight baby compared with non-smokers (14% vs. 9%). (Table 8 on page 26.) Maternal cigarette smoking and prepregnancy BMI each had an independent effect on the risk of low birthweight. Infants of underweight smokers had the highest incidence of low birthweight (20%), while infants of overweight non-smokers had the lowest incidence (7%).

Discussion

The reported prevalence of cigarette use among low-income pregnant women has remained relatively constant since 1991. Prevalence of smoking still very high, especially among white women and women with less than a high school education. Cigarette smoking is one of the most significant risk factors for low birthweight. Cessation of smoking at any point during pregnancy has a positive impact on maternal well-being and infant birthweight. Low-income pregnant women should be provided with health education about the negative effects of cigarette smoke on the developing infant and about methods of smoking cessation which have proven to be effective. Support for smoking cessation should be provided by all health professionals.

Table 7. Maternal Smoking During Pregnancy By Race/Ethnicity By Maternal Education

North Carolina, 1999

Race/Ethnicity	Education Level	Smokers		Non-Smokers		Total
		Count	%	Count	%	Count
White, non-Hispanic	<12 years	4315	50.8%	4182	49.2%	8497
	High School	3791	34.8%	7100	65.2%	10891
	>12 years	1340	22.9%	4510	77.1%	5850
	<SUBTOTAL>	9459	37.4%	15810	62.6%	25269
Black, non-Hispanic	<12 years	1423	22.5%	4892	77.5%	6315
	High School	1227	13.1%	8105	86.9%	9332
	>12 years	452	7.9%	5261	92.1%	5713
	<SUBTOTAL>	3110	14.5%	18290	85.5%	21400
Native, non-Hispanic	<12 years	223	43.6%	289	56.4%	512
	High School	141	25.4%	415	74.6%	556
	>12 years	47	18.4%	208	81.6%	255
	<SUBTOTAL>	411	31.0%	914	69.0%	1325
Asian, non-Hispanic	<12 years	18	6.5%	258	93.5%	276
	High School	15	4.8%	300	95.2%	315
	>12 years	6	2.7%	214	97.3%	220
	<SUBTOTAL>	40	4.9%	784	95.1%	824
Hispanic	<12 years	106	2.4%	4268	97.6%	4374
	High School	73	5.1%	1368	94.9%	1441
	>12 years	29	4.1%	687	95.9%	716
	<SUBTOTAL>	211	3.2%	6394	96.8%	6605
Total	<12 years	6085	30.4%	13889	69.5%	19991
	High School	5247	23.3%	17288	76.7%	22548
	>12 years	1874	14.7%	10880	85.3%	12761
	Total	13234	23.9%	42207	76.1%	55441

North Carolina Pregnancy Nutrition Surveillance System

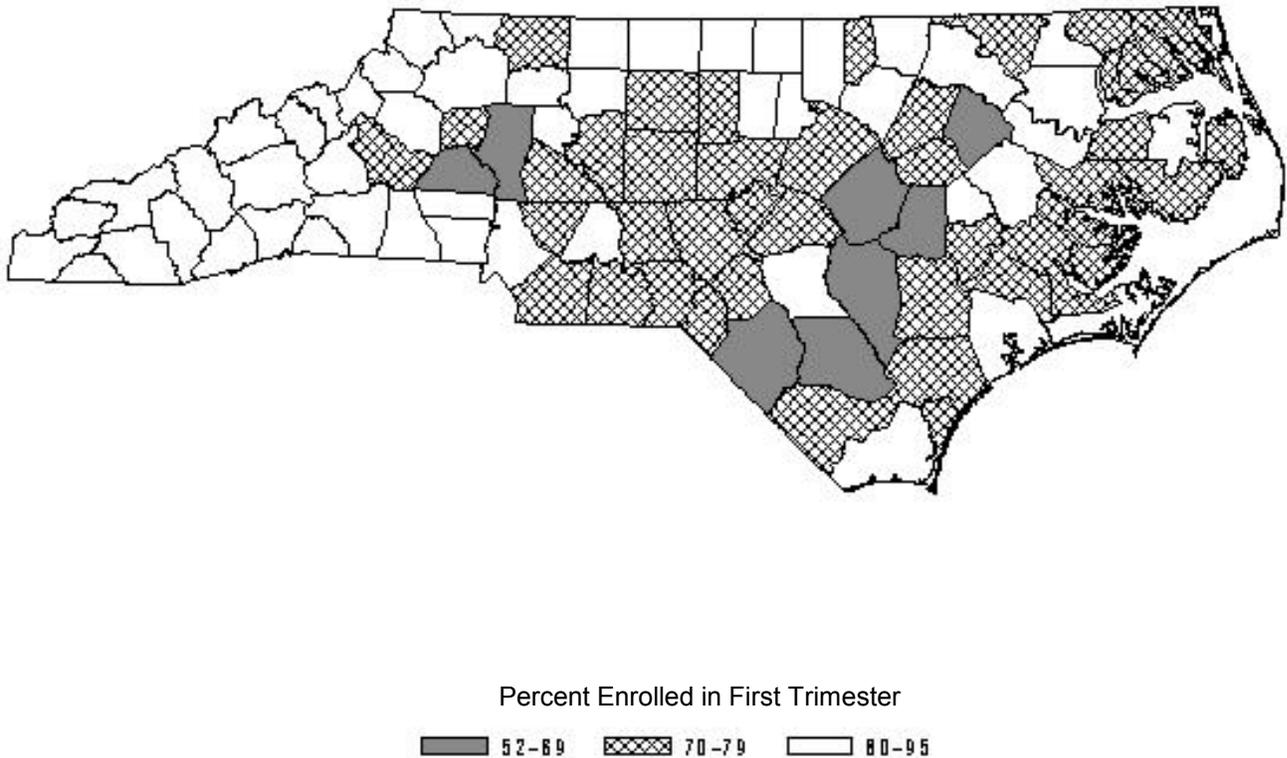
Table 8. Infant Birthweight Distribution By Maternal Prepregnancy BMI By Smoking Status During Pregnancy of Women on Prenatal WIC, North Carolina 1999

		INFANT BIRTWEIGHT						
Prepregnancy Body Mass Index	Tobacco Use	<2500 GRAMS		2500-4500 GRAMS		> 4500 GRAMS		Total
		Count	%	Count	%	Count	%	Count
Underweight (BMI <18.5)	Smokers	204	19.9%	819	79.7%	4	0.4%	1,027
	Non-smokers	232	12.5%	1,614	87.1%	8	0.4%	1,854
	Subtotal	436	15.1%	2,433	84.4%	12	0.4%	2,881
Normal Weight (BMI 18.5 to 24.9)	Smokers	662	13.6%	4,202	86.1%	19	0.4%	4,883
	Non-smokers	1,189	8.2%	13,096	90.8%	132	0.9%	14,417
	Subtotal	1,851	9.6%	17,298	89.6%	151	0.8%	19,300
Overweight (BMI 25.0 to 29.9)	Smokers	268	11.7%	2,008	87.5%	20	0.9%	2,296
	Non-smokers	550	7.2%	6,929	91.3%	109	1.4%	7,588
	Subtotal	818	8.3%	8,937	90.4%	129	1.3%	9,884
Obese (BMI >=30.0)	Smokers	254	10.5%	2,135	88.5%	24	1.0%	2,413
	Non-smokers	769	8.9%	7,644	88.7%	203	2.4%	8,616
	Subtotal	1,023	9.3%	9,779	88.7%	227	2.1%	11,029
Total Women in PNSS	Smokers	1,837	13.9%	11,314	85.5%	83	0.6%	13,234
	Non-smokers	3,914	9.3%	37,685	89.3%	608	1.4%	42,207
	Total	5,756	10.4%	49,015	88.4%	692	1.2%	55,463

Prenatal Care

Early and comprehensive prenatal care has been shown to positively affect pregnancy outcomes among low-income women. The majority of women (78%) reported that they initiated prenatal medical care in the first trimester (Table 9 on page 29). According to NC-PNSS 1999 data, 1% of low-income women received no prenatal care, about 3% began prenatal medical care in their third trimester, and about 18% began care in their second trimester. County-specific rates for women entering prenatal medical care in first trimester varied from 52% to 95% (Figure 8).

Figure 8. Proportion of Women Entering Prenatal Medical Care in First Trimester, North Carolina Counties, 1999



Women under 18 years of age were least likely to receive prenatal care in the first trimester (68%), compared to women in other age groups. (Table 10a on page 31) White, non-Hispanic women were more likely to begin prenatal care early than any other race/ethnic group (Table 10b on page 31). Level of education was positively associated with prenatal care beginning in the first trimester. Women with more than a high school education had the highest rate of early prenatal care (86%). (Table 10c on page 31.)

Prenatal care was considered inadequate when a woman's first prenatal medical care began after the 4th month or included fewer than 50% of the number of visits recommended by the American College of Obstetrics and Gynecologists.¹ Overall, 14% of women received inadequate prenatal care (Table 11 on page 32). White, non-Hispanic women had the lowest prevalence of inadequate prenatal care (9%) and Hispanic women had the highest rate of inadequate prenatal care (23%). Within each race/ethnic group, women under 18 years old were more likely than older women to have received inadequate prenatal care. Level of education was also associated with inadequate prenatal care in every race/ethnic group (Table 12 on page 33). According to PNSS 1999 data, women with less than a high school education were over twice more likely to receive inadequate prenatal care than women with over 12 years of school education (8% vs. 19%, respectively).

Table 9. Women in NC-PNSS Entering Prenatal Care by Trimester, 1999

COUNTY	No Care		1st Trimester		2nd Trimester		3rd Trimester		TOTAL
	#	%	#	%	#	%	#	%	#
NORTH CAROLINA	527	1.0%	42,907	78.1%	9,851	17.9%	1,685	3.1%	54,970
ALAMANCE	7	0.8%	654	77.4%	148	17.5%	36	4.3%	845
ALEXANDER	-	0.0%	144	72.7%	43	21.7%	11	5.6%	198
ALLEGHANY	-	0.0%	48	81.4%	11	18.6%	-	0.0%	59
ANSON	2	0.8%	187	75.4%	46	18.5%	13	5.2%	248
ASHE	-	0.0%	153	86.4%	20	11.3%	4	2.3%	177
AVERY	-	0.0%	98	91.6%	8	7.5%	1	0.9%	107
BEAUFORT	-	0.0%	294	78.8%	70	18.8%	9	2.4%	373
BERTIE	1	0.5%	159	81.1%	31	15.8%	5	2.6%	196
BLADEN	1	0.3%	179	61.7%	89	30.7%	21	7.2%	290
BRUNSWICK	6	1.3%	366	82.2%	56	12.6%	17	3.8%	445
BUNCOMBE	11	0.9%	1,159	90.3%	97	7.6%	17	1.3%	1,284
BURKE	1	0.2%	426	74.0%	123	21.4%	26	4.5%	576
CABARRUS	1	0.1%	521	74.6%	146	20.9%	30	4.3%	698
CALDWELL	10	1.7%	517	86.9%	62	10.4%	6	1.0%	595
CAMDEN	-	0.0%	20	76.9%	5	19.2%	1	3.8%	26
CARTERET	3	1.0%	251	85.1%	40	13.6%	1	0.3%	295
CASWELL	2	1.7%	94	81.7%	17	14.8%	2	1.7%	115
CATAWBA	2	0.2%	606	68.5%	237	26.8%	40	4.5%	885
CHATHAM	1	0.4%	199	75.4%	56	21.2%	8	3.0%	264
CHEROKEE	-	0.0%	160	92.0%	14	8.0%	-	0.0%	174
CHOWAN	-	0.0%	88	76.5%	25	21.7%	2	1.7%	115
CLAY	-	0.0%	32	88.9%	3	8.3%	1	2.8%	36
CLEVELAND	5	0.8%	533	80.2%	107	16.1%	20	3.0%	665
COLUMBUS	11	2.0%	386	69.9%	118	21.4%	37	6.7%	552
CRAVEN	4	0.4%	713	78.5%	175	19.3%	16	1.8%	908
CUMBERLAND	29	0.8%	2,846	83.4%	487	14.3%	51	1.5%	3,413
CURRITUCK	-	0.0%	44	75.9%	8	13.8%	6	10.3%	58
DARE	-	0.0%	65	71.4%	25	27.5%	1	1.1%	91
DAVIDSON	10	1.1%	724	76.9%	185	19.7%	22	2.3%	941
DAVIE	2	1.0%	167	87.0%	20	10.4%	3	1.6%	192
DUPLIN	4	0.8%	386	78.0%	95	19.2%	10	2.0%	495
DURHAM	23	1.6%	1,155	81.7%	213	15.1%	22	1.6%	1,413
EDGECOMBE	9	1.7%	361	66.6%	148	27.3%	24	4.4%	542
FORSYTH	21	1.1%	1,627	83.3%	262	13.4%	43	2.2%	1,953
FRANKLIN	1	0.4%	221	82.8%	42	15.7%	3	1.1%	267
GASTON	22	1.6%	1,148	85.5%	151	11.2%	22	1.6%	1,343
GATES	1	2.5%	31	77.5%	5	12.5%	3	7.5%	40
GRAHAM	-	0.0%	81	95.3%	4	4.7%	-	0.0%	85
GRANVILLE	5	1.8%	225	80.9%	42	15.1%	6	2.2%	278
GREENE	-	0.0%	125	79.6%	30	19.1%	2	1.3%	157
GUILFORD	26	1.0%	2,033	78.6%	448	17.3%	81	3.1%	2,588
HALIFAX	5	1.0%	413	84.5%	57	11.7%	14	2.9%	489
HARNETT	3	0.4%	499	72.3%	161	23.3%	27	3.9%	690
HAYWOOD	1	0.3%	285	89.3%	27	8.5%	6	1.9%	319
HENDERSON	2	0.4%	458	88.2%	53	10.2%	6	1.2%	519
HERTFORD	1	0.4%	199	86.5%	25	10.9%	5	2.2%	230
HOKE	6	1.4%	331	76.4%	86	19.9%	10	2.3%	433
HYDE	-	0.0%	20	76.9%	6	23.1%	-	0.0%	26
IREDELL	4	0.6%	460	68.1%	178	26.4%	33	4.9%	675
JACKSON	1	0.4%	204	91.5%	18	8.1%	-	0.0%	223
JOHNSTON	11	1.5%	377	52.4%	253	35.1%	79	11.0%	720

Table 9. Women in NC-PNSS Entering Prenatal Care by Trimester, 1999

COUNTY	No Care		1 Trimester		2 Trimester		3 Trimester		TOTAL
	#	%	#	%	#	%	#	%	#
NORTH CAROLINA	527	1.0%	42,907	78.1%	9,851	17.9%	1,685	3.1%	54,970
JONES	1	1.2%	65	75.6%	15	17.4%	5	5.8%	86
LEE	3	0.7%	306	71.2%	101	23.5%	20	4.7%	430
LENOIR	4	0.8%	359	70.4%	128	25.1%	19	3.7%	510
LINCOLN	2	0.5%	298	79.7%	65	17.4%	9	2.4%	374
MACON	1	0.5%	167	90.3%	15	8.1%	2	1.1%	185
MADISON	-	0.0%	114	91.2%	10	8.0%	1	0.8%	125
MARTIN	2	0.9%	187	83.9%	32	14.3%	2	0.9%	223
MCDOWELL	-	0.0%	263	84.3%	47	15.1%	2	0.6%	312
MECKLENBURG	52	1.6%	2,650	79.9%	540	16.3%	74	2.2%	3,316
MITCHELL	-	0.0%	95	87.2%	12	11.0%	2	1.8%	109
MONTGOMERY	1	0.4%	174	73.4%	54	22.8%	8	3.4%	237
MOORE	8	1.7%	336	70.9%	106	22.4%	24	5.1%	474
NASH	8	1.2%	457	71.2%	147	22.9%	30	4.7%	642
NEW HANOVER	6	0.6%	728	77.8%	173	18.5%	29	3.1%	936
NORTHAMPTON	2	1.1%	146	78.5%	35	18.8%	3	1.6%	186
ONSLow	23	1.1%	1,844	87.8%	212	10.1%	21	1.0%	2,100
ORANGE	1	0.3%	317	80.1%	68	17.2%	10	2.5%	396
PAMLICO	-	0.0%	63	76.8%	16	19.5%	3	3.7%	82
PASQUOTANK	3	1.2%	188	75.8%	48	19.4%	9	3.6%	248
PENDER	3	1.1%	216	75.8%	53	18.6%	13	4.6%	285
PERQUIMANS	2	2.5%	63	78.8%	14	17.5%	1	1.3%	80
PERSON	1	0.4%	208	84.2%	33	13.4%	5	2.0%	247
PITT	15	1.4%	878	81.2%	173	16.0%	15	1.4%	1,081
POLK	-	0.0%	74	82.2%	14	15.6%	2	2.2%	90
RANDOLPH	10	1.2%	666	79.2%	139	16.5%	26	3.1%	841
RICHMOND	5	1.0%	360	73.6%	110	22.5%	14	2.9%	489
ROBESON	24	1.6%	952	63.4%	459	30.6%	67	4.5%	1,502
ROCKINGHAM	4	0.6%	561	82.9%	95	14.0%	17	2.5%	677
ROWAN	7	0.9%	566	70.3%	197	24.5%	35	4.3%	805
RUTHERFORD	3	0.6%	378	80.8%	66	14.1%	21	4.5%	468
SAMPSON	2	0.4%	389	68.4%	148	26.0%	30	5.3%	569
SCOTLAND	9	2.2%	299	73.3%	84	20.6%	16	3.9%	408
STANLY	-	0.0%	294	81.2%	59	16.3%	9	2.5%	362
STOKES	-	0.0%	224	91.8%	18	7.4%	2	0.8%	244
SURRY	2	0.4%	350	74.0%	104	22.0%	17	3.6%	473
SWAIN	-	0.0%	132	88.0%	16	10.7%	2	1.3%	150
TRANSYLVANIA	-	0.0%	134	82.2%	27	16.6%	2	1.2%	163
TYRRELL	-	0.0%	29	82.9%	4	11.4%	2	5.7%	35
UNION	5	0.7%	519	74.0%	142	20.3%	35	5.0%	701
VANCE	6	1.3%	363	76.4%	89	18.7%	17	3.6%	475
WAKE	33	1.3%	1,845	69.9%	633	24.0%	129	4.9%	2,640
WARREN	2	1.2%	134	81.2%	26	15.8%	3	1.8%	165
WASHINGTON	1	0.9%	88	75.2%	25	21.4%	3	2.6%	117
WATAUGA	-	0.0%	179	90.9%	17	8.6%	1	0.5%	197
WAYNE	16	1.7%	550	58.1%	295	31.2%	86	9.1%	947
WILKES	3	0.6%	425	85.0%	61	12.2%	11	2.2%	500
WILSON	-	0.0%	476	76.9%	123	19.9%	20	3.2%	619
YADKIN	2	0.9%	206	88.8%	18	7.8%	6	2.6%	232
YANCEY	-	0.0%	120	91.6%	9	6.9%	2	1.5%	131

Table 10a. Prenatal Care By Maternal Age, NC 1999

	1st Trimester		2nd Trimester		3rd Trimester		Total
North Carolina	42907	78.1%	9851	17.9%	1685	3.1%	54970
AGE	Count	%	Count	%	Count	%	Count
<18 years	3249	67.8%	1281	26.7%	263	5.5%	4793
18-24 years	22592	78.0%	5463	18.9%	897	3.1%	28952
25-29 years	10142	82.9%	1789	14.6%	297	2.4%	12228
30-34 years	4625	82.7%	829	14.8%	137	2.5%	5591
35 + years	2199	80.6%	445	16.3%	83	3.0%	2727

Table 10b. Prenatal Care By Maternal Race/Ethnicity, NC 1999

	1st Trimester		2nd Trimester		3rd Trimester		Total
Race/Ethnicity	Count	%	Count	%	Count	%	Count
White, non-Hispanic	21202	85.0%	3318	13.3%	438	1.8%	24958
Black, non-Hispanic	15691	75.1%	4435	21.2%	756	3.6%	20882
Native American, non-Hispanic	959	74.3%	299	23.2%	33	2.6%	1291
Asian, non-Hispanic	558	69.8%	211	26.4%	31	3.9%	800
Hispanic	4397	69.1%	1544	24.3%	419	6.6%	6360

Table 10c. Prenatal Care By Maternal Education, NC 1999

	1st Trimester		2nd Trimester		3rd Trimester		Total
EDUCATION	Count	%	Count	%	Count	%	Count
<12 years	13955	71.6%	4610	23.7%	914	4.7%	19479
H.S. Graduate	17990	81.1%	3648	16.4%	557	2.5%	22195
>12 years	10862	86.1%	1549	12.3%	206	1.6%	12617

Table 11. Adequacy of Prenatal Care Utilization (Kotelchuck Index) By Maternal Race/Ethnicity and By Maternal Age , NC 1999

Race/Ethnicity	Kotelchuck Index	MISSING INFO		INADEQUATE		INTERMEDIATE		ADEQUATE		ADEQUATE +		Total
	Age Group	#	%	#	%	#	%	#	%	#	%	
White,non-Hispanic	Under 18	16	0.8%	270	13.2%	130	6.4%	814	39.8%	813	39.8%	2,043
	18-24	122	0.9%	1,178	8.5%	998	7.2%	5,507	39.8%	6,024	43.6%	13,829
	25-29	39	0.7%	402	7.0%	363	6.3%	2,234	39.0%	2,697	47.0%	5,735
	30-34	22	0.9%	182	7.3%	135	5.4%	959	38.5%	1,193	47.9%	2,491
	35 or older	13	1.1%	115	9.8%	71	6.0%	382	32.4%	597	50.7%	1,178
	White Total	212	0.8%	2,147	8.5%	1,697	6.7%	9,896	39.2%	11,324	44.8%	25,276
Black,non-Hispanic	Under 18	36	1.6%	610	27.2%	173	7.7%	669	29.8%	758	33.7%	2,246
	18-24	131	1.2%	1,882	16.7%	892	7.9%	3,733	33.2%	4,620	41.0%	11,258
	25-29	58	1.3%	553	12.3%	317	7.1%	1,464	32.6%	2,098	46.7%	4,490
	30-34	26	1.2%	294	13.1%	133	5.9%	715	31.9%	1,070	47.8%	2,238
	35 or older	15	1.3%	175	14.9%	92	7.8%	316	26.8%	579	49.2%	1,177
	Black Total	266	1.2%	3,514	16.4%	1,607	7.5%	6,897	32.2%	9,125	42.6%	21,409
Native American,non-Hispanic	Under 18	1	0.7%	30	19.7%	15	9.9%	60	39.5%	46	30.3%	152
	18-24	10	1.4%	117	15.8%	97	13.1%	297	40.2%	218	29.5%	739
	25-29	3	1.1%	28	10.3%	30	11.0%	107	39.2%	105	38.5%	273
	30-34	1	1.0%	12	11.8%	7	6.9%	39	38.2%	43	42.2%	102
	35 or older	-	0.0%	4	6.8%	6	10.2%	27	45.8%	22	37.3%	59
	Native American Total	15	1.1%	191	14.4%	155	11.7%	530	40.0%	434	32.8%	1,325
Asian/Pacific Islander,non-Hispanic	Under 18	2	2.7%	24	32.4%	9	12.2%	24	32.4%	15	20.3%	74
	18-24	1	0.3%	60	19.2%	34	10.9%	119	38.1%	98	31.4%	312
	25-29	-	0.0%	36	16.1%	11	4.9%	99	44.2%	78	34.8%	224
	30-34	3	2.3%	17	12.9%	12	9.1%	57	43.2%	43	32.6%	132
	35 or older	1	1.2%	8	9.8%	9	11.0%	30	36.6%	34	41.5%	82
	Asian/Pacific Islander Total	7	0.8%	145	17.6%	75	9.1%	329	39.9%	268	32.5%	824
Hispanic	Under 18	9	2.2%	125	30.0%	36	8.6%	143	34.3%	104	24.9%	417
	18-24	78	2.3%	798	23.6%	419	12.4%	1,200	35.5%	885	26.2%	3,380
	25-29	68	3.9%	364	20.7%	213	12.1%	621	35.3%	493	28.0%	1,759
	30-34	17	2.3%	154	20.5%	80	10.6%	274	36.4%	228	30.3%	753
	35 or older	4	1.3%	61	20.2%	25	8.3%	112	37.1%	100	33.1%	302
	Hispanic Total	176	2.7%	1,502	22.7%	773	11.7%	2,350	35.5%	1,810	27.4%	6,611
All Races	Under 18	64	1.3%	1,059	21.5%	363	7.4%	1,710	34.7%	1,736	35.2%	4,932
	18-24	342	1.2%	4,035	13.7%	2,440	8.3%	10,856	36.8%	11,845	40.1%	29,518
	25-29	168	1.3%	1,383	11.1%	934	7.5%	4,525	36.3%	5,471	43.8%	12,481
	30-34	69	1.2%	659	11.5%	367	6.4%	2,044	35.8%	2,577	45.1%	5,716
	35 or older	33	1.2%	363	13.0%	203	7.3%	867	31.0%	1,332	47.6%	2,798
	NORTH CAROLINA	676	1.2%	7,502	13.5%	4,308	7.8%	20,009	36.1%	22,968	41.4%	55,463

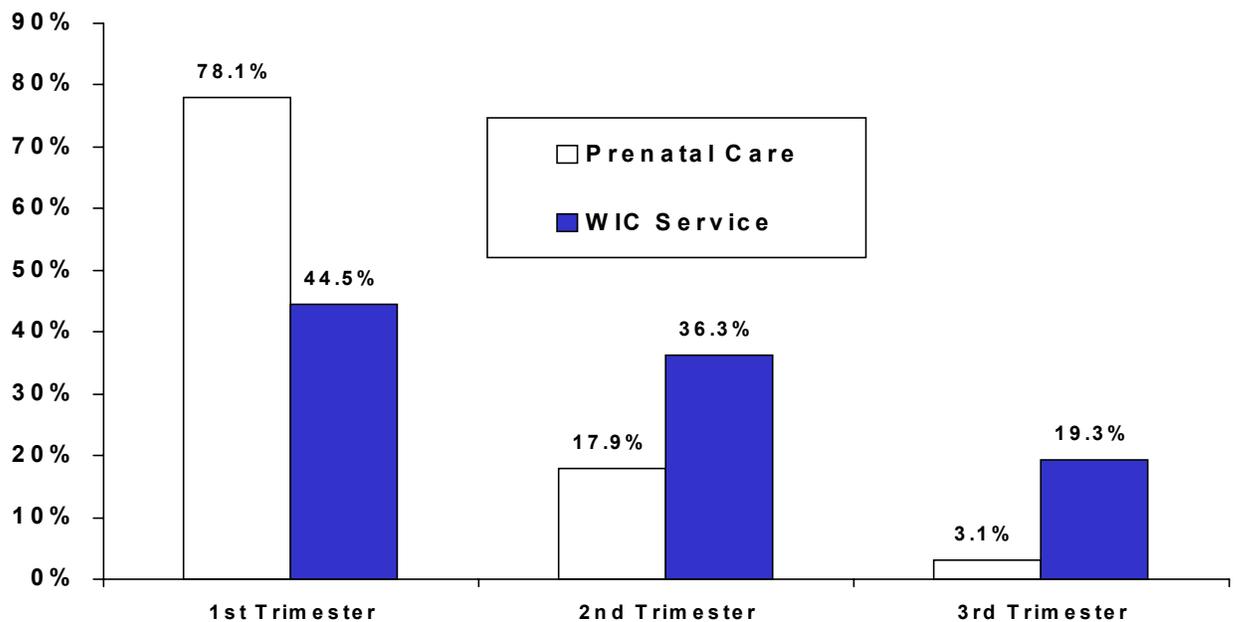
Table 12. Adequacy of Prenatal Care Utilization (Kotelchuck Index) By Maternal Race/Ethnicity and By Maternal Education, NC 1999

Race/Ethnicity	Kotelchuck Index	MISSING INFO		INADEQUATE		INTERMEDIATE		ADEQUATE		ADEQUATE +		Total
	Education	#	%	#	%	#	%	#	%	#	%	#
White,non-Hispanic	Under 12 years	68	0.8%	984	11.6%	620	7.3%	3,155	37.1%	3,673	43.2%	8,500
	High School	94	0.9%	814	7.5%	716	6.6%	4,333	39.8%	4,936	45.3%	10,893
	Over 12 years	42	0.7%	345	5.9%	360	6.2%	2,399	41.0%	2,706	46.2%	5,852
	White Total	212	0.8%	2,147	8.5%	1,697	6.7%	9,896	39.2%	11,324	44.8%	25,276
Black,non-Hispanic	Under 12 years	100	1.6%	1,524	24.1%	551	8.7%	1,874	29.7%	2,271	35.9%	6,320
	High School	96	1.0%	1,412	15.1%	692	7.4%	3,131	33.5%	4,003	42.9%	9,334
	Over 12 years	62	1.1%	571	10.0%	359	6.3%	1,887	33.0%	2,835	49.6%	5,714
	Black Total	266	1.2%	3,514	16.4%	1,607	7.5%	6,897	32.2%	9,125	42.6%	21,409
Native American,non-Hispanic	Under 12 years	6	1.2%	101	19.7%	63	12.3%	185	36.1%	157	30.7%	512
	High School	6	1.1%	75	13.5%	63	11.3%	234	42.1%	178	32.0%	556
	Over 12 years	3	1.2%	15	5.9%	28	11.0%	110	43.1%	99	38.8%	255
	Native American Total	15	1.1%	191	14.4%	155	11.7%	530	40.0%	434	32.8%	1,325
Asian/Pacific Islander,non-Hispanic	Under 12 years	4	1.4%	70	25.4%	30	10.9%	93	33.7%	79	28.6%	276
	High School	2	0.6%	45	14.3%	25	7.9%	139	44.1%	104	33.0%	315
	Over 12 years	1	0.5%	26	11.8%	20	9.1%	91	41.4%	82	37.3%	220
	Asian/Pacific Islander Total	7	0.8%	145	17.6%	75	9.1%	329	39.9%	268	32.5%	824
Hispanic	Under 12 years	132	3.0%	1,167	26.7%	576	13.2%	1,456	33.3%	1,045	23.9%	4,376
	High School	26	1.8%	225	15.6%	135	9.4%	581	40.3%	476	33.0%	1,443
	Over 12 years	6	0.8%	90	12.6%	55	7.7%	297	41.4%	269	37.5%	717
	Hispanic Total	176	2.7%	1,502	22.7%	773	11.7%	2,350	35.5%	1,810	27.4%	6,611
All Races	Under 12 years	310	1.6%	3,849	19.3%	1,840	9.2%	6,766	33.8%	7,226	36.1%	19,991
	High School	224	1.0%	2,571	11.4%	1,632	7.2%	8,420	37.3%	9,701	43.0%	22,548
	Over 12 years	114	0.9%	1,047	8.2%	822	6.4%	4,785	37.5%	5,993	47.0%	12,761
	NORTH CAROLINA	676	1.2%	7,502	13.5%	4,308	7.8%	20,009	36.1%	22,968	41.4%	55,463

Prenatal WIC Enrollment

Prenatal participation in the WIC program has been shown to positively affect pregnancy outcomes among low-income women. Dietary intake and prenatal weight gain are better for women who enroll in the WIC program than for those who do not.^{7,8} The date of the prenatal WIC certification was used to calculate the trimester of WIC enrollment for each woman who participated in WIC during her pregnancy. The majority of low-income women who gave birth in 1999 did not enroll in WIC until their second (36%) or third (19%) trimester. Whereas 78% women received their prenatal care in the first trimester, only 45% received WIC services during first trimester as shown in Figure 9. WIC enrollment in the first trimester varied by county from 24% to 76% (Table 13 on page 36).

Figure 9. Comparison of Women Entering WIC in First Trimester with Women Entering Prenatal Medical Care in First Trimester, North Carolina Counties, 1999



Women 35 years of age and older were slightly less likely to certify in WIC during the first trimester of pregnancy (Table 14a on page 38). There were also racial/ethnic differences in trimester of WIC enrollment. White, non-Hispanic women were nearly twice as likely to enroll in WIC during their first trimester than Asian women (50% vs. 27%, respectively). (Table 14b on page 38.) Level of education had little impact on trimester of WIC enrollment (Table 14c on page 38).

Table 13. Women Certifying in WIC By Trimester of Pregnancy, 1999

COUNTY	Cert. during 1st Trimester		Cert. during 2nd Trimester		Cert. during 3rd Trimester		Total #
	#	%	#	%	#	%	
NORTH CAROLINA	19,144	44.5%	15,620	36.3%	8,299	19.3%	43,063
ALAMANCE	318	47.0%	246	36.3%	113	16.7%	677
ALEXANDER	82	49.7%	45	27.3%	38	23.0%	165
ALLEGHANY	18	40.0%	17	37.8%	10	22.2%	45
ANSON	95	46.1%	82	39.8%	29	14.1%	206
ASHE	96	64.0%	34	22.7%	20	13.3%	150
AVERY	66	71.7%	16	17.4%	10	10.9%	92
BEAUFORT	161	50.9%	96	30.4%	59	18.7%	316
BERTIE	76	44.4%	64	37.4%	31	18.1%	171
BLADEN	131	53.7%	71	29.1%	42	17.2%	244
BRUNSWICK	192	51.3%	123	32.9%	59	15.8%	374
BUNCOMBE	586	56.2%	309	29.7%	147	14.1%	1,042
BURKE	266	56.8%	142	30.3%	60	12.8%	468
CABARRUS	206	37.4%	210	38.1%	135	24.5%	551
CALDWELL	334	64.9%	126	24.5%	55	10.7%	515
CAMDEN	12	48.0%	9	36.0%	4	16.0%	25
CARTERET	121	49.6%	88	36.1%	35	14.3%	244
CASWELL	47	49.0%	32	33.3%	17	17.7%	96
CATAWBA	320	47.8%	220	32.8%	130	19.4%	670
CHATHAM	82	40.4%	84	41.4%	37	18.2%	203
CHEROKEE	102	71.8%	25	17.6%	15	10.6%	142
CHOWAN	38	39.6%	37	38.5%	21	21.9%	96
CLAY	20	66.7%	7	23.3%	3	10.0%	30
CLEVELAND	312	54.8%	167	29.3%	90	15.8%	569
COLUMBUS	217	48.2%	148	32.9%	85	18.9%	450
CRAVEN	221	29.9%	316	42.8%	202	27.3%	739
CUMBERLAND	747	30.2%	1,076	43.5%	649	26.3%	2,472
CURRITUCK	24	47.1%	16	31.4%	11	21.6%	51
DARE	32	43.2%	28	37.8%	14	18.9%	74
DAVIDSON	464	61.7%	190	25.3%	98	13.0%	752
DAVIE	85	60.3%	37	26.2%	19	13.5%	141
DUPLIN	166	46.8%	131	36.9%	58	16.3%	355
DURHAM	470	42.2%	454	40.7%	191	17.1%	1,115
EDGECOMBE	168	39.1%	183	42.6%	79	18.4%	430
FORSYTH	522	36.6%	573	40.2%	332	23.3%	1,427
FRANKLIN	110	48.7%	78	34.5%	38	16.8%	226
GASTON	458	44.4%	366	35.5%	207	20.1%	1,031
GATES	8	28.6%	11	39.3%	9	32.1%	28
GRAHAM	55	76.4%	9	12.5%	8	11.1%	72
GRANVILLE	99	47.4%	71	34.0%	39	18.7%	209
GREENE	78	56.9%	39	28.5%	20	14.6%	137
GUILFORD	729	39.3%	698	37.6%	430	23.2%	1,857
HALIFAX	149	39.5%	164	43.5%	64	17.0%	377
HARNETT	236	42.8%	220	39.9%	96	17.4%	552
HAYWOOD	170	65.4%	61	23.5%	29	11.2%	260
HENDERSON	231	53.8%	138	32.2%	60	14.0%	429
HERTFORD	69	37.9%	72	39.6%	41	22.5%	182
HOKE	115	35.4%	138	42.5%	72	22.2%	325
HYDE	5	31.3%	5	31.3%	6	37.5%	16
IREDELL	206	38.6%	221	41.5%	106	19.9%	533
JACKSON	116	63.4%	45	24.6%	22	12.0%	183
JOHNSTON	216	40.8%	217	40.9%	97	18.3%	530

Table 13. Women Certifying in WIC By Trimester of Pregnancy, 1999

COUNTY	Cert. during 1st Trimester		Cert. during 2nd Trimester		Cert. during 3rd Trimester		Total #
	#	%	#	%	#	%	
NORTH CAROLINA	9,297	44.2%	7,702	36.6%	4,057	19.3%	21,019
JONES	44	57.1%	25	32.5%	8	10.4%	77
LEE	116	33.3%	143	41.1%	89	25.6%	348
LENOIR	207	47.8%	162	37.4%	64	14.8%	433
LINCOLN	94	33.8%	113	40.6%	71	25.5%	278
MACON	96	60.4%	42	26.4%	21	13.2%	159
MADISON	56	53.8%	31	29.8%	17	16.3%	104
MARTIN	120	63.5%	54	28.6%	15	7.9%	189
MCDOWELL	134	55.8%	55	22.9%	51	21.3%	240
MECKLENBURG	591	24.3%	1,054	43.3%	787	32.4%	2,432
MITCHELL	50	56.2%	25	28.1%	14	15.7%	89
MONTGOMERY	108	54.0%	68	34.0%	24	12.0%	200
MOORE	158	42.8%	152	41.2%	59	16.0%	369
NASH	264	49.5%	183	34.3%	86	16.1%	533
NEW HANOVER	272	39.4%	253	36.6%	166	24.0%	691
NORTHAMPTON	68	44.4%	63	41.2%	22	14.4%	153
ONslow	751	45.5%	574	34.8%	326	19.7%	1,651
ORANGE	127	41.5%	126	41.2%	53	17.3%	306
PAMLICO	30	44.1%	23	33.8%	15	22.1%	68
PASQUOTANK	101	45.7%	73	33.0%	47	21.3%	221
PENDER	110	48.2%	74	32.5%	44	19.3%	228
PERQUIMANS	39	60.9%	17	26.6%	8	12.5%	64
PERSON	105	50.5%	74	35.6%	29	13.9%	208
PITT	417	51.4%	275	33.9%	119	14.7%	811
POLK	34	54.8%	16	25.8%	12	19.4%	62
RANDOLPH	290	45.6%	224	35.2%	122	19.2%	636
RICHMOND	212	54.6%	117	30.2%	59	15.2%	388
ROBESON	482	42.4%	478	42.1%	176	15.5%	1,136
ROCKINGHAM	286	57.0%	131	26.1%	85	16.9%	502
ROWAN	271	44.7%	221	36.5%	114	18.8%	606
RUTHERFORD	207	53.6%	126	32.6%	53	13.7%	386
SAMPSON	211	46.4%	172	37.8%	72	15.8%	455
SCOTLAND	181	54.7%	94	28.4%	56	16.9%	331
STANLY	121	40.9%	113	38.2%	62	20.9%	296
STOKES	111	55.8%	53	26.6%	35	17.6%	199
SURRY	208	57.3%	114	31.4%	41	11.3%	363
SWAIN	82	66.7%	31	25.2%	10	8.1%	123
TRANSYLVANIA	95	70.4%	26	19.3%	14	10.4%	135
TYRRELL	20	64.5%	6	19.4%	5	16.1%	31
UNION	255	44.6%	200	35.0%	117	20.5%	572
VANCE	117	31.3%	170	45.5%	87	23.3%	374
WAKE	934	44.2%	821	38.9%	358	16.9%	2,113
WARREN	73	55.7%	45	34.4%	13	9.9%	131
WASHINGTON	49	49.5%	31	31.3%	19	19.2%	99
WATAUGA	115	68.5%	35	20.8%	18	10.7%	168
WAYNE	341	39.7%	349	40.7%	168	19.6%	858
WILKES	209	52.5%	125	31.4%	64	16.1%	398
WILSON	154	29.6%	244	46.8%	123	23.6%	521
YADKIN	103	59.9%	41	23.8%	28	16.3%	172
YANCEY	78	69.6%	23	20.5%	11	9.8%	112

Table 14a. Trimester of WIC Certification By Maternal Age, NC 1999

	1st Trimester		2nd Trimester		3rd Trimester		Total
North Carolina	19144	44.5%	15620	36.3%	8299	19.3%	43063
AGE	Count	%	Count	%	Count	%	Count
<18 years	1743	43.1%	1599	39.5%	704	17.4%	4046
18-24 years	10685	45.6%	8264	35.3%	4465	19.1%	23414
25-29 years	4041	43.6%	3363	36.3%	1867	20.1%	9271
30-34 years	1836	43.5%	1563	37.1%	819	19.4%	4218
35 + years	789	39.9%	769	38.9%	418	21.2%	1976

Table 14b. Trimester of WIC Certification By Maternal Race/Ethnicity, NC 1999

RACE/ETHNICITY	Count	%	Count	%	Count	%	Count
White, non-Hispanic	9871	50.4%	6240	31.9%	3467	17.7%	19578
Black, non-Hispanic	6656	40.0%	6557	39.4%	3439	20.7%	16652
Native American, non-Hispanic	484	48.3%	372	37.1%	147	14.7%	1003
Asian/Pacific Islander, non-Hispanic	163	27.4%	270	45.4%	162	27.2%	595
Hispanic	1920	37.7%	2119	41.6%	1058	20.8%	5097

Table 14c. Trimester of WIC Certification By Maternal Education, NC 1999

EDUCATION	Count	%	Count	%	Count	%	Count
<12 years	7269	45.4%	5944	37.1%	2797	17.5%	16010
H.S. Graduate	7925	45.1%	6190	35.2%	3456	19.7%	17571
>12 years	3900	41.7%	3424	36.6%	2020	21.6%	9344

Interpregnancy Interval

Interpregnancy interval is defined as the number of months between delivery of the previous pregnancy and conception of the subsequent pregnancy. The intervals were obtained from the birth certificate/fetal death reports. Women with short interpregnancy intervals (less than 12 months from the birth of one child to conception of the next) are at risk for poor pregnancy outcomes.

In the 1999 NC PNSS, 27% of women who had at least one previous birth had a short interpregnancy interval. County-specific rates varied from 7% to 38% (Table 15 page 40). Differences in short interpregnancy interval by age, ethnicity, and education are presented in Table 16 on page 42 and Table 17 on page 43. These tables include only data on women who had a previous birth.

One important finding was a lower incidence of short interpregnancy interval in women 25 and older and a higher incidence of short interpregnancy interval in women under 18 years of age. Data from PNSS showed that 63% percent of the 675 women under 18 years of age with a previous birth had short interpregnancy intervals, compared to 16% of women 35 years and older with short interpregnancy intervals.

There was slight variation in the incidence of short interpregnancy intervals by race (White non-Hispanic 28%, Black non-Hispanic 27%, Native American 27%, Asian 28% and Hispanic 23%). However, among the race/ethnic groups, Asians under 18 years of age had the highest incidence of short interpregnancy interval (87%) and Asians over 34 years of age had the lowest incidence (6%).

Except for Hispanic women, women with more than 12 years of education had slightly lower rates of short interpregnancy interval than women with under than 12 years of education: 25% vs. 31%. Black women with less than 12 years of education were much more likely to have a short interpregnancy interval than Black women with more than 12 years of school (34% vs. 24%).

Table 15. Women* With 12 Months or Less Between Pregnancies, 1999

COUNTY	Under 12 months		Over 12 months		TOTAL
	Count	%	Count	%	Count
NORTH CAROLINA	9,174	27.1%	24,691	72.9%	33,865
ALAMANCE	133	25.6%	387	74.4%	520
ALEXANDER	29	25.4%	85	74.6%	114
ALLEGHANY	7	20.0%	28	80.0%	35
ANSON	57	35.8%	102	64.2%	159
ASHE	23	23.5%	75	76.5%	98
AVERY	14	25.0%	42	75.0%	56
BEAUFORT	60	24.9%	181	75.1%	241
BERTIE	30	24.8%	91	75.2%	121
BLADEN	54	28.6%	135	71.4%	189
BRUNSWICK	59	22.3%	205	77.7%	264
BUNCOMBE	191	25.4%	561	74.6%	752
BURKE	110	31.9%	235	68.1%	345
CABARRUS	115	26.7%	316	73.3%	431
CALDWELL	102	28.3%	258	71.7%	360
CAMDEN	3	21.4%	11	78.6%	14
CARTERET	55	31.6%	119	68.4%	174
CASWELL	15	21.7%	54	78.3%	69
CATAWBA	112	25.2%	332	74.8%	444
CHATHAM	43	26.7%	118	73.3%	161
CHEROKEE	23	20.7%	88	79.3%	111
CHOWAN	15	21.7%	54	78.3%	69
CLAY	4	18.2%	18	81.8%	22
CLEVELAND	92	23.1%	307	76.9%	399
COLUMBUS	97	24.9%	293	75.1%	390
CRAVEN	157	29.6%	374	70.4%	531
CUMBERLAND	590	28.1%	1,512	71.9%	2,102
CURRITUCK	9	22.0%	32	78.0%	41
DARE	7	17.5%	33	82.5%	40
DAVIDSON	182	31.7%	393	68.3%	575
DAVIE	28	24.6%	86	75.4%	114
DUPLIN	74	22.0%	262	78.0%	336
DURHAM	178	21.6%	646	78.4%	824
EDGECOMBE	91	25.6%	264	74.4%	355
FORSYTH	319	25.9%	915	74.1%	1,234
FRANKLIN	33	21.9%	118	78.1%	151
GASTON	219	26.6%	603	73.4%	822
GATES	7	29.2%	17	70.8%	24
GRAHAM	16	31.4%	35	68.6%	51
GRANVILLE	39	23.2%	129	76.8%	168
GREENE	20	20.0%	80	80.0%	100
GUILFORD	460	27.9%	1,189	72.1%	1,649
HALIFAX	62	21.2%	230	78.8%	292
HARNETT	126	28.8%	312	71.2%	438
HAYWOOD	58	28.7%	144	71.3%	202
HENDERSON	84	26.8%	230	73.2%	314
HERTFORD	36	27.1%	97	72.9%	133
HOKE	75	28.8%	185	71.2%	260
HYDE	1	6.7%	14	93.3%	15
IREDELL	127	29.8%	299	70.2%	426
JACKSON	35	28.2%	89	71.8%	124
JOHNSTON	121	25.8%	348	74.2%	469

*Only women who had a previous birth were included in this table

Table 15. Women* With 12 Months or Less Between Pregnancies, 1999

COUNTY	Under 12 months		Over 12 months		TOTAL
	Count	%	Count	%	Count
NORTH CAROLINA	9,174	27.1%	24,691	72.9%	33,865
JONES	10	20.0%	40	80.0%	50
LEE	78	27.1%	210	72.9%	288
LENOIR	98	32.0%	208	68.0%	306
LINCOLN	78	33.5%	155	66.5%	233
MACON	27	26.5%	75	73.5%	102
MADISON	12	16.7%	60	83.3%	72
MARTIN	43	30.3%	99	69.7%	142
MCDOWELL	61	31.1%	135	68.9%	196
MECKLENBURG	558	27.4%	1,479	72.6%	2,037
MITCHELL	22	31.9%	47	68.1%	69
MONTGOMERY	59	37.6%	98	62.4%	157
MOORE	86	29.1%	210	70.9%	296
NASH	103	25.5%	301	74.5%	404
NEW HANOVER	169	28.5%	424	71.5%	593
NORTHAMPTON	31	24.8%	94	75.2%	125
ONSLow	371	29.2%	900	70.8%	1,271
ORANGE	68	27.3%	181	72.7%	249
PAMLICO	9	20.5%	35	79.5%	44
PASQUOTANK	38	25.5%	111	74.5%	149
PENDER	45	25.1%	134	74.9%	179
PERQUIMANS	16	34.8%	30	65.2%	46
PERSON	42	27.5%	111	72.5%	153
PITT	156	24.2%	488	75.8%	644
POLK	12	21.4%	44	78.6%	56
RANDOLPH	119	23.6%	386	76.4%	505
RICHMOND	94	30.6%	213	69.4%	307
ROBESON	275	28.6%	685	71.4%	960
ROCKINGHAM	96	24.2%	300	75.8%	396
ROWAN	154	31.0%	342	69.0%	496
RUTHERFORD	86	29.2%	209	70.8%	295
SAMPSON	106	29.9%	248	70.1%	354
SCOTLAND	73	28.4%	184	71.6%	257
STANLY	82	33.9%	160	66.1%	242
STOKES	44	28.6%	110	71.4%	154
SURRY	82	27.6%	215	72.4%	297
SWAIN	28	29.5%	67	70.5%	95
TRANSYLVANIA	19	19.4%	79	80.6%	98
TYRRELL	5	22.7%	17	77.3%	22
UNION	119	27.0%	322	73.0%	441
VANCE	80	27.0%	216	73.0%	296
WAKE	467	28.5%	1,171	71.5%	1,638
WARREN	20	19.0%	85	81.0%	105
WASHINGTON	26	31.7%	56	68.3%	82
WATAUGA	23	22.8%	78	77.2%	101
WAYNE	149	23.9%	475	76.1%	624
WILKES	72	23.5%	235	76.5%	307
WILSON	106	27.9%	274	72.1%	380
YADKIN	41	27.5%	108	72.5%	149
YANCEY	19	25.3%	56	74.7%	75

*Only women who had a previous birth were included in this table

Table 16. Short Interpregnancy (less than 12 months) Interval * By Maternal Race/Ethnicity By Maternal Age, North Carolina 1999

Race/Ethnicity	Age Group	<12 months between pregnancies		12+ months between pregnancies		TOTAL
		Count	%	Count	%	Count
White,non-Hispanic	<18 years	155	66.0%	80	34.0%	235
	18-24 years	2481	35.0%	4600	65.0%	7081
	25-29 years	977	21.5%	3576	78.5%	4553
	30-34 years	383	18.6%	1679	81.4%	2062
	35 + years	193	19.1%	817	80.9%	1010
	Subtotal	4189	28.0%	10752	72.0%	14941
Black,non-Hispanic	<18 years	197	58.6%	139	41.4%	336
	18-24 years	2220	33.7%	4359	66.3%	6579
	25-29 years	764	20.7%	2933	79.3%	3697
	30-34 years	335	17.6%	1572	82.4%	1907
	35 + years	147	14.2%	891	85.8%	1038
	Subtotal	3663	27.0%	9894	73.0%	13557
Native American,non-Hispanic	<18 years	12	63.2%	7	36.8%	19
	18-24 years	151	34.6%	285	65.4%	436
	25-29 years	46	19.8%	186	80.2%	232
	30-34 years	15	16.9%	74	83.1%	89
	35 + years	4	7.3%	51	92.7%	55
	Subtotal	228	27.4%	603	72.6%	831
Asian,non-Hispanic	<18 years	13	86.7%	2	13.3%	15
	18-24 years	67	41.6%	94	58.4%	161
	25-29 years	38	25.2%	113	74.8%	151
	30-34 years	14	15.2%	78	84.8%	92
	35 + years	4	6.0%	63	94.0%	67
	Subtotal	136	28.0%	350	72.0%	486
Hispanic	<18 years	47	67.1%	23	32.9%	70
	18-24 years	494	30.1%	1148	69.9%	1642
	25-29 years	238	17.8%	1100	82.2%	1338
	30-34 years	111	17.0%	541	83.0%	652
	35 + years	39	14.6%	228	85.4%	267
	Subtotal	929	23.4%	3040	76.6%	3969
TOTAL	<18 years	424	62.8%	251	37.2%	675
	18-24 years	5413	34.0%	10486	66.0%	15899
	25-29 years	2063	20.7%	7908	79.3%	9971
	30-34 years	858	17.9%	3944	82.1%	4802
	35 + years	387	15.9%	2050	84.1%	2437
	Total	9174	27.1%	24691	72.9%	33865

* Interpregnancy interval is the number of months from the end of the last pregnancy to conception of the current pregnancy. Only data on women who had a previous birth were included in this table.

Table 17. Short Interpregnancy (less than 12 months) Interval * By Maternal Race/Ethnicity By Maternal Education, North Carolina 1999

Race/Ethnicity	Education Level	<12 months between pregnancies		12+ months between pregnancies		TOTAL
		Count	%	Count	%	Count
White, non-Hispanic	<12 years	1517	32.2%	3192	67.8%	4709
	Graduate	1777	26.6%	4898	73.4%	6675
	>12 years	895	25.2%	2662	74.8%	3557
	Subtotal	4189	28.0%	10752	72.0%	14941
Black, non-Hispanic	<12 years	1162	34.2%	2235	65.8%	3397
	Hi Sch. Graduate	1600	25.2%	4741	74.8%	6341
	>12 years	901	23.6%	2918	76.4%	3819
	Subtotal	3663	27.0%	9894	73.0%	13557
Native, non-Hispanic	<12 years	96	32.2%	202	67.8%	298
	Hi Sch. Graduate	89	24.3%	277	75.7%	366
	>12 years	43	25.7%	124	74.3%	167
	Subtotal	228	27.4%	603	72.6%	831
Asian/Pacific Islander, non-Hispanic	<12 years	54	33.1%	109	66.9%	163
	Hi Sch. Graduate	48	23.4%	157	76.6%	205
	>12 years	34	28.8%	84	71.2%	118
	Subtotal	136	28.0%	350	72.0%	486
Hispanic	<12 years	613	22.6%	2097	77.4%	2710
	Hi Sch. Graduate	200	24.0%	632	76.0%	832
	>12 years	116	27.2%	311	72.8%	427
	Subtotal	929	23.4%	3040	76.6%	3969
Total	<12 years	3442	30.5%	7835	69.5%	11277
	Hi Sch. Graduate	3714	25.8%	10705	74.2%	14419
	>12 years	1989	24.6%	6099	75.4%	8088
	Total	9174	27.1%	24691	72.9%	33865

* Interpregnancy interval is the number of months from the end of the last pregnancy to conception of the current pregnancy. Only data on women who had a previous birth were included in this table.

North Carolina Pregnancy Nutrition Surveillance System

Maternal Prepregnancy Weight

Maternal prepregnancy weight has a strong effect on pregnancy outcome, especially infant birthweight. Women who are underweight before pregnancy are more likely to be anemic, may be undernourished, and are more likely to deliver a low-birthweight infant. Women who are overweight before pregnancy are more likely to develop gestational diabetes, may also be poorly nourished, and are more likely to deliver a macrosomic infant.

Body Mass Index (BMI) is a measure that adjusts body weight for height. BMI is calculated as weight in kilograms divided by height in meters squared. Using the BMI cut points defined by the June 1998 guidelines of the National Institutes of Health,⁹ National Heart, Lung, and Blood Institute, women were categorized by prepregnancy BMI status into four categories: (a) Underweight: BMI less than 18.5, (b) Normal Weight: BMI of 18.5 to 24.9, (c) Overweight: BMI of 25.0 to 29.9, and (d) Obese: BMI of 30.0 or more.

Underweight: BMI less than 18.5

In PNSS 1999, about 7% of low-income women were underweight. County-specific rates varied from 1% to 16% (Table 18 page 48). Women under 18 years of age had the highest prevalence of underweight (11%). Asian women had the highest prevalence of underweight (13%) and Hispanic women had the lowest incidence of underweight (4%). (Table 19 on page 51).

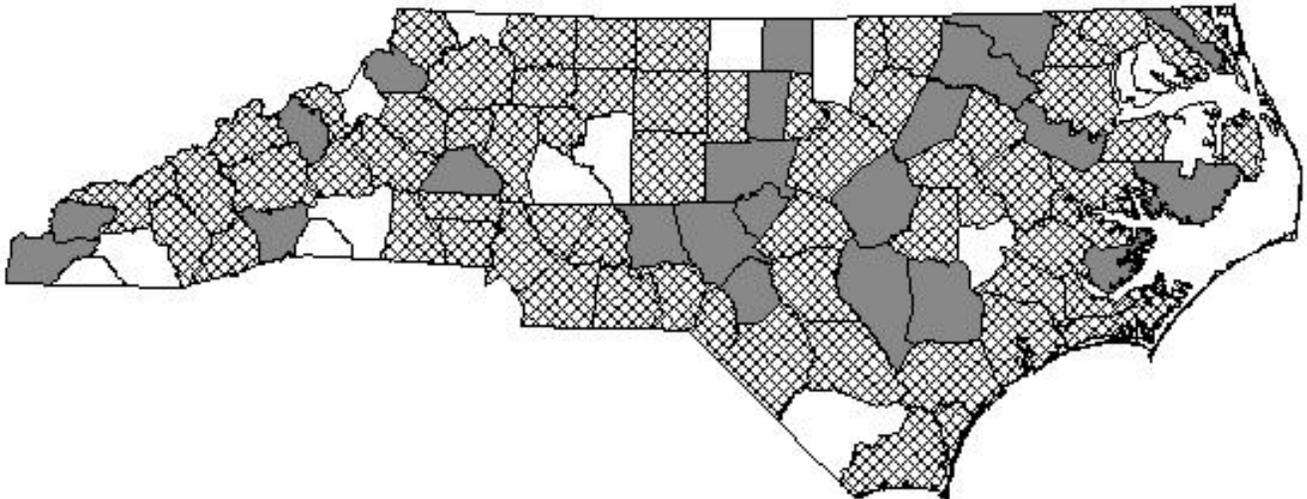
White, Black, or Native American women with less than 12 years of education were all more likely to be underweight than women with 12 years or more of school (Table 20 on page 52). Among Hispanic and Asian women, education was not strongly related to prevalence of underweight.

Overweight: BMI of 25.0 to 29.9

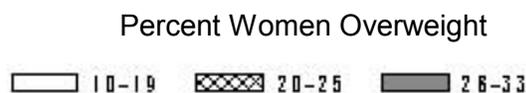
During 1999, the prevalence of overweight among women participating in WIC was 23%. County-specific rates varied from 10% to 33% (Figure 10 on page 45 and Table 18 page 49). Women 35 years of age and over had the highest incidence of overweight (27%). Hispanics were observed to have the highest incidence of overweight (30%). (Table 19 on page 51).

Prevalence of overweight was higher among more educated women for all ethnic groups except Asians and Hispanics. Asian women with more than a high school education had a lower prevalence of overweight than those with less than a high school education. (Table 20 on page 52).

Figure 10. Proportion of Prepregnancy Overweight Women* Participating in WIC, North Carolina, 1999



* Includes only women enrolled in WIC during pregnancy

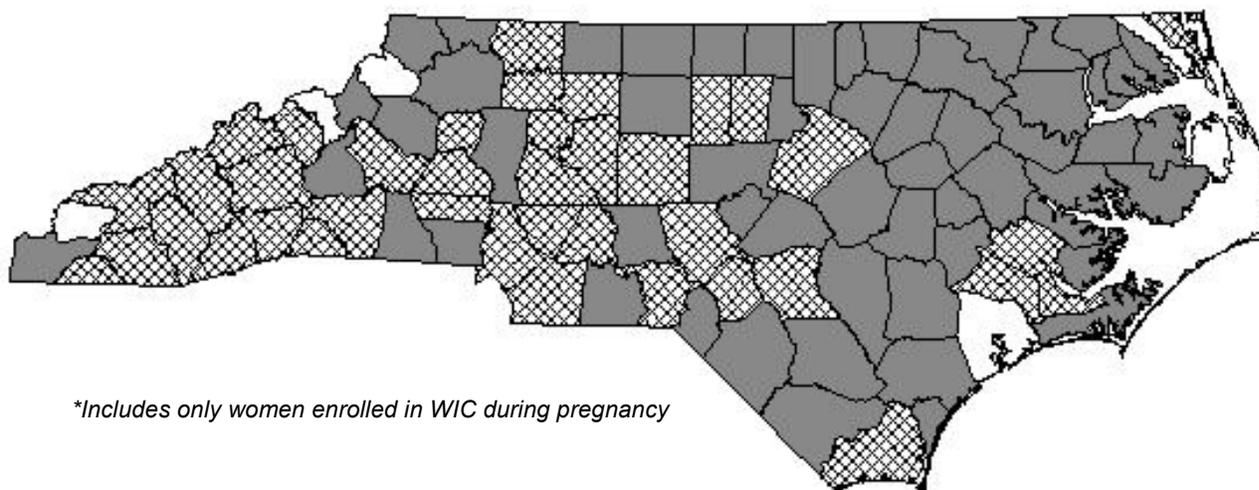


Obese: BMI of 30.0 or more.

Twenty-six percent were obese prior to pregnancy. County-specific rates for obesity ranged from 12% to 47% (Figure 11 on page 46 and Table 18 on page 49). More than one-third of women aged 30 and older were obese prior to pregnancy. Forty-four percent of Black women aged 30 and older were obese prior to pregnancy (Table 19 on page 51).

Overall, women who were overweight or obese prior to pregnancy comprised 49% of the total group (Table 20 on page 52).

Figure 11. Prepregnancy Obesity in Women* Participating in WIC North Carolina Counties, 1999



Maternal prepregnancy weight was a strong predictor of the incidence of low birthweight. Underweight women were more likely to have a low-birthweight (15%) infant than overweight women (8%). Maternal prepregnancy underweight and cigarette smoking each had independent effects on the risk of low birthweight (Table 8 on page 26). Infants of underweight smokers had the highest incidence of low birthweight (20%), and infants of overweight non-smokers had the lowest incidence (7%).

Table 18. Prepregnancy Body Mass Index of Women in WIC Program, NC 1999

BMI Levels	Underweight Under 18.5		Normal weight 18.5 to 24.9		Overweight 25.0 to 29.9		Obese ≥30.0		TOTAL #
	#	%	#	%	#	%	#	%	
NORTH CAROLINA	2,881	6.7%	19,300	44.8%	9,884	22.9%	11,029	25.6%	43,094
ALAMANCE	37	8.8%	211	50.1%	83	19.7%	90	21.4%	421
ALEXANDER	12	7.3%	78	47.6%	33	20.1%	41	25.0%	164
ALLEGHANY	4	8.3%	19	39.6%	8	16.7%	17	35.4%	48
ANSON	7	3.3%	95	45.2%	52	24.8%	56	26.7%	210
ASHE	15	9.7%	63	40.6%	37	23.9%	40	25.8%	155
AVERY	4	4.3%	50	53.2%	13	13.8%	27	28.7%	94
BEAUFORT	9	2.8%	119	37.0%	80	24.8%	114	35.4%	322
BERTIE	8	4.6%	51	29.5%	36	20.8%	78	45.1%	173
BLADEN	14	5.4%	109	41.8%	60	23.0%	78	29.9%	261
BRUNSWICK	24	6.5%	171	46.3%	82	22.2%	92	24.9%	369
BUNCOMBE	77	7.5%	485	47.0%	224	21.7%	246	23.8%	1,032
BURKE	38	7.8%	233	47.8%	112	23.0%	104	21.4%	487
CABARRUS	41	7.8%	232	44.0%	120	22.8%	134	25.4%	527
CALDWELL	60	11.3%	220	41.6%	112	21.2%	137	25.9%	529
CAMDEN	2	8.0%	12	48.0%	7	28.0%	4	16.0%	25
CARTERET	17	6.7%	120	47.2%	52	20.5%	65	25.6%	254
CASWELL	8	8.2%	45	45.9%	18	18.4%	27	27.6%	98
CATAWBA	35	5.0%	335	47.4%	191	27.0%	146	20.7%	707
CHATHAM	7	3.4%	71	34.6%	65	31.7%	62	30.2%	205
CHEROKEE	10	7.5%	54	40.3%	35	26.1%	35	26.1%	134
CHOWAN	12	11.4%	47	44.8%	15	14.3%	31	29.5%	105
CLAY	5	16.1%	14	45.2%	5	16.1%	7	22.6%	31
CLEVELAND	37	6.5%	248	43.4%	127	22.2%	159	27.8%	571
COLUMBUS	30	6.4%	202	43.3%	85	18.2%	149	32.0%	466
CRAVEN	63	8.1%	378	48.7%	171	22.0%	164	21.1%	776
CUMBERLAND	184	7.2%	1,298	50.8%	557	21.8%	517	20.2%	2,556
CURRITUCK	2	4.1%	25	51.0%	12	24.5%	10	20.4%	49
DARE	7	9.2%	43	56.6%	17	22.4%	9	11.8%	76
DAVIDSON	72	9.6%	362	48.1%	142	18.9%	176	23.4%	752
DAVIE	12	8.2%	70	47.9%	33	22.6%	31	21.2%	146
DUPLIN	24	6.6%	143	39.3%	99	27.2%	98	26.9%	364
DURHAM	51	4.4%	492	42.5%	295	25.5%	321	27.7%	1,159
EDGECOMBE	16	7.3%	95	43.4%	44	20.1%	64	29.2%	219
FORSYTH	89	6.4%	626	45.4%	324	23.5%	341	24.7%	1,380
FRANKLIN	8	3.4%	94	40.0%	51	21.7%	82	34.9%	235
GASTON	77	7.2%	466	43.7%	250	23.5%	273	25.6%	1,066
GATES	1	3.1%	8	25.0%	8	25.0%	15	46.9%	32
GRAHAM	6	8.5%	31	43.7%	21	29.6%	13	18.3%	71
GRANVILLE	17	7.8%	87	39.7%	42	19.2%	73	33.3%	219
GREENE	1	0.8%	55	43.3%	28	22.0%	43	33.9%	127
GUILFORD	115	5.9%	817	41.8%	453	23.2%	571	29.2%	1,956
HALIFAX	23	6.0%	138	35.9%	102	26.6%	121	31.5%	384
HARNETT	48	8.5%	239	42.1%	129	22.7%	152	26.8%	568
HAYWOOD	23	9.7%	107	45.0%	49	20.6%	59	24.8%	238
HENDERSON	21	5.0%	189	44.8%	111	26.3%	101	23.9%	422
HERTFORD	8	4.3%	74	39.4%	42	22.3%	64	34.0%	188
HOKE	14	4.2%	150	45.3%	87	26.3%	80	24.2%	331
HYDE	2	11.1%	5	27.8%	6	33.3%	5	27.8%	18
IREDELL	49	9.0%	216	39.5%	123	22.5%	159	29.1%	547
JACKSON	16	8.8%	91	50.3%	38	21.0%	36	19.9%	181
JOHNSTON	23	4.9%	198	42.2%	120	25.6%	128	27.3%	469

Table 18. Prepregnancy Body Mass Index of Women in WIC Program, NC 1999

BMI Levels----->	Underweight Under 18.5		Normal weight 18.5 to 24.9		Overweight 25.0 to 29.9		Obese >=30.0		TOTAL #
	#	%	#	%	#	%	#	%	
NORTH CAROLINA	2,881	6.7%	19,300	44.8%	9,884	22.9%	11,029	25.6%	43,094
JONES	4	5.1%	39	49.4%	16	20.3%	20	25.3%	79
LEE	17	5.0%	148	43.3%	89	26.0%	88	25.7%	342
LENOIR	34	7.6%	210	47.2%	86	19.3%	115	25.8%	445
LINCOLN	13	4.6%	131	46.1%	70	24.6%	70	24.6%	284
MACON	12	8.4%	74	51.7%	27	18.9%	30	21.0%	143
MADISON	11	10.3%	49	45.8%	22	20.6%	25	23.4%	107
MARTIN	14	7.1%	54	27.4%	54	27.4%	75	38.1%	197
MCDOWELL	16	6.3%	102	40.3%	59	23.3%	76	30.0%	253
MECKLENBURG	168	7.0%	1,117	46.3%	579	24.0%	546	22.7%	2,410
MITCHELL	9	9.9%	42	46.2%	23	25.3%	17	18.7%	91
MONTGOMERY	10	5.0%	84	41.6%	52	25.7%	56	27.7%	202
MOORE	23	6.1%	163	43.0%	98	25.9%	95	25.1%	379
NASH	35	6.8%	206	40.2%	139	27.1%	133	25.9%	513
NEW HANOVER	53	7.2%	335	45.3%	162	21.9%	189	25.6%	739
NORTHAMPTON	6	3.7%	52	31.9%	54	33.1%	51	31.3%	163
ONSLOW	102	5.9%	906	52.1%	395	22.7%	337	19.4%	1,740
ORANGE	19	6.1%	136	43.9%	83	26.8%	72	23.2%	310
PAMLICO	6	8.8%	23	33.8%	20	29.4%	19	27.9%	68
PASQUOTANK	12	5.3%	93	41.3%	45	20.0%	75	33.3%	225
PENDER	17	7.5%	96	42.1%	45	19.7%	70	30.7%	228
PERQUIMANS	5	8.2%	23	37.7%	8	13.1%	25	41.0%	61
PERSON	11	5.0%	89	40.3%	57	25.8%	64	29.0%	221
PITT	44	5.2%	331	39.5%	201	24.0%	263	31.3%	839
POLK	3	4.5%	37	55.2%	11	16.4%	16	23.9%	67
RANDOLPH	42	7.1%	272	45.8%	130	21.9%	150	25.3%	594
RICHMOND	33	8.5%	193	49.6%	85	21.9%	78	20.1%	389
ROBESON	84	7.1%	523	44.5%	257	21.9%	312	26.5%	1,176
ROCKINGHAM	21	5.4%	179	45.7%	86	21.9%	106	27.0%	392
ROWAN	49	7.9%	295	47.4%	121	19.4%	158	25.4%	623
RUTHERFORD	34	8.6%	195	49.4%	75	19.0%	91	23.0%	395
SAMPSON	18	3.9%	180	39.0%	123	26.6%	141	30.5%	462
SCOTLAND	25	8.9%	109	38.7%	66	23.4%	82	29.1%	282
STANLY	17	5.4%	157	50.3%	72	23.1%	66	21.2%	312
STOKES	10	5.4%	85	45.9%	41	22.2%	49	26.5%	185
SURRY	36	9.6%	171	45.5%	87	23.1%	82	21.8%	376
SWAIN	9	7.4%	59	48.8%	25	20.7%	28	23.1%	121
TRANSYLVANIA	6	4.3%	70	50.4%	31	22.3%	32	23.0%	139
TYRRELL	3	9.7%	14	45.2%	3	9.7%	11	35.5%	31
UNION	34	6.0%	259	45.8%	131	23.2%	141	25.0%	565
VANCE	24	6.3%	147	38.6%	93	24.4%	117	30.7%	381
WAKE	154	6.9%	1,010	45.6%	493	22.2%	560	25.3%	2,217
WARREN	5	3.5%	57	39.6%	32	22.2%	50	34.7%	144
WASHINGTON	3	3.0%	36	36.4%	21	21.2%	39	39.4%	99
WATAUGA	18	10.6%	76	44.7%	44	25.9%	32	18.8%	170
WAYNE	50	5.9%	360	42.8%	195	23.2%	237	28.1%	842
WILKES	42	10.1%	172	41.5%	93	22.5%	107	25.8%	414
WILSON	21	4.4%	229	47.8%	105	21.9%	124	25.9%	479
YADKIN	8	4.8%	77	46.4%	40	24.1%	41	24.7%	166
YANCEY	6	5.1%	54	46.2%	34	29.1%	23	19.7%	117

Table 19. Prevalence of Prepregnancy Body Mass Index by Maternal Age and Race/Ethnicity, North Carolina 1999

Race/Ethnicity	BMI Levels	Underweight		Normal weight		Overweight		Obese		TOTAL
	Age Group	Count	%	Count	%	Count	%	Count	%	Count
White, non-Hispanic	Under 18	239	13.9%	1,057	61.7%	264	15.4%	154	9.0%	1,714
	18-24	1,095	9.9%	5,358	48.4%	2,343	21.2%	2,282	20.6%	11,078
	25-29	259	6.1%	1,715	40.3%	937	22.0%	1,345	31.6%	4,256
	30-34	86	4.8%	732	40.5%	412	22.8%	579	32.0%	1,809
	35 or older	42	5.1%	373	45.2%	195	23.6%	216	26.2%	826
	White Total	1,721	8.7%	9,235	46.9%	4,151	21.1%	4,576	23.2%	19,683
Black, non-Hispanic	Under 18	155	8.4%	1,050	57.1%	390	21.2%	243	13.2%	1,838
	18-24	475	5.3%	3,919	43.5%	2,003	22.2%	2,615	29.0%	9,012
	25-29	111	3.3%	1,098	32.2%	862	25.3%	1,340	39.3%	3,411
	30-34	50	3.0%	448	26.5%	419	24.8%	774	45.8%	1,691
	35 or older	23	2.6%	255	28.9%	235	26.6%	369	41.8%	882
	Black Total	814	4.8%	6,770	40.2%	3,909	23.2%	5,341	31.7%	16,834
Native American, non-Hispanic	Under 18	15	12.2%	76	61.8%	24	19.5%	8	6.5%	123
	18-24	47	8.1%	260	45.1%	131	22.7%	139	24.1%	577
	25-29	14	7.1%	71	35.9%	49	24.7%	64	32.3%	198
	30-34	4	5.5%	21	28.8%	20	27.4%	28	38.4%	73
	35 or older	2	4.4%	17	37.8%	15	33.3%	11	24.4%	45
	Native American Total	82	8.1%	445	43.8%	239	23.5%	250	24.6%	1,016
Asian/Pacific Islander, non-Hispanic	Under 18	8	13.1%	40	65.6%	8	13.1%	5	8.2%	61
	18-24	40	16.7%	146	60.8%	35	14.6%	19	7.9%	240
	25-29	25	15.4%	97	59.9%	28	17.3%	12	7.4%	162
	30-34	6	6.1%	66	67.3%	23	23.5%	3	3.1%	98
	35 or older	1	1.9%	33	62.3%	15	28.3%	4	7.5%	53
	Asian/P. I. Total	80	13.0%	382	62.2%	109	17.8%	43	7.0%	614
Hispanic	Under 18	17	5.5%	209	67.4%	57	18.4%	27	8.7%	310
	18-24	121	4.8%	1,437	56.8%	643	25.4%	329	13.0%	2,530
	25-29	32	2.4%	550	41.3%	479	36.0%	271	20.3%	1,332
	30-34	11	2.0%	192	35.6%	205	38.0%	131	24.3%	539
	35 or older	2	0.9%	75	34.1%	85	38.6%	58	26.4%	220
	Hispanic Total	183	3.7%	2,463	49.9%	1,469	29.8%	816	16.5%	4,931
All Races	Under 18	434	10.7%	2,434	60.1%	744	18.4%	437	10.8%	4,049
	18-24	1,779	7.6%	11,121	47.4%	5,160	22.0%	5,386	23.0%	23,446
	25-29	441	4.7%	3,533	37.7%	2,356	25.2%	3,033	32.4%	9,363
	30-34	157	3.7%	1,459	34.7%	1,079	25.6%	1,515	36.0%	4,210
	35 or older	70	3.5%	753	37.2%	545	26.9%	658	32.5%	2,026
	All Age	2,881	6.7%	19,300	44.8%	9,884	22.9%	11,029	25.6%	43,094

Table 20. Prevalence of Prepregnancy Body Mass Index By Maternal Race/Ethnicity By Maternal Education, North Carolina 1999

Race/Ethnicity	BMI Levels	Underweight		Normal weight		Overweight		Obese		TOTAL
	Education Levels	Count	%	Count	%	Count	%	Count	%	Count
White,non-Hispanic	Under 12 years	817	11.7%	3,434	49.3%	1,358	19.5%	1,357	19.5%	6,966
	High School	660	7.8%	3,835	45.2%	1,885	22.2%	2,113	24.9%	8,493
	Over 12 years	240	5.7%	1,955	46.6%	904	21.5%	1,099	26.2%	4,198
	White Total	1,717	8.7%	9,224	46.9%	4,147	21.1%	4,569	23.2%	19,657
Black,non-Hispanic	Under 12 years	313	6.2%	2,317	46.1%	1,100	21.9%	1,292	25.7%	5,022
	High School	323	4.4%	2,797	37.9%	1,773	24.0%	2,483	33.7%	7,376
	Over 12 years	174	4.0%	1,643	37.3%	1,033	23.5%	1,554	35.3%	4,404
	Black Total	810	4.8%	6,757	40.2%	3,906	23.2%	5,329	31.7%	16,802
Native American,non-Hispanic	Under 12 years	31	7.8%	194	48.5%	86	21.5%	89	22.3%	400
	High School	44	10.4%	174	41.2%	96	22.7%	108	25.6%	422
	Over 12 years	7	3.6%	77	39.9%	56	29.0%	53	27.5%	193
	Native American Total	82	8.1%	445	43.8%	238	23.4%	250	24.6%	1,015
Asian/Pacific Islander,non-Hispanic	Under 12 years	27	12.7%	133	62.4%	43	20.2%	10	4.7%	213
	High School	28	12.1%	142	61.5%	39	16.9%	22	9.5%	231
	Over 12 years	25	15.4%	101	62.3%	26	16.0%	10	6.2%	162
	Asian/Pacific Islander Total	80	13.2%	376	62.0%	108	17.8%	42	6.9%	606
Hispanic	Under 12 years	106	3.3%	1,580	49.2%	1,014	31.6%	510	15.9%	3,210
	High School	52	4.6%	587	52.4%	296	26.4%	185	16.5%	1,120
	Over 12 years	23	4.2%	271	49.5%	138	25.2%	115	21.0%	547
	Hispanic Total	181	3.7%	2,438	50.0%	1,448	29.7%	810	16.6%	4,877
Total	Under 12 years	1,294	8.2%	7,660	48.4%	3,604	22.8%	3,259	20.6%	15,817
	High School	1,108	6.3%	7,536	42.7%	4,093	23.2%	4,911	27.8%	17,648
	Over 12 years	469	4.9%	4,048	42.6%	2,157	22.7%	2,833	29.8%	9,507
	All Race Total	2,881	6.7%	19,300	44.8%	9,884	22.9%	11,029	25.6%	43,094

Low Hemoglobin or Low Hematocrit During Pregnancy

Low hemoglobin/hematocrit has negative consequences for maternal health, pregnancy outcome, and adequacy of infant iron stores. Low hemoglobin/hematocrit during the first two trimesters of pregnancy has been associated with inadequate gestational weight gain, a twofold risk for preterm delivery, and a threefold risk for delivering a low-birthweight infant.⁸

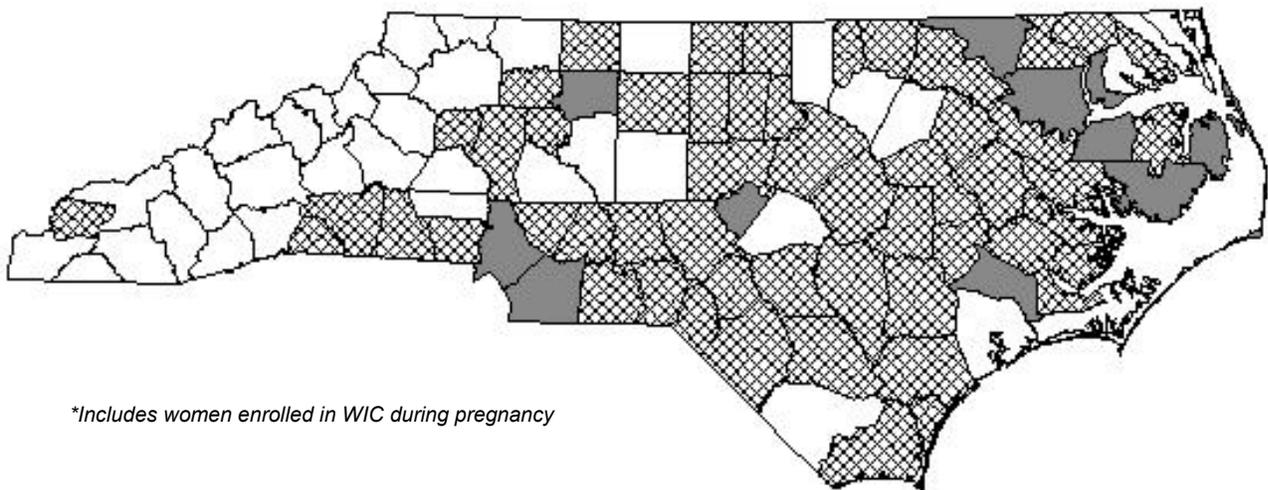
Each woman's hemoglobin or hematocrit measurement from her prenatal WIC certification visit was compared to the definitions established by the Centers for Disease Control and Prevention to determine if she had a low hemoglobin or hematocrit. The definitions are specific for trimester of measurement and number of cigarettes smoked per day as shown in the following matrix.

First Trimester	Hemoglobin	Hematocrit
Non-smoker	Less than 11.0 gm/dl	Less than 33.0%
Smoked <10 cigarettes daily	Less than 11.0 gm/dl	Less than 33.0%
Smoked 10 to <20 cigarettes daily	Less than 11.3 gm/dl	Less than 34.0%
Smoked 20 to <40 cigarettes daily	Less than 11.5 gm/dl	Less than 34.5%
Smoked >=40 cigarettes daily	Less than 11.7 gm/dl	Less than 35.0%
Second Trimester	Hemoglobin	Hematocrit
Non-smoker	Less than 10.5 gm/dl	Less than 32.0%
Smoked less than 10 cigarettes daily	Less than 10.5 gm/dl	Less than 32.0%
Smoked 10 to <20 cigarettes daily	Less than 10.8 gm/dl	Less than 33.0%
Smoked 20 to <40 cigarettes daily	Less than 11.0 gm/dl	Less than 33.5%
Smoked >=40 cigarettes daily	Less than 11.2 gm/dl	Less than 34.0%
Third Trimester	Hemoglobin	Hematocrit
Non-smoker	Less than 11.0 gm/dl	Less than 33.0%
Smoked less than 10 cigarettes daily	Less than 11.0 gm/dl	Less than 33.0%
Smoked 10 to <20 cigarettes daily	Less than 11.3 gm/dl	Less than 34.0%
Smoked 20 to <40 cigarettes daily	Less than 11.5 gm/dl	Less than 34.5%
Smoked >=40 cigarettes daily	Less than 11.7 gm/dl	Less than 35.0%

The overall prevalence of low hemoglobin/hematocrit among low-income women reported in 1999 PNSS report and who gave birth in 1999 was 12%. Table 21 on page 54 shows some variation in the prevalence of low hemoglobin/hematocrit by age. Pregnant women 35 years of age and older were more likely to have low hemoglobin or low hematocrit than women under 18 years of age (16% and 11%, respectively).

There were strong racial/ethnic differences in prevalence of low hemoglobin or low hematocrit. Black women had a prevalence of low hemoglobin or low hematocrit (19%) which was nearly three times as high as the prevalence among white women (7%). Black women had a higher incidence of low hemoglobin/hematocrit in all age groups (17% to 25%). (Table 21 on page 54). County-specific rates for low hemoglobin or low hematocrit ranged from 0% to 32% (Figure 12 on page 53 and Table 22 on page 55).

Figure 12. Prevalence of Low Hemoglobin or Low Hematocrit in Women* Participating in WIC, North Carolina 1999



**Includes women enrolled in WIC during pregnancy*

Percent Women with Low Hemoglobin or Low Hematocrit

0-9 10-19 20-32

Table 21. Prevalence of Low Hemoglobin (Hgb) or Low Hematocrit (Hct) during Pregnancy By Maternal Race/Ethnicity and By Maternal Age, NC, 1999

Race/Ethnicity	Age Group	Low Hgb/Hct		Normal Hgb/Hct		Total
		Count	%	Count	%	Count
White, non-Hispanic	Under 18	91	5.8%	1488	94.2%	1579
	18-24	713	6.9%	9568	93.1%	10281
	25-29	300	7.5%	3699	92.5%	3999
	30-34	125	7.4%	1564	92.6%	1689
	35 or older	74	10.0%	666	90.0%	740
	White Total		1303	7.1%	16985	92.9%
Black, non-Hispanic	Under 18	337	21.5%	1234	78.5%	1571
	18-24	1414	18.4%	6258	81.6%	7672
	25-29	493	17.1%	2397	82.9%	2890
	30-34	283	20.1%	1123	79.9%	1406
	35 or older	189	25.1%	564	74.9%	753
	Black Total		2716	19.0%	11576	81.0%
Native American, non-Hispanic	Under 18	16	13.6%	102	86.4%	118
	18-24	60	10.8%	494	89.2%	554
	25-29	19	10.1%	169	89.9%	188
	30-34	7	9.7%	65	90.3%	72
	35 or older	3	8.1%	34	91.9%	37
	Native American Total		105	10.8%	864	89.2%
Asian/Pacific Islander, non-Hispanic	Under 18	6	12.0%	44	88.0%	50
	18-24	17	8.6%	181	91.4%	198
	25-29	18	12.2%	129	87.8%	147
	30-34	8	9.6%	75	90.4%	83
	35 or older	4	9.3%	39	90.7%	43
	Asian/P.I. Total		53	10.2%	468	89.8%
Hispanic	Under 18	24	8.3%	264	91.7%	288
	18-24	279	12.0%	2054	88.0%	2333
	25-29	101	8.4%	1099	91.6%	1200
	30-34	37	7.8%	438	92.2%	475
	35 or older	16	7.8%	189	92.2%	205
	Hispanic Total		457	10.2%	4044	89.8%
All Race	Under 18	474	13.1%	3132	86.9%	3606
	18-24	2483	11.8%	18555	88.2%	21038
	25-29	931	11.1%	7493	88.9%	8424
	30-34	460	12.3%	3265	87.7%	3725
	35 or older	286	16.1%	1492	83.9%	1778
	Total		4635	12.0%	33950	88.0%

Table 22. Prevalence of Low Hemoglobin or Low Hematocrit in Women Participating in WIC, NC 1999

COUNTY	Low Hgb/Hct		Normal Hgb/Hct		Total
	#	%	#	%	#
NORTH CAROLINA	4,635	12.0%	33,950	88.0%	38,585
ALAMANCE	75	10.8%	620	89.2%	695
ALEXANDER	33	19.3%	138	80.7%	171
ALLEGHANY	2	4.2%	46	95.8%	48
ANSON	23	10.7%	191	89.3%	214
ASHE	7	4.5%	148	95.5%	155
AVERY	2	2.1%	92	97.9%	94
BEAUFORT	39	11.8%	291	88.2%	330
BERTIE	39	22.9%	131	77.1%	170
BLADEN	15	16.7%	75	83.3%	90
BRUNSWICK	42	11.5%	322	88.5%	364
BUNCOMBE	49	5.5%	834	94.5%	883
BURKE	29	6.1%	446	93.9%	475
CABARRUS	78	13.7%	492	86.3%	570
CALDWELL	16	3.1%	503	96.9%	519
CAMDEN	-	0.0%	18	100.0%	18
CARTERET	20	8.0%	229	92.0%	249
CASWELL	11	11.3%	86	88.7%	97
CATAWBA	51	8.3%	562	91.7%	613
CHATHAM	21	10.4%	180	89.6%	201
CHEROKEE	6	4.3%	135	95.7%	141
CHOWAN	31	32.3%	65	67.7%	96
CLAY	1	3.0%	32	97.0%	33
CLEVELAND	60	10.0%	541	90.0%	601
COLUMBUS	36	7.7%	432	92.3%	468
CRAVEN	104	16.9%	513	83.1%	617
CUMBERLAND	313	13.3%	2,034	86.7%	2,347
CURRITUCK	-	0.0%	23	100.0%	23
DARE	17	22.4%	59	77.6%	76
DAVIDSON	53	7.0%	700	93.0%	753
DAVIE	14	9.6%	132	90.4%	146
DUPLIN	24	16.2%	124	83.8%	148
DURHAM	61	15.7%	328	84.3%	389
EDGECOMBE	77	17.4%	366	82.6%	443
FORSYTH	172	20.5%	665	79.5%	837
FRANKLIN	22	9.3%	214	90.7%	236
GASTON	139	12.9%	935	87.1%	1,074
GATES	4	15.4%	22	84.6%	26
GRAHAM	8	11.3%	63	88.7%	71
GRANVILLE	14	8.8%	145	91.2%	159
GREENE	26	19.0%	111	81.0%	137
GUILFORD	283	15.8%	1,505	84.2%	1,788
HALIFAX	53	15.1%	297	84.9%	350
HARNETT	44	7.7%	526	92.3%	570
HAYWOOD	9	3.5%	249	96.5%	258
HENDERSON	19	4.5%	399	95.5%	418
HERTFORD	19	11.7%	143	88.3%	162
HOKE	42	12.3%	300	87.7%	342
HYDE	4	21.1%	15	78.9%	19
IREDELL	53	9.6%	497	90.4%	550
JACKSON	4	2.4%	162	97.6%	166
JOHNSTON	54	10.4%	463	89.6%	517

Table 22. Prevalence of Low Hemoglobin or Low Hematocrit in Women Participating in WIC, NC 1999

COUNTY	Low Hgb/Hct		Normal Hgb/Hct		Total
	#	%	#	%	#
NORTH CAROLINA	4,635	12.0%	33,950	88.0%	38,585
JONES	16	20.3%	63	79.7%	79
LEE	77	22.0%	273	78.0%	350
LENOIR	53	11.8%	395	88.2%	448
LINCOLN	24	8.5%	260	91.5%	284
MACON	2	1.3%	157	98.7%	159
MADISON	9	8.3%	99	91.7%	108
MARTIN	20	10.8%	165	89.2%	185
MCDOWELL	14	5.6%	238	94.4%	252
MECKLENBURG	178	19.8%	719	80.2%	897
MITCHELL	7	8.3%	77	91.7%	84
MONTGOMERY	30	14.3%	180	85.7%	210
MOORE	30	9.6%	282	90.4%	312
NASH	33	9.4%	317	90.6%	350
NEW HANOVER	69	11.2%	546	88.8%	615
NORTHAMPTON	33	20.4%	129	79.6%	162
ONSLow	161	9.4%	1,552	90.6%	1,713
ORANGE	29	10.4%	250	89.6%	279
PAMLICO	9	13.4%	58	86.6%	67
PASQUOTANK	39	19.4%	162	80.6%	201
PENDER	22	9.5%	209	90.5%	231
PERQUIMANS	3	7.5%	37	92.5%	40
PERSON	24	11.0%	195	89.0%	219
PITT	110	13.3%	714	86.7%	824
POLK	10	17.9%	46	82.1%	56
RANDOLPH	31	5.5%	534	94.5%	565
RICHMOND	65	16.1%	338	83.9%	403
ROBESON	145	12.2%	1,045	87.8%	1,190
ROCKINGHAM	37	7.2%	474	92.8%	511
ROWAN	59	9.3%	573	90.7%	632
RUTHERFORD	29	12.8%	198	87.2%	227
SAMPSON	62	13.1%	411	86.9%	473
SCOTLAND	40	11.6%	306	88.4%	346
STANLY	54	17.3%	259	82.7%	313
STOKES	10	11.9%	74	88.1%	84
SURRY	19	5.0%	358	95.0%	377
SWAIN	3	3.2%	91	96.8%	94
TRANSYLVANIA	13	9.4%	125	90.6%	138
TYRRELL	3	9.7%	28	90.3%	31
UNION	152	27.1%	409	72.9%	561
VANCE	57	16.5%	288	83.5%	345
WAKE	211	12.2%	1,512	87.8%	1,723
WARREN	16	11.4%	124	88.6%	140
WASHINGTON	23	25.3%	68	74.7%	91
WATAUGA	3	1.8%	165	98.2%	168
WAYNE	148	16.6%	744	83.4%	892
WILKES	31	7.5%	380	92.5%	411
WILSON	86	15.8%	460	84.2%	546
YADKIN	18	10.1%	161	89.9%	179
YANCEY	-	0.0%	103	100.0%	103

Infant's Birthweight

Low Birthweight

Low birthweight (LBW) is defined as infants weighing less than 2,500 grams or less than 5 lbs 9 ounces at birth. LBW is the single most important factor affecting neonatal mortality and is a determinant of postneonatal mortality.¹⁰ Factors associated with low birthweight include sociodemographic characteristics such as race or ethnicity, age, marital status, and income, as well as nutritional and behavioral factors such as weight gain, smoking, and alcohol consumption.¹¹

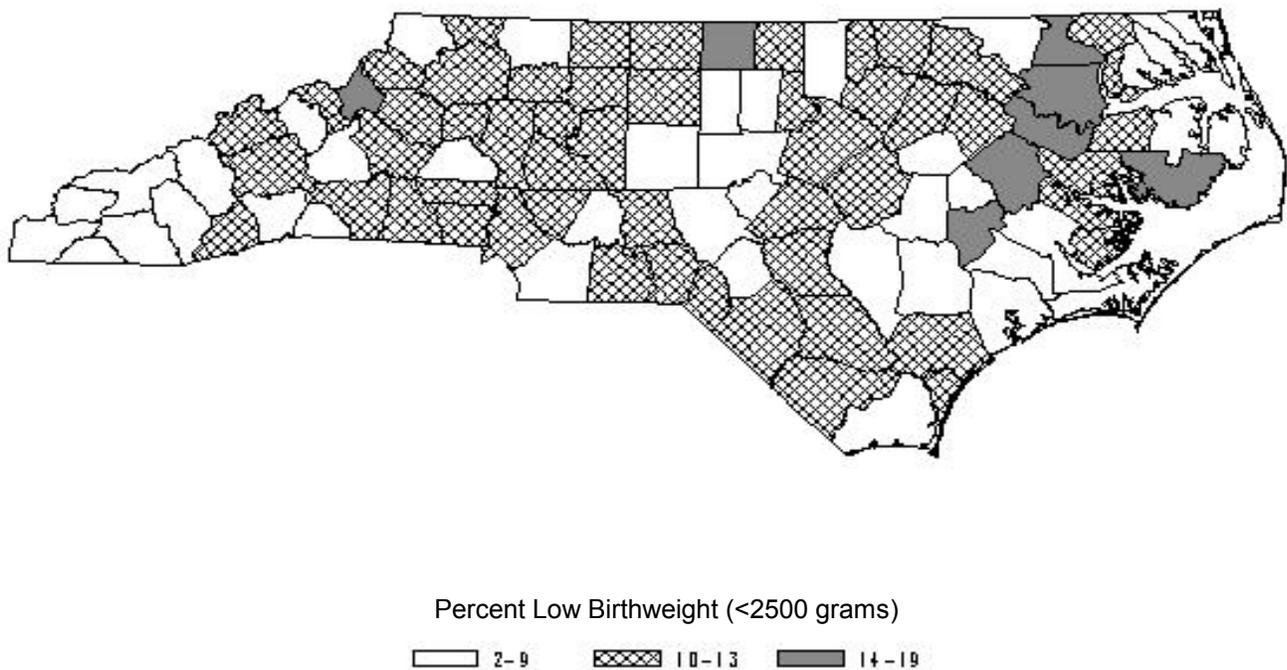
LBW and prematurity are the leading precursors of infant mortality in North Carolina. Infants weighing 2,500 grams or less are almost 40 times more likely to die during the first month of their life than are infants of normal birth weight. Additionally, compared to infants with normal birth weight, infants with LBW are more likely to experience developmental delays and disabilities than infants with normal birth weight.¹²

The birthweight distribution of infants born in 1999 to low-income women is presented by county in Figure 13 on page 58 and Table 23 on page 60. According to PNSS 1999 data, 10% of infants weighed less than 2,500 grams at birth.

The incidence of low birthweight was highest among infants of women 35 years of age and older (15%). Women 30-34 years of age had the next highest incidence of low birthweight (12%). By race, infants of Black women had the highest rate of low birthweight (13%). The lowest rates of low birthweight were found among infants of Hispanic (6%), Asian (7%) and White (9%) women. The low birthweight rates for infants of Native American women was 11% (Table 24 on page 62).

As described on page 48, both maternal cigarette smoking and prepregnancy underweight were strong predictors of low birthweight. Underweight women gave birth to infants who were about two times more likely to be low birthweight (15%) than the infants of overweight women (8%). Women who smoked cigarettes during pregnancy were also more likely to give birth to a low birthweight baby compared with non-smokers (14% vs. 9%). Infants of underweight smokers had the highest incidence of low birthweight (20%), and infants of overweight non-smokers had the lowest incidence of low birthweight (7%).

Figure 13. Prevalence of Low Birth Weight Infants Delivered by Women Participating in WIC and Public Prenatal Clinics, North Carolina 1999



High Birthweight (Macrosomia)

High birthweight, or *macrosomia*, is also associated with higher rates of infant mortality. Over 1% of infants weighed more than 4,500 grams at birth. Infant macrosomia (birthweight greater than 4,500 grams) was most prevalent among the obese women.

The incidence of high birthweight was highest among infants of women 30 years of age and older (2%). As shown in Table 24 on page 62, infants of White, non-Hispanic women and Native American, non-Hispanic women had the highest rates of high birthweight (1.6%). The lowest rates of high birthweight were found among infants of Asian (0.6%) women and infants of Black (0.7%) women.

Women with less than 12 years of education were slightly less likely to give birth to a high birthweight infant than women with more than 12 years of school (1% vs. 2%).

Table 23. Infant Birthweight Distribution By County, NC 1999

COUNTY	LOW <2500 GRAMS		NORMAL 2500-4500 GRAMS		HIGH > 4500 GRAMS		Total
	#	%	#	%	#	%	#
NORTH CAROLINA	5,756	10.4%	49,015	88.4%	692	1.2%	55,463
ALAMANCE	78	9.2%	758	89.5%	11	1.3%	847
ALEXANDER	19	9.6%	177	89.4%	2	1.0%	198
ALLEGHANY	7	11.9%	50	84.7%	2	3.4%	59
ANSON	28	11.2%	219	87.6%	3	1.2%	250
ASHE	16	9.0%	160	90.4%	1	0.6%	177
AVERY	15	13.9%	93	86.1%	-	0.0%	108
BEAUFORT	41	10.8%	334	88.1%	4	1.1%	379
BERTIE	30	15.3%	164	83.7%	2	1.0%	196
BLADEN	38	12.8%	258	87.2%	-	0.0%	296
BRUNSWICK	40	8.9%	400	89.3%	8	1.8%	448
BUNCOMBE	146	11.3%	1,129	87.4%	17	1.3%	1,292
BURKE	76	13.1%	502	86.3%	4	0.7%	582
CABARRUS	72	10.2%	626	89.0%	5	0.7%	703
CALDWELL	61	10.1%	535	88.3%	10	1.7%	606
CAMDEN	1	3.8%	25	96.2%	-	0.0%	26
CARTERET	21	6.8%	280	90.0%	10	3.2%	311
CASWELL	17	14.7%	99	85.3%	-	0.0%	116
CATAWBA	78	8.7%	806	90.4%	8	0.9%	892
CHATHAM	17	6.4%	245	92.8%	2	0.8%	264
CHEROKEE	6	3.4%	166	95.4%	2	1.1%	174
CHOWAN	13	11.2%	102	87.9%	1	0.9%	116
CLAY	2	5.3%	36	94.7%	-	0.0%	38
CLEVELAND	82	12.3%	578	86.7%	7	1.0%	667
COLUMBUS	56	9.6%	518	89.0%	8	1.4%	582
CRAVEN	81	8.8%	825	89.7%	14	1.5%	920
CUMBERLAND	359	10.5%	3,027	88.4%	37	1.1%	3,423
CURRITUCK	1	1.7%	56	96.6%	1	1.7%	58
DARE	7	7.7%	83	91.2%	1	1.1%	91
DAVIDSON	114	12.0%	822	86.7%	12	1.3%	948
DAVIE	22	11.5%	167	87.0%	3	1.6%	192
DUPLIN	43	8.6%	448	89.8%	8	1.6%	499
DURHAM	183	12.5%	1,261	86.4%	16	1.1%	1,460
EDGECOMBE	63	11.6%	476	87.7%	4	0.7%	543
FORSYTH	257	13.1%	1,682	85.9%	20	1.0%	1,959
FRANKLIN	34	12.5%	233	85.7%	5	1.8%	272
GASTON	132	9.8%	1,193	88.8%	19	1.4%	1,344
GATES	5	12.5%	35	87.5%	-	0.0%	40
GRAHAM	4	4.7%	80	94.1%	1	1.2%	85
GRANVILLE	20	7.0%	262	92.3%	2	0.7%	284
GREENE	11	7.0%	147	93.0%	-	0.0%	158
GUILFORD	282	10.9%	2,283	88.0%	30	1.2%	2,595
HALIFAX	56	11.4%	434	88.0%	3	0.6%	493
HARNETT	74	10.7%	614	88.6%	5	0.7%	693
HAYWOOD	26	8.2%	288	90.3%	5	1.6%	319
HENDERSON	42	8.1%	471	90.6%	7	1.3%	520
HERTFORD	36	15.7%	194	84.3%	-	0.0%	230
HOKE	41	9.4%	384	88.3%	10	2.3%	435
HYDE	5	19.2%	21	80.8%	-	0.0%	26
IREDELL	82	12.1%	589	86.7%	8	1.2%	679
JACKSON	13	5.8%	207	92.8%	3	1.3%	223
JOHNSTON	80	10.8%	652	88.2%	7	0.9%	739

Table 23. Infant Birthweight Distribution By County, NC 1999

COUNTY	LOW <2500 GRAMS		NORMAL 2500-4500 GRAMS		HIGH > 4500 GRAMS		Total
	#	%	#	%	#	%	#
NORTH CAROLINA	5,756	10.4%	49,015	88.4%	692	1.2%	55,463
JONES	6	6.9%	81	93.1%	-	0.0%	87
LEE	34	7.8%	397	91.5%	3	0.7%	434
LENOIR	73	14.1%	439	85.1%	4	0.8%	516
LINCOLN	37	9.9%	333	88.8%	5	1.3%	375
MACON	13	6.9%	172	91.0%	4	2.1%	189
MADISON	13	10.4%	111	88.8%	1	0.8%	125
MARTIN	33	14.8%	187	83.9%	3	1.3%	223
MCDOWELL	29	9.2%	285	90.2%	2	0.6%	316
MECKLENBURG	371	11.1%	2,925	87.8%	35	1.1%	3,331
MITCHELL	12	10.9%	97	88.2%	1	0.9%	110
MONTGOMERY	28	11.7%	210	87.9%	1	0.4%	239
MOORE	42	8.8%	432	90.0%	6	1.3%	480
NASH	75	11.6%	564	87.4%	6	0.9%	645
NEW HANOVER	94	10.0%	828	88.0%	19	2.0%	941
NORTHAMPTON	14	7.4%	172	91.5%	2	1.1%	188
ONSLow	174	8.3%	1,884	89.5%	48	2.3%	2,106
ORANGE	37	9.3%	356	89.7%	4	1.0%	397
PAMLICO	9	10.8%	73	88.0%	1	1.2%	83
PASQUOTANK	20	8.0%	223	89.6%	6	2.4%	249
PENDER	31	10.8%	249	87.1%	6	2.1%	286
PERQUIMANS	6	7.5%	73	91.3%	1	1.3%	80
PERSON	26	10.4%	220	88.0%	4	1.6%	250
PITT	148	13.6%	934	85.6%	9	0.8%	1,091
POLK	6	6.7%	83	92.2%	1	1.1%	90
RANDOLPH	79	9.3%	753	88.8%	16	1.9%	848
RICHMOND	61	12.4%	419	85.2%	12	2.4%	492
ROBESON	180	11.9%	1,319	86.9%	19	1.3%	1,518
ROCKINGHAM	66	9.7%	608	89.5%	5	0.7%	679
ROWAN	83	10.2%	716	88.3%	12	1.5%	811
RUTHERFORD	49	10.4%	417	88.7%	4	0.9%	470
SAMPSON	53	9.2%	516	89.4%	8	1.4%	577
SCOTLAND	43	10.4%	367	88.9%	3	0.7%	413
STANLY	30	8.2%	332	90.5%	5	1.4%	367
STOKES	27	11.0%	214	87.0%	5	2.0%	246
SURRY	43	9.1%	429	90.3%	3	0.6%	475
SWAIN	11	7.3%	135	90.0%	4	2.7%	150
TRANSYLVANIA	16	9.8%	144	88.3%	3	1.8%	163
TYRRELL	1	2.9%	32	91.4%	2	5.7%	35
UNION	55	7.7%	649	91.2%	8	1.1%	712
VANCE	53	11.1%	415	87.2%	8	1.7%	476
WAKE	270	10.1%	2,365	88.7%	31	1.2%	2,666
WARREN	18	10.9%	147	89.1%	-	0.0%	165
WASHINGTON	12	10.3%	105	89.7%	-	0.0%	117
WATAUGA	20	10.2%	173	87.8%	4	2.0%	197
WAYNE	79	7.8%	915	89.9%	24	2.4%	1,018
WILKES	51	10.2%	444	88.8%	5	1.0%	500
WILSON	54	8.7%	559	90.3%	6	1.0%	619
YADKIN	27	11.6%	203	87.5%	2	0.9%	232
YANCEY	11	8.4%	117	89.3%	3	2.3%	131

Table 24. Birthweights By Maternal Age and By Maternal Race/Ethnicity, NC 1999

Race/Ethnicity	Age Group	LOW <2500 GRAMS		NORMAL 2500-4500 GRAMS		HIGH > 4500 GRAMS		Total
		Count	%	Count	%	Count	%	Count
White,non-Hispanic	Under 18	223	10.9%	1,798	88.0%	22	1.1%	2,043
	18-24	1,109	8.0%	12,526	90.6%	194	1.4%	13,829
	25-29	524	9.1%	5,097	88.9%	114	2.0%	5,735
	30-34	244	9.8%	2,193	88.0%	54	2.2%	2,491
	35 or older	169	14.3%	981	83.3%	28	2.4%	1,178
	White Total	2,269	9.0%	22,595	89.4%	412	1.6%	25,276
Black,non-Hispanic	Under 18	313	13.9%	1,929	85.9%	4	0.2%	2,246
	18-24	1,388	12.3%	9,802	87.1%	68	0.6%	11,258
	25-29	618	13.8%	3,822	85.1%	50	1.1%	4,490
	30-34	340	15.2%	1,874	83.7%	24	1.1%	2,238
	35 or older	211	17.9%	952	80.9%	14	1.2%	1,177
	Black Total	2,870	13.4%	18,379	85.8%	160	0.7%	21,409
Native American,non-Hispanic	Under 18	19	12.5%	131	86.2%	2	1.3%	152
	18-24	81	11.0%	650	88.0%	8	1.1%	739
	25-29	28	10.3%	241	88.3%	4	1.5%	273
	30-34	12	11.8%	84	82.4%	6	5.9%	102
	35 or older	8	13.6%	50	84.7%	1	1.7%	59
	Native American Total	148	11.2%	1,156	87.2%	21	1.6%	1,325
Asian/Pacific Islander,non-Hispanic	Under 18	7	9.5%	67	90.5%	-	0.0%	74
	18-24	24	7.7%	287	92.0%	1	0.3%	312
	25-29	12	5.4%	211	94.2%	1	0.4%	224
	30-34	11	8.3%	119	90.2%	2	1.5%	132
	35 or older	5	6.1%	76	92.7%	1	1.2%	82
	Asian/Pacific Islander Total	59	7.2%	760	92.2%	5	0.6%	824
Hispanic	Under 18	37	8.9%	378	90.6%	2	0.5%	417
	18-24	199	5.9%	3,156	93.4%	25	0.7%	3,380
	25-29	105	6.0%	1,617	91.9%	37	2.1%	1,759
	30-34	43	5.7%	691	91.8%	19	2.5%	753
	35 or older	26	8.6%	265	87.7%	11	3.6%	302
	Hispanic Total	410	6.2%	6,107	92.4%	94	1.4%	6,611
All Races	Under 18	599	12.1%	4,303	87.2%	30	0.6%	4,932
	18-24	2,801	9.5%	26,421	89.5%	296	1.0%	29,518
	25-29	1,287	10.3%	10,988	88.0%	206	1.7%	12,481
	30-34	650	11.4%	4,961	86.8%	105	1.8%	5,716
	35 or older	419	15.0%	2,324	83.1%	55	2.0%	2,798
	Total	5,756	10.4%	49,015	88.4%	692	1.2%	55,463

Breastfeeding

Effective in 1999, the methodology for computing the breastfeeding rate for the NC Surveillance Report has been modified. Breastfeeding information was collected at the time of women's postpartum WIC visit. All postpartum women enrolled in WIC who reported currently breastfeeding or who reported discontinuing breastfeeding were classified as breastfeeding, even if the infant was fed any amount of formula. The prevalence rate stated in this report, however, cannot be compared to all preceding years because of the change in definition of breastfeeding used in this report.

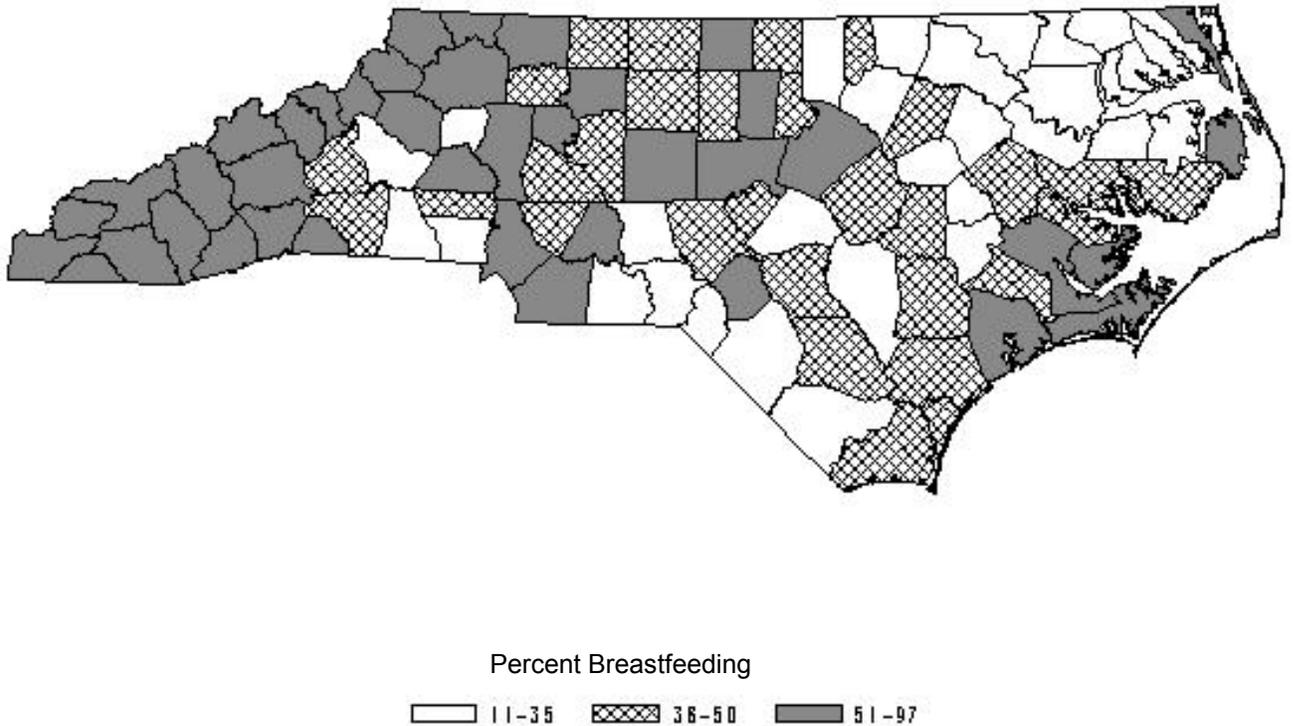
In 1999 breastfeeding information could be collected from 46,789 women (84%). A total of 22,032 women (47%) reported at their first postpartum WIC visit that they were breastfeeding or had breastfed their infants.

Women 25 years of age and older were more likely to breastfeed than women under 18 years of age (50% vs. 36%, respectively). There was significant variation in prevalence of breastfeeding by race/ethnicity. The breastfeeding rate was 51% among white, non-Hispanic women; 35% among black, non-Hispanic women; 42% among Native American, non-Hispanic women; and 49% among Asian, non-Hispanic women. The highest breastfeeding rate, however, was among the Hispanic women (74%) (Table 25 on page 66).

Women with more than 12 years of education were much more likely to breastfeed than women with less than 12 years of school (59% vs. 42%, respectively). The differences in breastfeeding among the two education groups also varied by race/ethnicity (Table 26 on page 67). For example, Black women with less than a high school education had a breastfeeding prevalence of only 24%, while those with more than a high school education were twice as likely to breastfeed (50%). Similarly, white women with more than 12 years of education were also more likely to breastfeed than white women with less than a high school education (65% vs. 40%, respectively). The effect of education on breastfeeding was least pronounced among the Hispanics.

Breastfeeding rates varied considerably by county, ranging from 11% to 97% (Table 27 on page 68). Incidence rates of breastfeeding were higher in the western part compared to the eastern part of North Carolina (Figure 14 on page 64).

Figure 14. Incidence of Breastfeeding Amongst Women* Participating in WIC, North Carolina Counties 1999



**Includes only women enrolled in WIC after delivery*

Discussion

Special breastfeeding promotion efforts across the state, many funded by the WIC program, have contributed to an increase in the incidence of breastfeeding at the WIC postpartum visit. Most low-income women are aware of the benefits of breastfeeding, but they are less likely to breastfeed because of cultural norms, lack of social support, few role models, and economic barriers which include early return to work or school. Community-wide changes in school and workplace policies, and the knowledge and attitudes of mothers, families, and health professionals will be necessary to make breastfeeding the best choice for all mothers.

Table 25. Incidence of Breastfeeding Among Women* Participating in the WIC Program By Maternal Race/Ethnicity By Maternal Age, NC, 1999

Ethnicity	Age Group	Breastfeeding Initiated at Birth		Did not initiate Breastfeed		Total
		Count	%	Count	%	Count
White,non-Hispanic	Under 18	695	40.0%	1043	60.0%	1738
	18-24	5889	50.5%	5761	49.5%	11650
	25-29	2581	52.7%	2315	47.3%	4896
	30-34	1129	52.5%	1021	47.5%	2150
	35 or older	596	57.6%	439	42.4%	1035
	White Total	10890	50.7%	10579	49.3%	21469
Black,non-Hispanic	Under 18	477	25.4%	1401	74.6%	1878
	18-24	3181	33.9%	6192	66.1%	9373
	25-29	1438	38.5%	2301	61.5%	3739
	30-34	755	39.7%	1148	60.3%	1903
	35 or older	365	36.5%	635	63.5%	1000
	Black Total	6216	34.7%	11677	65.3%	17893
Native American,non-Hispanic	Under 18	48	37.5%	80	62.5%	128
	18-24	239	38.2%	387	61.8%	626
	25-29	116	48.5%	123	51.5%	239
	30-34	47	47.5%	52	52.5%	99
	35 or older	24	50.0%	24	50.0%	48
	Native American Total	474	41.6%	666	58.4%	1140
Asian,non-Hispanic	Under 18	25	35.2%	46	64.8%	71
	18-24	132	49.1%	137	50.9%	269
	25-29	104	55.0%	85	45.0%	189
	30-34	47	44.3%	59	55.7%	106
	35 or older	38	53.5%	33	46.5%	71
	Asian Total	346	49.0%	360	51.0%	706
Hispanic	Under 18	246	72.8%	92	27.2%	338
	18-24	2053	72.6%	773	27.4%	2826
	25-29	1134	75.8%	362	24.2%	1496
	30-34	484	75.0%	161	25.0%	645
	35 or older	189	73.0%	70	27.0%	259
	Hispanic Total	4106	73.8%	1458	26.2%	5564
Total	Under 18	1491	35.9%	2662	64.1%	4153
	18-24	11494	46.5%	13250	53.5%	24744
	25-29	5373	50.9%	5186	49.1%	10559
	30-34	2462	50.2%	2441	49.8%	4903
	35 or older	1212	50.2%	1201	49.8%	2413
	All Race Total	22044	47.1%	24745	52.9%	46789

North Carolina Pregnancy Nutrition Surveillance System.

*Includes only mothers enrolled in WIC after delivery

Table 26. Incidence of Breastfeeding Amongst Women* Participating in WIC Program By Maternal Race/Ethnicity and Maternal Education, NC, 1999

Ethnicity	Education Level	Breastfeeding		Did not initiate		Total
		Count	%	Count	%	Count
White,non-Hispanic	Under 12 years	2886	39.8%	4357	60.2%	7243
	High School	4778	51.6%	4490	48.4%	9268
	Over 12 years	3212	65.1%	1722	34.9%	4934
	White Total	10876	50.7%	10569	49.3%	21445
Black,non-Hispanic	Under 12 years	1266	24.3%	3949	75.7%	5215
	High School	2550	32.5%	5300	67.5%	7850
	Over 12 years	2386	49.6%	2420	50.4%	4806
	Black Total	6202	34.7%	11669	65.3%	17871
Native American,non-Hispanic	Under 12 years	147	33.9%	287	66.1%	434
	High School	192	39.8%	290	60.2%	482
	Over 12 years	134	60.4%	88	39.6%	222
	Native American Total	473	41.6%	665	58.4%	1138
Asian,non-Hispanic	Under 12 years	76	30.8%	171	69.2%	247
	High School	139	50.9%	134	49.1%	273
	Over 12 years	130	75.1%	43	24.9%	173
	Asian Total	345	49.8%	348	50.2%	693
Hispanic	Under 12 years	2683	73.6%	963	26.4%	3646
	High School	909	73.1%	334	26.9%	1243
	Over 12 years	475	77.5%	138	22.5%	613
	Hispanic Total	4067	73.9%	1435	26.1%	5502
Total	Under 12 years	7058	42.0%	9727	58.0%	16785
	High School	8568	44.8%	10548	55.2%	19116
	Over 12 years	6337	59.0%	4411	41.0%	10748
	All Race Total	22044	47.1%	24745	52.9%	46789

North Carolina Pregnancy Nutrition Surveillance System.

*Includes only mothers enrolled in WIC after delivery

Table 27. Incidence of Breastfeeding Among Women* Participating in The WIC Program, NC 1999

COUNTY	Breastfeeding Initiated at Postpartum		Did not initiate Breastfeeding		Total
	#	%	#	%	#
NORTH CAROLINA	22,044	47.1%	24,745	52.9%	46,789
ALAMANCE	293	43.0%	388	57.0%	681
ALEXANDER	31	17.7%	144	82.3%	175
ALLEGHANY	28	51.9%	26	48.1%	54
ANSON	46	19.4%	191	80.6%	237
ASHE	88	55.3%	71	44.7%	159
AVERY	50	53.2%	44	46.8%	94
BEAUFORT	146	43.7%	188	56.3%	334
BERTIE	21	11.2%	166	88.8%	187
BLADEN	91	36.1%	161	63.9%	252
BRUNSWICK	145	49.2%	150	50.8%	295
BUNCOMBE	917	80.7%	219	19.3%	1,136
BURKE	181	33.8%	354	66.2%	535
CABARRUS	255	50.0%	255	50.0%	510
CALDWELL	290	53.2%	255	46.8%	545
CAMDEN	7	29.2%	17	70.8%	24
CARTERET	161	55.7%	128	44.3%	289
CASWELL	63	56.3%	49	43.8%	112
CATAWBA	451	54.7%	373	45.3%	824
CHATHAM	125	58.4%	89	41.6%	214
CHEROKEE	84	51.2%	80	48.8%	164
CHOWAN	11	11.3%	86	88.7%	97
CLAY	20	55.6%	16	44.4%	36
CLEVELAND	120	24.7%	365	75.3%	485
COLUMBUS	94	17.3%	449	82.7%	543
CRAVEN	453	61.2%	287	38.8%	740
CUMBERLAND	1,568	50.2%	1,557	49.8%	3,125
CURRITUCK	32	74.4%	11	25.6%	43
DARE	50	63.3%	29	36.7%	79
DAVIDSON	343	41.8%	478	58.2%	821
DAVIE	107	62.2%	65	37.8%	172
DUPLIN	183	40.0%	275	60.0%	458
DURHAM	484	42.0%	669	58.0%	1,153
EDGECOMBE	141	30.1%	328	69.9%	469
FORSYTH	1,110	64.5%	612	35.5%	1,722
FRANKLIN	55	23.4%	180	76.6%	235
GASTON	424	35.1%	785	64.9%	1,209
GATES	4	11.4%	31	88.6%	35
GRAHAM	75	96.2%	3	3.8%	78
GRANVILLE	84	34.1%	162	65.9%	246
GREENE	49	34.8%	92	65.2%	141
GUILFORD	1,035	50.3%	1,023	49.7%	2,058
HALIFAX	124	29.0%	304	71.0%	428
HARNETT	186	32.6%	384	67.4%	570
HAYWOOD	145	52.2%	133	47.8%	278
HENDERSON	316	71.7%	125	28.3%	441
HERTFORD	22	13.5%	141	86.5%	163
HOKE	215	53.6%	186	46.4%	401
HYDE	10	47.6%	11	52.4%	21
IREDELL	289	50.9%	279	49.1%	568
JACKSON	153	73.2%	56	26.8%	209
JOHNSTON	245	38.1%	398	61.9%	643

Table 27. Incidence of Breastfeeding Among Women* Participating in The WIC Program, NC 1999

COUNTY	Breastfeeding Initiated at Postpartum		Did not initiate Breastfeeding		Total #
	#	%	#	%	
NORTH CAROLINA	22,044	47.1%	24,745	52.9%	46,789
JONES	27	36.5%	47	63.5%	74
LEE	161	48.5%	171	51.5%	332
LENOIR	102	24.5%	315	75.5%	417
LINCOLN	139	44.6%	173	55.4%	312
MACON	100	62.1%	61	37.9%	161
MADISON	84	70.0%	36	30.0%	120
MARTIN	52	27.4%	138	72.6%	190
MCDOWELL	144	49.8%	145	50.2%	289
MECKLENBURG	1,425	52.9%	1,267	47.1%	2,692
MITCHELL	53	54.6%	44	45.4%	97
MONTGOMERY	48	21.9%	171	78.1%	219
MOORE	193	49.2%	199	50.8%	392
NASH	207	35.6%	375	64.4%	582
NEW HANOVER	355	45.9%	418	54.1%	773
NORTHAMPTON	24	14.7%	139	85.3%	163
ONSLow	1,018	55.4%	821	44.6%	1,839
ORANGE	210	65.0%	113	35.0%	323
PAMLICO	36	53.7%	31	46.3%	67
PASQUOTANK	64	28.4%	161	71.6%	225
PENDER	91	46.9%	103	53.1%	194
PERQUIMANS	15	21.1%	56	78.9%	71
PERSON	103	45.4%	124	54.6%	227
PITT	348	37.7%	576	62.3%	924
POLK	49	61.3%	31	38.8%	80
RANDOLPH	457	61.3%	288	38.7%	745
RICHMOND	75	23.7%	242	76.3%	317
ROBESON	441	33.8%	863	66.2%	1,304
ROCKINGHAM	210	36.5%	366	63.5%	576
ROWAN	297	40.3%	440	59.7%	737
RUTHERFORD	183	42.1%	252	57.9%	435
SAMPSON	168	33.5%	334	66.5%	502
SCOTLAND	130	35.1%	240	64.9%	370
STANLY	214	64.3%	119	35.7%	333
STOKES	96	43.4%	125	56.6%	221
SURRY	233	59.4%	159	40.6%	392
SWAIN	126	96.9%	4	3.1%	130
TRANSYLVANIA	87	56.5%	67	43.5%	154
TYRRELL	9	32.1%	19	67.9%	28
UNION	323	53.7%	278	46.3%	601
VANCE	165	39.6%	252	60.4%	417
WAKE	1,103	58.0%	800	42.0%	1,903
WARREN	40	27.2%	107	72.8%	147
WASHINGTON	14	12.8%	95	87.2%	109
WATAUGA	126	74.6%	43	25.4%	169
WAYNE	392	45.3%	473	54.7%	865
WILKES	239	51.7%	223	48.3%	462
WILSON	94	32.4%	196	67.6%	290
YADKIN	87	41.2%	124	58.8%	211
YANCEY	67	55.8%	53	44.2%	120

References

1. Kotelchuck M. An evaluation of the Kessner Adequacy of Prenatal Care Index and a proposed Adequacy of Prenatal Care Utilization Index. *American Journal of Public Health*, 1994;84:1414-1420.
2. Paneth KA: The Problem of Low Birth Weight. *The Future of Children* 1995;5:19-34.
3. Karin K. Maternal Smoking during pregnancy and infant head circumference at birth. *Early Hum Dev* 2000;58:197-204
4. Cogswell ME, Yip R: The influence of fetal and maternal factors on the distribution of birthweight. *Semin Perinatol* 1995;19:222-240.
5. <http://www.cdc.gov/nchs/fastats/smoking.htm> U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES Centers for Disease Control and Prevention, National Center for Health Statistics Division of Data Services, Hyattsville, MD
6. Wen SW, Goldenberg RL, Cutter GR, et al: Smoking, maternal age, fetal growth and gestational age. *Am J Obstet Gynecol* 1990;162:53-58.
7. Rush D: The national WIC evaluation: evaluation of the Special Supplemental Food Program for Women, Infants, and Children. *Am J Clin Nutr* 1988; 48:389-519.
8. General Accounting Office: Early intervention: federal investments like WIC can produce savings. Washington, DC: General Accounting Office, 1992.
9. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. Bethesda, MD: National Institutes of Health, National Heart, Lung, and Blood Institute, June 1998.
10. Abrams BF, Laros RK: Prepregnancy weight, weight gain and birthweight. *Am J Obstet Gynecol* 1986;154:503-509.
11. Ventura SJ, Kimberly MA, Martin JA, et al; Births and deaths: United States, 1996; preliminary data. *Monthly vital statistics report*; vol 46(1), supp. 2. Hyattsville, MD:National Center for Health Statistics, September 11,1997.
12. Scholl TO, Heidiger ML, Eischer RL, Shearer JW: Anemia vs. iron deficiency: increased risk of preterm delivery in a prospective study. *Am J Clin Nutr* 1992;55:985-988