

PREGNANCY NUTRITION SURVEILLANCE SYSTEM

**CENTERS FOR DISEASE CONTROL AND
PREVENTION (CDC) / MASSACHUSETTS
WOMEN, INFANTS AND CHILDREN (WIC)
NUTRITION PROGRAM**



**Massachusetts Department of Public Health
Bureau of Family Health and Nutrition
Nutrition Division
2009 PREGNANCY DATA REPORT**



AUGUST, 2011

PREGNANCY NUTRITION SURVEILLANCE SYSTEM CDC / MASSACHUSETTS WIC NUTRITION PROGRAM

2009 Pregnancy Data Report

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AUGUST 2011

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TABLE OF CONTENTS

PAGE

Acknowledgements	ii
Table of Contents	iii
Introduction	v
Limitations	vii
Executive Summary	viii
<i>Maternal Demographic Characteristics</i>	
Figure 1: Source of Data	1
Figure 2a: Racial and Ethnic Distribution	2
Figure 2b: Trends in Racial and Ethnic Distribution	3
Figure 3a: Age Distribution	4
Figure 3b: Trends in Age Distribution	5
Figure 4: Education Level	6
Figure 5: Migrant Status	7
Figure 6: Household Income, Reported as Percent Poverty Level	8
Figure 7: Program Participation, at Initial Prenatal Visit	10
Figure 8: Timing of WIC Enrollment and Medical Care	11
Figure 9: Trends in WIC Enrollment and Medical Care	13
Figure 10: Parity Level and Inter-Pregnancy Interval	14
<i>Maternal Weight Characteristics</i>	
Figure 11a: Prevalence of Pre-pregnancy Underweight and Overweight	16
Figure 11b: Trends in Pre-pregnancy Underweight and Overweight	18
Figure 12: Prevalence of Pre-pregnancy Underweight, by Race and Ethnicity ..	19
Figure 13: Prevalence of Pre-pregnancy Overweight, by Race and Ethnicity ..	20
Figure 14: Prevalence of Less than Ideal Maternal Weight Gain, by Race and Ethnicity	21
Figure 15: Prevalence of Greater than Ideal Maternal Weight Gain, by Race and Ethnicity	22
Figure 16: Maternal Weight Gain, by Pre-pregnancy BMI	24
Figure 17: Prevalence of Less than Ideal, Ideal and Greater than Ideal Maternal Weight Gain	25
<i>Maternal Anemia Characteristics</i>	
Figure 18: Prevalence of Anemia by Timing of Program Enrollment	26
Figure 19a: Prevalence of Third-Trimester Anemia, by Race and Ethnicity	28
Figure 19b: Trends in Third-Trimester Anemia, by Race and Ethnicity	29
Figure 20a: Prevalence of Post-partum Anemia, by Race and Ethnicity	30
Figure 20b: Trends in Post-partum Anemia, by Race and Ethnicity	31

TABLE OF CONTENTS, Cont'd	PAGE
---------------------------	------

Maternal Smoking and Drinking

Figure 21a: Prevalence of Smoking and Smoking in the Household by Pregnancy Status	32
Figure 21b: Trends in Maternal Smoking by Pregnancy Status	34
Figure 21c: Trends in Household Smoking during Pregnancy	35
Figure 22: Smoking Changes during Pregnancy	36
Figure 23: Prevalence of Maternal Drinking	37

Infant Characteristics

Figure 24: Prevalence of Low Birth Weight and High Birth Weight	39
Figure 25: Prevalence of Selected Birth Outcomes	41
Figure 26a: Prevalence of Low Birth Weight, by Race and Ethnicity	42
Figure 26b: Trends in Prevalence of Low Birth Weight by Race and Ethnicity ..	43
Figure 27: Prevalence of Low Birth Weight, by Selected Health Indicators	44
Figure 28: Prevalence of High Birth Weight, by Race and Ethnicity	45
Figure 29: Prevalence of Preterm Delivery, by Race and Ethnicity	47
Figure 30: Trends in Prevalence of Preterm Delivery	49
Figure 31: Percentage of Infants Ever Breastfed, by Race and Ethnicity	50
Figure 32: Trends in Percentage of Infants Ever Breastfed	52

References.....53

Appendix 1 Pre-pregnancy Weight Status, Hemoglobin and Hematocrit

Status	58
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Appendix 2 2009 Participating WIC Programs60

Appendix 3 State Maps of County Data61

Appendix 4 Trends Charts.....68

INTRODUCTION

The Special Supplemental Nutrition Program for Women, Infants, and Children (the WIC Program) is a preventive nutrition program targeted at low-to moderate-income women as well as infants and children up to age five years who are at increased health risk in comparison to the general population. WIC's goal is the early detection of potential health and nutritional risks accompanied by appropriate interventions. The WIC program provides nutrition education, breastfeeding support, and referrals to health care providers, social service agencies and many other assistance programs. WIC also provides checks to purchase nutritious foods for participating women, infants, and children. In 2009, there were 35 WIC local programs and 127 WIC sites across Massachusetts (MA). The United States (US) Department of Agriculture and the state of Massachusetts jointly fund the Massachusetts WIC Nutrition Program.

National Pregnancy Nutrition Surveillance

Since 1991, the Massachusetts WIC Program has participated in the Centers for Disease Control and Prevention (CDC) Pregnancy Nutrition Surveillance System (PNSS). The CDC began monitoring behavioral and nutritional risk factors and birth outcomes among low-income pregnant women enrolled in public health programs in 1979. The resulting surveillance system, referred to here as PNSS, has collected data from various participating states and territories on nutrition-related factors that contribute to pregnancy outcomes. The collected data are analyzed, interpreted and disseminated to guide public health policy and action. The data may also be used to set public health priorities and to plan, implement and evaluate nutrition programs for pregnant women. Demographic data include maternal birth date, race and ethnicity, marital status, education level, percent poverty, program participation and migrant status. Data also are collected on maternal height and pre-pregnancy weight, weight gain during pregnancy, anemia, parity, inter-pregnancy interval, breastfeeding, and timing of prenatal care, alcohol use, and tobacco use before, during, and after pregnancy. Collected information related to the infant includes date of birth, gestational age at birth, birth weight, parity, sex, infant feeding behavior and health status at birth. States, US territories and Indian Tribal Organizations (ITOs) constitute data contributors to the PNSS program.

The national PNSS is based primarily on data derived from the clinical service records of individual state WIC programs or other contributors, although a small proportion of records are obtained from women attending prenatal clinics funded by Title V Maternal and Child Health Services Block grant and state funds. In 2009, data contributions were included for 30 states, the District of Columbia, one US territory and 6 Indian Tribal Organizations (the states and tribal organizations that participate in the PNSS have varied since the system's inception). The quantity and quality of data in the PNSS are affected by different data collection methods among contributing programs as well as differences in the criteria for women's eligibility among participating public health programs.

At the present time, all data submitted by Massachusetts to PNSS are derived from the clinical service records of the Massachusetts WIC Program. All clinic data are aggregated at the state level and then submitted in a secure system to

the CDC for analysis. The CDC then generates the national data as well as state specific data. In 2009, 35,278 women participated in the Massachusetts PNSS (MA PNSS), and 1,307,887 women participated in the national PNSS.

PREGNANCY NUTRITION SURVEILLANCE SYSTEM IN MASSACHUSETTS

The present report can be utilized as a statewide summary using the data derived from the 2009 Massachusetts WIC Program. Starting with the 2002 report and for all subsequent reports, data analysis and chart preparation are provided by the CDC and not by the Massachusetts Department of Public Health (MDPH) Office of Data Translation (ODT), (formerly the Office of Statistics and Evaluation).

Limitations

MA PNSS data are exclusive to pregnant women in the WIC program. Certain data on demographics, nutritional status, anemia and infant feeding practices should be interpreted with caution as they tend to be much different than the data for the general MA population published by the MA Department of Public Health. This discrepancy could occur because MA PNSS data are based on low income women participating in the WIC Program only and such data is not representative of the state of Massachusetts as a whole.

There were also small number limitations. Rates and proportions based on fewer than 100 observations are suppressed and trends based on small numbers should be interpreted cautiously. No statistics for some variables are shown for American Indian and multiple race MA PNSS populations. The CDC does not generate statistics based on fewer than 100 records as the data will not be statistically stable.

Some data such as income, child's birth weight information, and mother's age and breastfeeding characteristics were not obtained from certain clients as the clients declined to report them. Such missing information will impact household poverty determination, nutritional status, low birth weight and high birth weight determination as well as other factors that impact the health of the mother and child.

Executive Summary

This 2009 Massachusetts PNSS Pregnancy Data Report includes records for women served by the Massachusetts WIC Program during the 2009 calendar year (from January 01, 2009 to December 31, 2009). In this report, the 2009 Massachusetts PNSS data are directly compared to the 2008 national PNSS data which was the most currently available national data, at the time of 2009 MA PNSS analysis. The Massachusetts PNSS report presents demographic, nutrition, and health-related data collected as part of normal service delivery for low- to moderate-income women who participate in the Massachusetts WIC Program. Many of the elements presented relate to medical and behavioral risks associated with poor pregnancy outcomes.

Demographic Characteristics

The minority population (which consists of Asian/Pacific Islander, Native American/Alaskan Indian, Black non-Hispanic, and Hispanic women) accounted for 52.4% of the women served by the Massachusetts WIC program in 2009.

More than fifteen percent (15.5%) of the women were less than 20 years old, 56.6% were 20 to 29 years old, 25.7% were 30 to 39 years old and slightly over two percent were 40 years or older.

Almost twenty-nine percent (28.8%) of the MA PNSS women had less than 12 years of education.

Most of the women (98.1%) were at or below 200% of the federal poverty level (FPL).

The participation rates for women in various programs were as follows: WIC (100%), Food Stamps, now known as Supplemental Nutrition Assistance Program or SNAP (25.1%), Medicaid (75.9%) and Temporary Assistance for Needy Families or TANF (10.8%).

Maternal Health Characteristics

Over seventy-three percent (73.7%) of all Massachusetts PNSS women began prenatal care during the first trimester of pregnancy.

More than one-third of the women were enrolled in the WIC program in the first trimester and almost the same proportion in the second trimester (35.5% and 34.4%, respectively).

Forty-nine percent (49.0%) of the women had an above normal pre-pregnancy body mass index (BMI) (either overweight [25.9%] or obese [23.1%] prior to their current pregnancy).

Approximately fifty-two percent (51.8%) of the overall participants gained more than the recommended amount of weight during their pregnancy. Almost two-thirds (63.8%) of participants who were overweight before pregnancy gained more than the recommended weight during their pregnancy.

The prevalence of low hemoglobin/hematocrit (Hgb/Hct) status or anemia was lower in the postpartum period (29.9%) than in the 3rd trimester period (34.7%).

Over twenty-one percent (21.9%) of WIC participants reported smoking in the three months prior to pregnancy.

Infant Characteristics

Ten percent (10.0%) of Black non-Hispanic infants in MA PNSS had a moderately low or very low birth weight versus seven percent (7.1%) among White non-Hispanic infants.

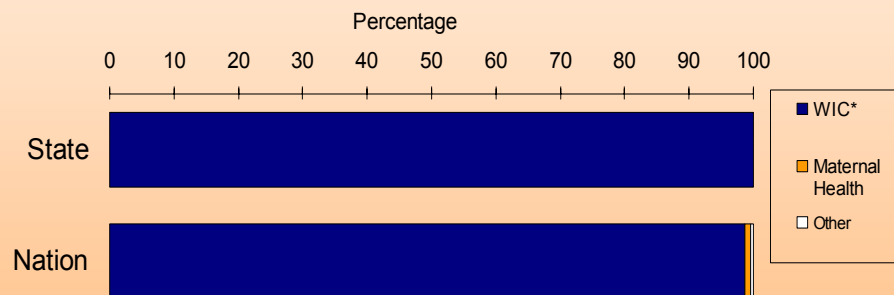
More than nine percent (9.1%) of the participants had a preterm delivery (i.e. less than 37 weeks gestation). Three percent (3.1%) of participants had full term pregnancies (37 or more weeks of gestation) but delivered low birth weight (1500 grams to less than 2500 grams) babies. Just over one percent (1.3%) of participants had multiple births (more than one baby at time of delivery).

Black non-Hispanic women had the highest prevalence of preterm deliveries (11.2%) followed by Hispanic women (9.5%).

Slightly more than seventy-five percent (75.1%) of MA PNSS women reported breastfeeding their infants during the early postpartum period, meeting the Healthy People 2010 goal of 75% for breastfeeding initiation.

Data Source

Figure 1-Source of data for PNSS



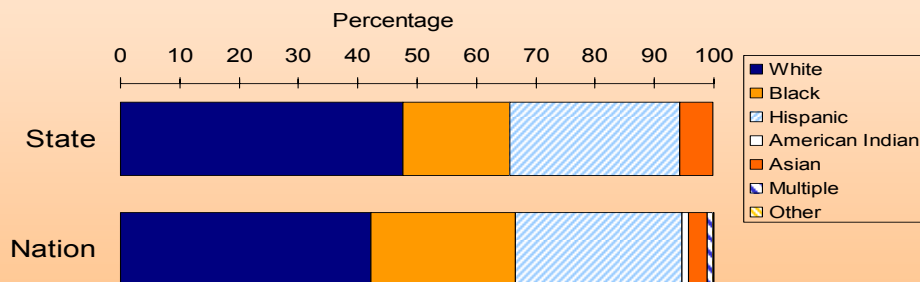
* Special Supplemental Nutrition Program for Women, Infants and Children.

2009 MA PNSS

- In Massachusetts, the entire PNSS data set (100%) was derived from the WIC Program. Nationally, nearly all records also came from WIC participant data.

Racial and Ethnic Distribution

Figure 2a-Racial and Ethnic Distribution



2009 MA PNSS Table 1C

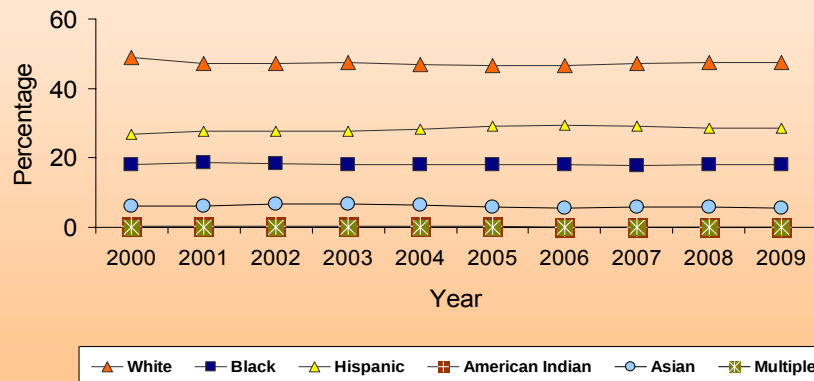
In 2009, the MA PNSS population was comprised of 47.6% White non-Hispanic, 18.0% Black non-Hispanic, 28.6% Hispanic, 5.6% Asian /Pacific Islander and 0.1% American Indian/Alaskan Native. For the 2009 MA PNSS data set, “multiple” and “other” race categories were not collected.

The national PNSS population (1,307,887) in 2008 was comprised of 42.2% White non-Hispanic, 24.3% Black non-Hispanic, 28.2% Hispanic, 1.0% American Indian, 3.1% Asian, 1.1% “multiple” race and 0.1% “other” race.

The percentage of White non-Hispanic women served in WIC was slightly higher for MA PNSS (47.6%) than for the National PNSS (42.2%). This proportion almost mirrors the proportion of non-WIC White non-Hispanic women in the state (86%) and the nation (80%) according to the recent census figures (<http://quickfacts.census.gov/qfd/states/25000.html>). The percentage of Asian women in MA PNSS (5.6%) was slightly higher than that of their counterparts (3.1%) in the National PNSS and reflects their percentage among non-WIC women as per the recent census data. The percentage of Black non-Hispanic Women is lower in MA PNSS (18.0%) than in National PNSS (24.3%) and also reflects the proportion among non-WIC women both in the state and the nation.

Demographic Trends: Race and Ethnicity Distribution

Figure 2b-Trends in Racial and Ethnic Distribution

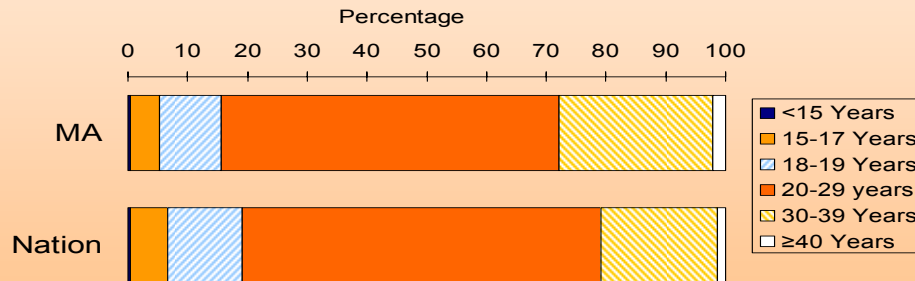


2009 MA PNSS

The racial and ethnic distributions among MA PNSS participants followed similar trends between 2000 and 2009, with White non-Hispanic being the racial and ethnic group with the largest percentage of participants served (48.9% in 2000 and 47.6% in 2009) and American Indian/Alaskan Native) group having the lowest percentage served (0.2% in 2000 and 0.1% in 2009).

Demographic Characteristics: Age Distribution

Figure 3a-Age Distribution

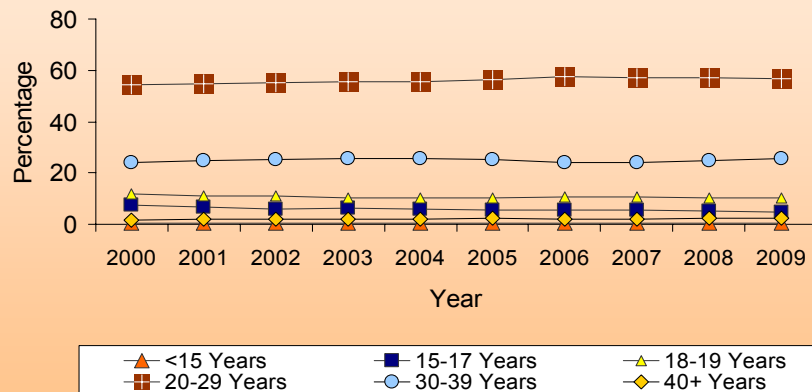


2009 MA PNSS

- In 2009, less than a fifth (15.5%) of the total MA PNSS population was younger than 20 years old. Over half (56.6%) were between 20 and 29 years old and a fourth (25.7%) were between the ages of 30 and 39 years. Over two percent (2.2%) of the MA PNSS population were 40 years of age or above.
- In the 2008 national PNSS data (the most recent national data at time of data preparation), 19.2% of the total national PNSS population was less than 20 years old. Almost two-thirds (59.9%) were between 20 and 29 years old and almost a fifth (19.5%) were between the ages of 30 and 39 years. Just over one percent (1.4%) of national PNSS population was forty years of age or above.

Demographic Characteristics: Age Distribution Trends

Figure 3b-Trends in Age Distribution in MA PNSS

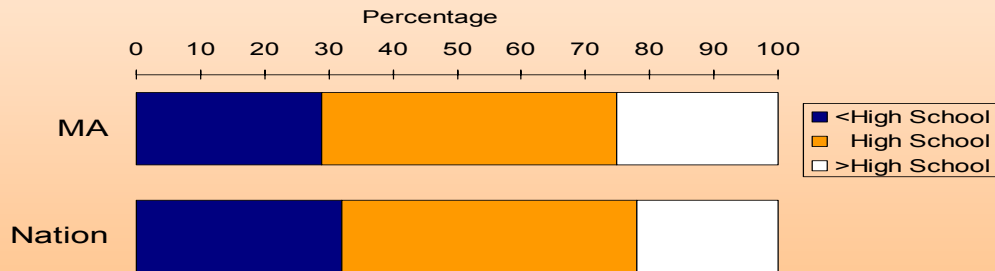


2009 MA PNSS

- The proportion of teenaged mothers in MA PNSS population declined from 19.7% in 2000 to 15.5% in 2009.
- The proportion of pregnant women aged 20 to 29 years in MA PNSS population increased slightly from 54.4% in 2000 to 56.6% in 2009.
- The proportion of pregnant women aged 30 years or older in MA PNSS population increased slightly from 25.8% in 2000 to 27.9% in 2009.

Demographic Characteristics: Educational Level

Figure 4-Education Level

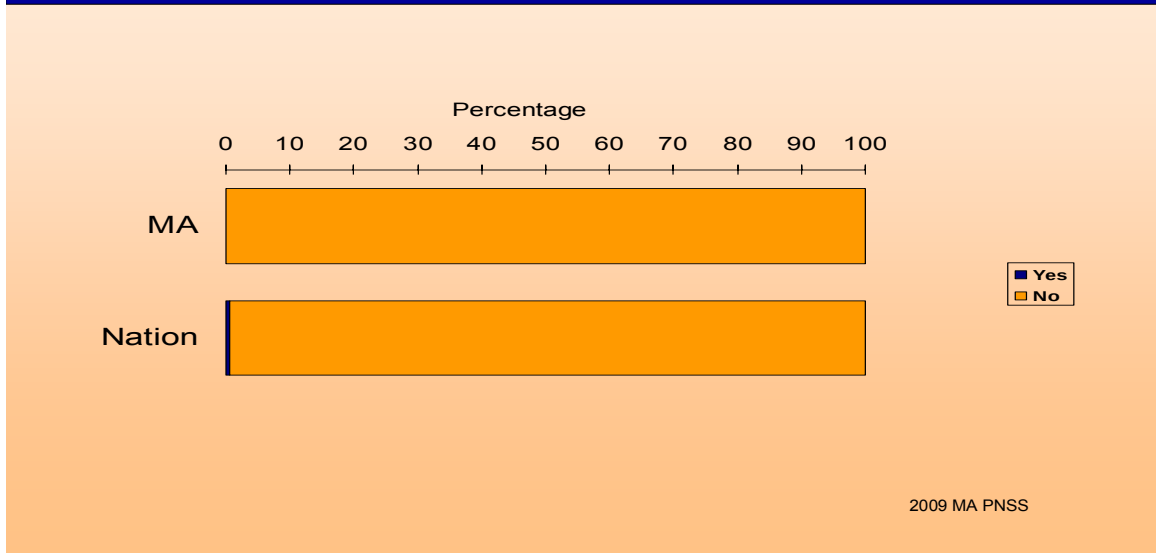


2009 MA PNSS

- Almost twenty-nine percent (28.8%) of MA PNSS women in 2009 had not finished high school, 46.1% had a high school diploma, and 25.1% had more than a high school diploma.
- In the 2008 national PNSS data set, a larger proportion (32.1%) of women nationally had not finished high school, 45.8% had completed high school education, and 22.1% had more than a high school education according to available data at that time.
- In comparison, according to the CDC, 22% of all US women who gave birth in a previous year in 2007 had less than a high school education (Reinhold et al 2009, CDC 2007).

Demographic Characteristics: Migrant Status

Figure 5-Migrant Status

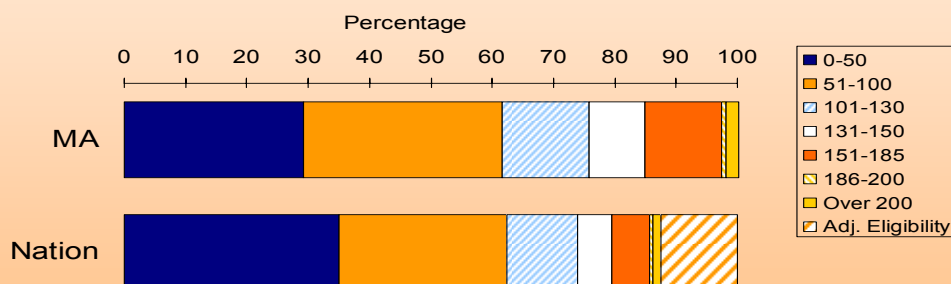


- Of the total number (35,278) of MA PNSS women, none (zero) were migrants. No statistics were therefore generated for migrants among women in the 2009 MA PNSS dataset since the number of migrants was fewer than 100 records. As a matter of policy, the CDC does not generate statistics based on fewer than 100 records as these estimates may be unstable.
- Only 0.6% of the national PNSS women were migrants.

Demographic characteristics: Household Income

Figure 6-Household Income

Reported as Percent Poverty Level



2009 MA PNSS

WIC participation is dependent upon income eligibility, nutrition risk eligibility criteria and other requirements. It should be noted that to be income eligible for WIC Nutrition Program, applicants must have an income at or below an income level or standard set by the state agency or be determined adjunctively income-eligible based on participation in certain other income-based assistance programs.

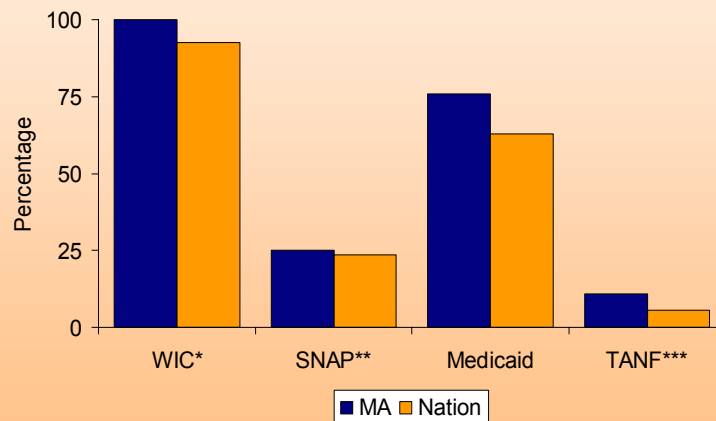
Nutritional risk eligibility criteria include medically-based conditions (for example anemia, underweight, growth failure and poor pregnancy outcomes) and dietary-based conditions (such as nutrient deficiencies or inadequate food intake).

To be eligible for the WIC Nutrition Program, an applicant's gross income must be equal to or less than 185% of the 2009 US Department of Health and Human Services Poverty Guidelines: (<http://aspe.hhs.gov/poverty/09poverty.htm>). Sometimes an applicant with a gross income greater than 185% of the 2009 US Department of Health and Human Services Poverty Guidelines may still qualify for the WIC Nutrition Program through adjunctive eligibility if such an applicant participates in SNAP, TANF, or Medicaid.

- In 2009, 29.2% of women in MA PNSS were at or below 50% of the federal poverty level (FPL) compared to the national PNSS with 35.1% of women at or below 50% of the FPL.
(Please refer to the following link for more information on poverty guidelines-<http://aspe.hhs.gov/poverty/09poverty.htm>).
- Approximately one third (32.5%) of women in MA PNSS had a household income between 51 and 100% of the FPL, higher than the figure seen in the national PNSS population (27.3%).
- The percentage of women in MA PNSS at 151% to 185% FPL was 12.4%, higher than the percentage observed in the national PNSS population (6.2%).

Program Participation at Initial Prenatal Visit

**Figure 7-Program Participation
at Initial Prenatal Visit**



* Special Supplemental Nutrition Program for Women, Infants, and Children.

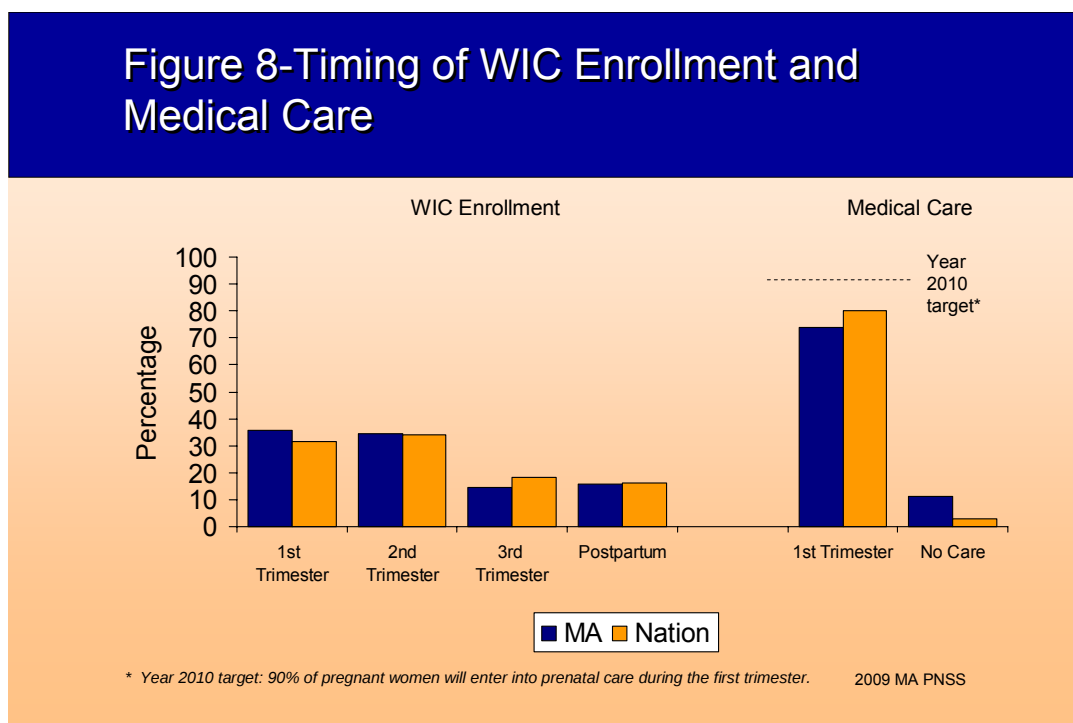
** Supplemental Nutrition Assistance Program.

*** Temporary Assistance for Needy Families.

2009 MA PNSS

- All women (100.0%) in MA PNSS were enrolled in the WIC Program, while 92.7% of national PNSS women were enrolled in WIC in 2009.
- Twenty-one percent (25.1%) of the women in MA PNSS also received Food Stamps or SNAP, 75.9% were on Medicaid, and 10.8% received Temporary Assistance for Needy Families (TANF).
- Over twenty-three percent (23.6%) of women in the national PNSS received Food Stamps or SNAP, 62.7% were on Medicaid, and 5.7% received TANF.

Timing of WIC Enrollment and Medical Care



Studies have shown that participation in the WIC program during pregnancy has been associated with improved birth weights, and reduction in preterm deliveries (Abrams 1993, Devaney 2007, Khanani et al., 2010). Additionally, studies concluded that participation in WIC during pregnancy resulted in fewer deliveries of infants who are small for gestational age, while healthier infants were linked to longer enrollment in the program (Ahluwalia et al., 1998).

Timing of WIC enrollment and medical care varied in both MA PNSS and national PNSS.

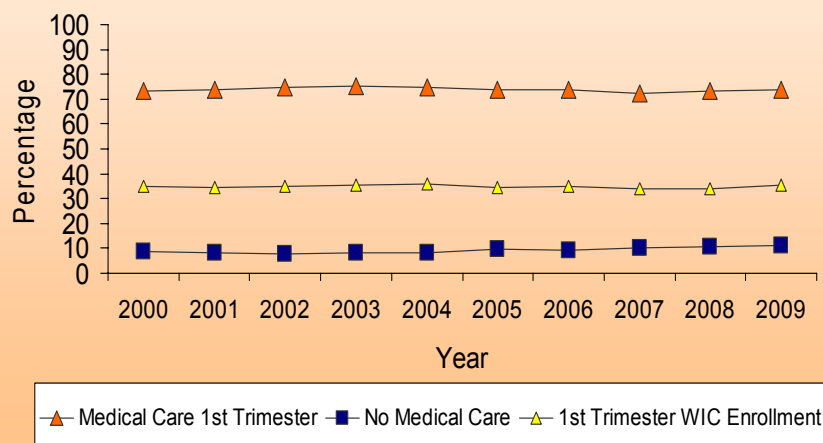
Over a third (35.5%) of the women in 2009 MA PNSS enrolled in WIC during their first trimester of pregnancy, 34.4% enrolled in the second trimester, 14.5% enrolled in the third trimester and 15.7% enrolled in the postpartum period. In the national PNSS, 31.7% of women enrolled in WIC during their first trimester of pregnancy, 34.0% enrolled in the second trimester, 18.4% enrolled during the third trimester and 16.0% enrolled in the postpartum period.

The proportion of PNSS women entering prenatal care and receiving no care is different for the MA PNSS and national PNSS populations. Specifically, about 73.7% of women in the 2009 MA PNSS and 80.1% in the national PNSS entered medical care during their first trimester of pregnancy. Both of these figures are lower than the Healthy People 2010 (HP 2010) target that 90% of women enter prenatal care during the first trimester of pregnancy.

National vital statistics data published in 2009 showed that 69.0% of women sought prenatal care during the first trimester, and 7.9% of women received no prenatal care during pregnancy (Martin et al 2009). Worthman (2009) also reported that 3.0% to 7.9% of women were either late for or received no prenatal care during pregnancy. Over eleven percent (11.3%) of women in MA PNSS and 3.1% of women in the national PNSS reported receiving no medical care during their current pregnancy. The 11.3% rate in MA PNSS is likely an overestimation, due to the fact that many women initiate their WIC prenatal certification prior to their first prenatal medical visit. In such cases, WIC certification records are created without dates at which prenatal care began, and are thus interpreted to read that no prenatal care was received. This assumption may be corroborated by 2009 Massachusetts Pregnancy Risk Assessment Monitoring System (PRAMS) data in which only 0.06% of WIC mothers surveyed reported no prenatal care in their most recent pregnancy.

Trends in WIC Enrollment and Medical Care

Figure 9-Trends in WIC Enrollment and Medical Care in MA PNSS

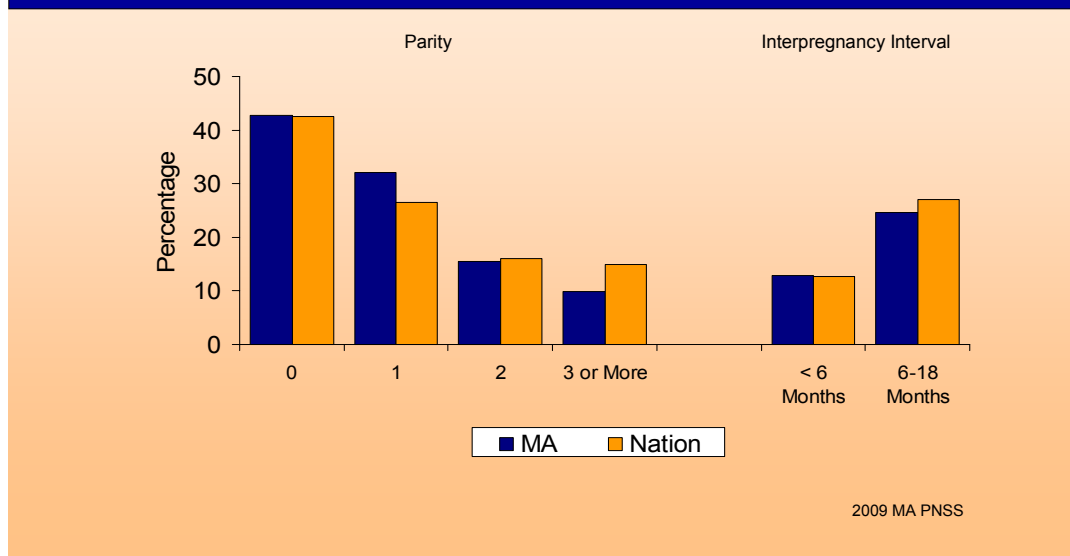


2009 MA PNSS

- The proportion of PNSS women in Massachusetts who received medical care during their first trimester of pregnancy has remained steady, from 73.3% in 2000 to 73.7% in 2009. The proportion of women receiving medical care reached its peak (75.2%) in 2003.
- The percentage of women in MA PNSS who enrolled in the WIC program during their first trimester of pregnancy remained steady from 35.1% in 2000 to 35.5% in 2009.
- The proportion of Massachusetts WIC women who reported they did not receive medical care during pregnancy was 8.7% in 2000 but rose slightly to 11.3% in 2009.

Parity Level and Inter-pregnancy Interval

Figure 10-Parity and Inter-Pregnancy Interval



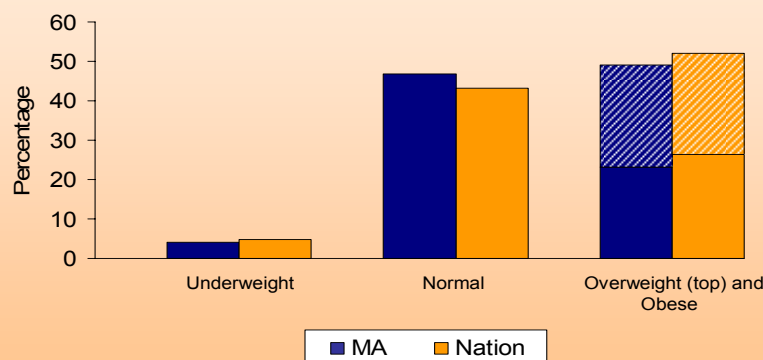
According to Reinhold et al (2009) of the CDC, inter-pregnancy interval (IPI) is the time between the end of one pregnancy and the last menstrual period before the next pregnancy. Studies (Zhu et al 1999, Smith, Pell and Dobbie 2003) have shown that women with an inter-pregnancy interval of less than 6 months are at a higher risk for maternal mortality and morbidity and also for giving birth to LBW infants, preterm infants or infants who are small for their gestational age than women conceiving after an inter-pregnancy interval of 18-23 months. A recent preliminary study has tied short inter pregnancy interval (also known in lay literature as short sibling spacing) to autism risk and the study needs to be corroborated with further studies (Lowry, 2011). Women who have a short inter-pregnancy interval have less time to replenish nutrient stores (IOM, 1996).

- Before their pregnancy in 2009, 42.8% of women in the MA PNSS had never been pregnant, 32.0% had one pregnancy, 15.2% had two pregnancies, and 9.8% had three or more pregnancies.
- Over twelve percent (12.8%) of MA PNSS women had less than 6 months between their previous pregnancy and the current pregnancy; almost a quarter (24.7%) of the women had 6 to 18 months between the previous pregnancy and the current pregnancy.

- Before their pregnancy in 2008, 42.6% of women in the national PNSS had never been pregnant, 26.4% had one pregnancy, 16.0% had two pregnancies and 14.9% had three or more pregnancies.
- The proportion of the national PNSS women who had less than 6 months between their previous pregnancy and the current pregnancy was 12.6%, while the proportion that had 6 to 18 months between the previous pregnancy and the current pregnancy was 27.1%.

Prevalence of Pre-Pregnancy Underweight and Overweight

Figure 11a-Prevalence of Pre-pregnancy Underweight and Overweight*



* Underweight (BMI < 18.5); overweight (BMI = 25.0-29.9); and obese (BMI ≥ 30.0).

2009 MA PNSS

Pre-pregnancy weight strongly determines infant birth weight according to the CDC-PNSS report of 2007 (Reinhold et al 2009). Some authors suggest that there is an association between maternal pre-pregnancy underweight and giving birth to an infant with low birth weight (Doherty et al., 2006). Low birth weight is the second leading cause of neonatal mortality and morbidity as well as childhood morbidity after preterm birth (Barnum and Schoendoff 2002). Other studies suggest that overweight women are at increased risk for pre-eclampsia, gestational diabetes mellitus (GDM), cesarean delivery, and failure to initiate breastfeeding (Li et al., 2003). Pre-pregnancy BMI data are derived from self reported weight and height information by PNSS women. The weight status of the women is classified based on the 2009 BMI categories proposed by the Institute of Medicine (IOM 2009)*. According to the IOM 2009, underweight is a BMI less than 18.5, normal weight is a BMI from 18.5 to-24.9, overweight is a BMI from 25.0 to 29.9, and obese is a BMI greater than 30.0. A woman with a pre-pregnancy weight status of underweight should have a recommended prenatal weight gain of 28-40 pounds, while one classified as a normal weight should have a recommended prenatal weight gain of 25-35 pounds. A woman with a pre-pregnancy weight status classified as overweight should have a recommended prenatal weight gain of 15-25 pounds, while one classified as an obese should have a recommended prenatal weight gain of 11-20 pounds.

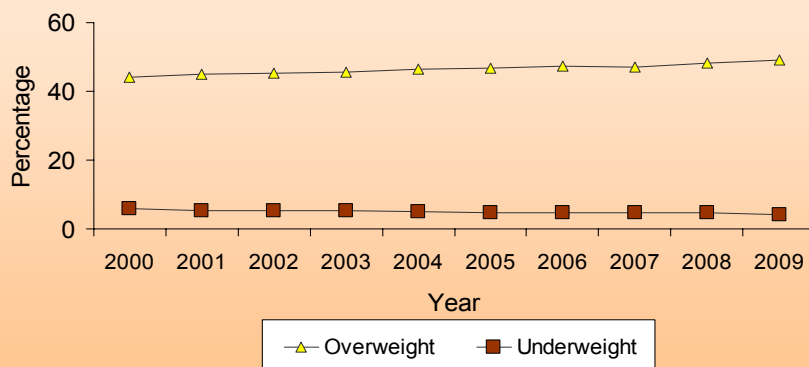
- In 2009, 4.2% of the women in MA PNSS were underweight prior to their current pregnancy. This percentage was comparable to the 2008 national PNSS where 4.7% of women were underweight prior to their current pregnancy.

- Forty-nine percent (49.0%) of the women in the MA PNSS population had excess weight and were either overweight (25.9%) or obese (23.1%), based on their BMI prior to pregnancy.
- About fifty-two percent (52.1%) of national PNSS women had excess weight pre-pregnancy (with 25.7% overweight and 26.4% obese).

**See Appendix 1 for designation of weight categories and weight gain Recommendations based on BMI according to IOM 2009.*

Trends in Pre-pregnancy Overweight and Underweight

Figure 11b-Trends in Prevalence of Pre-pregnancy Overweight and Underweight* in MA PNSS



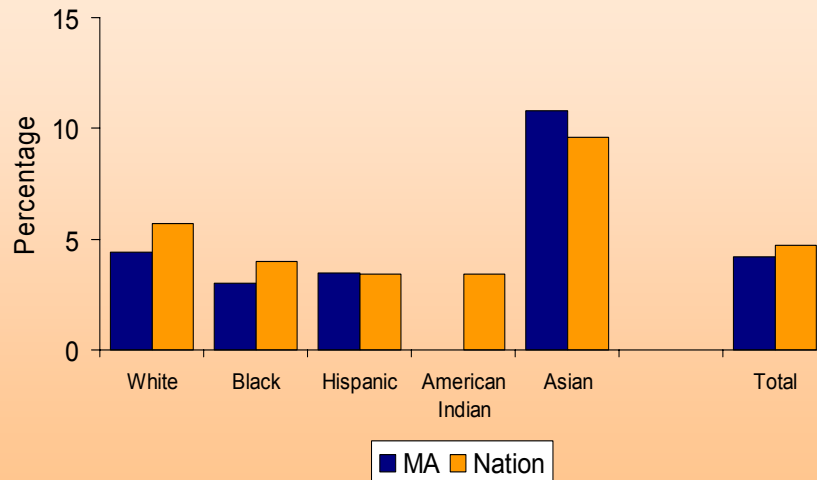
* Underweight (BMI < 18.5); overweight (BMI ≥ 25.0; includes overweight and obese).

2009 MA PNSS

- The proportion of PNSS women in Massachusetts who were overweight pre-pregnancy has gradually risen from 44.1% in the year 2000 to 49.0% in 2009. A modest portion of the increase from 2008 to 2009 could be related to the change in IOM definitions of BMI categories (IOM 2009).
- The proportion of Massachusetts WIC women who were underweight before pregnancy fell slightly from 5.9 % in 2000 to 4.2% in 2009. A portion of the change from 2008 to 2009 could be due to the more narrow definition of underweight in the new guidelines (2009 IOM).

Pre-Pregnancy Underweight by Race and Ethnicity

Figure 12-Prevalence of Pre-pregnancy Underweight*
by Race and Ethnicity



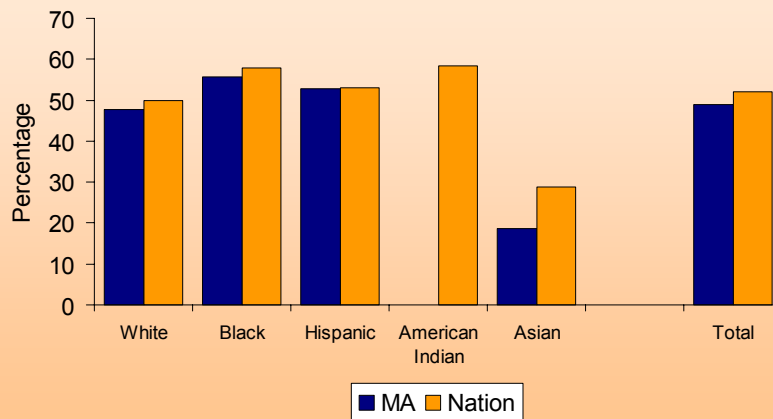
* BMI < 18.5.

2009 MA PNSS

- The percent of PNSS women who were underweight prior to pregnancy varied by race and Hispanic ethnicity in both MA PNSS and national PNSS.
- Asian women both in MA PNSS (10.8%) and national PNSS (9.6%) exhibited the highest prevalence of underweight prior to pregnancy.
- Black non-Hispanic (3.0%) and Hispanic (3.5%) women exhibited the lowest prevalence of pre-pregnancy underweight in the MA PNSS.
- Similarly, in the national PNSS, Black non-Hispanic (4.0%), Hispanic (3.4%) and American Indian (3.4%) women exhibited the lowest prevalence of pre-pregnancy underweight.

Pre-pregnancy Overweight by Race and Ethnicity

Figure 13-Prevalence of Pre-pregnancy Overweight*
by Race and Ethnicity



* BMI ≥ 25.0 (includes overweight and obese women).

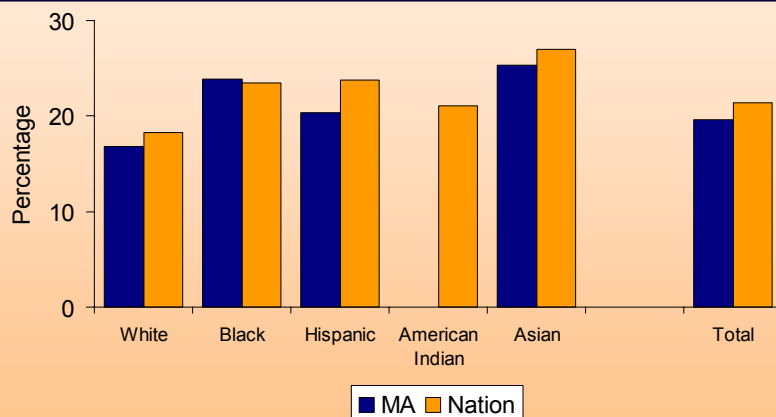
2009 MA PNSS

- Almost half (55.7%) of Black non-Hispanic women in the MA PNSS were overweight before the current pregnancy, higher than the overall prevalence of pre-pregnancy overweight in the state of MA (49.0%).
- Asian women in MA PNSS had the lowest prevalence of pre-pregnancy overweight (18.6%) compared to the state prevalence for all race and Hispanic ethnicity categories.
- Similarly, Asian women in the national PNSS had the lowest prevalence of pre-pregnancy overweight (28.8%) compared to the overall national prevalence in 2008.
- Compared to the overall prevalence (52.1%) in national PNSS women, pre-pregnancy overweight overall was less prevalent in MA PNSS women (49.0%).

**See Appendix 1 for designation of weight categories based on BMI*

Less than Ideal Maternal Weight Gain by Race and Ethnicity

Figure 14-Prevalence of Less than Ideal Maternal Weight Gain*
by Race and Ethnicity



* Ideal weight gain: prepregnancy underweight = 28-40 pounds; prepregnancy normal weight = 25-35 pounds; prepregnancy overweight = 15-25 pounds; and prepregnancy obese = 11-20 pounds.
2009 MA PNSS

The 2009 IOM report recommended a weight gain of 28-40 pounds for underweight women, 25-35 pounds for women of normal weight, 15-25 pounds for overweight women and 11-20 pounds for obese women (IOM 2009). Women who gain less than the IOM (2009) recommended weight gain are at an increased risk of giving birth to an infant with LBW.

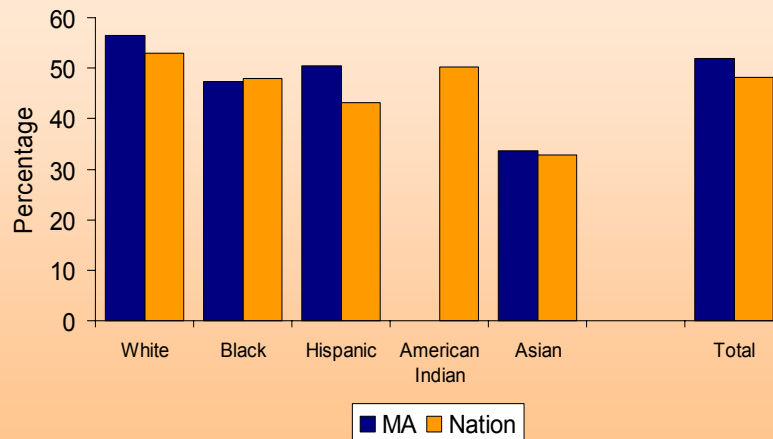
Prevalence of Less than Ideal Maternal Weight Gain by Race and Ethnicity

- The overall MA PNSS prevalence of less than ideal maternal weight gain (19.6%) in 2009 was slightly less than the national PNSS finding of 21.4% used for comparison.
- Asian women in 2009 MA PNSS had the highest prevalence of less than ideal maternal weight gain (25.3%) during the current pregnancy. In contrast, White non-Hispanic women had the lowest prevalence of less than ideal maternal weight gain (16.8%) in 2009 MA PNSS.

Greater than Ideal Maternal Weight Gain

Figure 15-Prevalence of Greater than Ideal Maternal Weight Gain*

by Race and Ethnicity



* Ideal weight gain: prepregnancy underweight = 28-40 pounds; prepregnancy normal weight = 25-35 pounds; prepregnancy overweight = 15-25 pounds; and prepregnancy obese = 11-20 pounds. 2009 MA PNSS

Women who gain more than the IOM's recommended weight gain during pregnancy are at an increased risk of giving birth to an infant with HBW, which can cause difficulty with delivery (IOM 2009) and may also lead to preterm delivery (Salihi et al 2008). In addition, women who gain excess weight during pregnancy may have more difficulty returning to their pre-pregnancy weight (Rooney and Schauburger, 2002). Similarly, excess weight gain during pregnancy coupled with failure to lose weight after pregnancy may lead to obesity beyond the childbearing years (Rooney and Schauburger 2002, Kabali and Werler 2007).

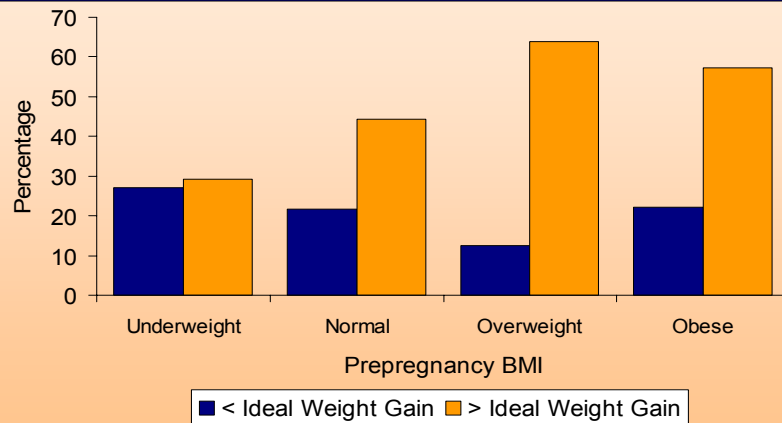
Prevalence of Greater than Ideal Weight Gain by Race and Ethnicity

Asian women in the 2009 MA PNSS data set had the lowest prevalence of greater than ideal maternal weight gain (33.6%) during the current pregnancy. Similarly Asian women in the 2008 national PNSS data set had the lowest prevalence of greater than ideal maternal weight gain (32.8%). In contrast, White non-Hispanic women had the highest prevalence of greater than ideal maternal weight gain both in MA PNSS (56.5%) and national PNSS (52.9%).

Overall in 2009, 51.8% of MA PNSS participants gained more than the recommended amount of weight during their pregnancy compared to the national 2008 PNSS women where 48.2% of women gained more than the recommended amount of weight during their pregnancy. Some of the variance could be due to the changes made to IOM guidelines from 2008 to 2009.

Overall Maternal Weight Gain by Pre-Pregnancy BMI

Figure 16-Maternal Weight Gain*
by Pre-pregnancy BMI** in MA PNSS



* Ideal weight gain: prepregnancy underweight = 28-40 pounds; prepregnancy normal weight = 25-35 pounds; prepregnancy overweight = 15-25 pounds; and prepregnancy obese = 11-20 pounds.

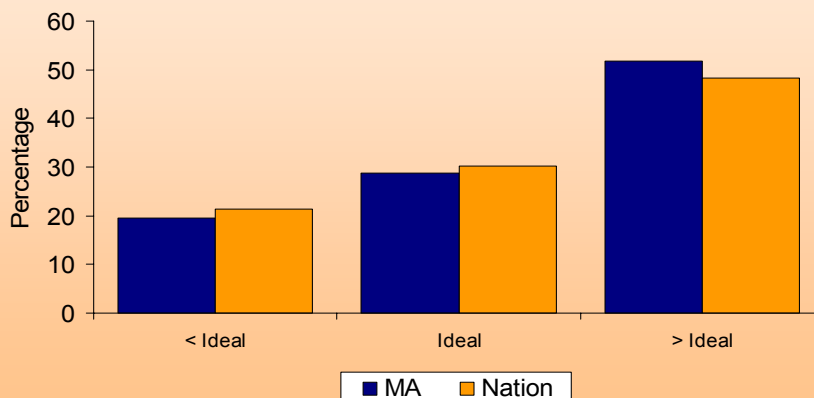
** Underweight (BMI < 18.5); overweight (BMI = 25.0-29.9); and obese (BMI ≥ 30.0).

2009 MA PNSS

- Overall, the women's pre-pregnancy BMI was a strong factor that determined whether the women in MA PNSS gained an adequate amount of weight during pregnancy. Overweight or obese women (prior to pregnancy) were more likely to exceed the IOM's recommended maximum weight gain for their body size.
- About a fifth (22.1%) of MA PNSS participants who were obese before pregnancy gained less than the recommended amount of weight, while 57.2% gained more than the recommended ideal weight.
- Similarly, 12.6% of participating women who were overweight before pregnancy gained less than the recommended amount of weight while 63.8% gained more than the ideal amount of weight.

**Prevalence of Maternal Weight Gain:
Less than Ideal/ Ideal / More than Ideal**

Figure 17-Prevalence of Less than Ideal, Ideal and Greater than Ideal Maternal Weight Gain*

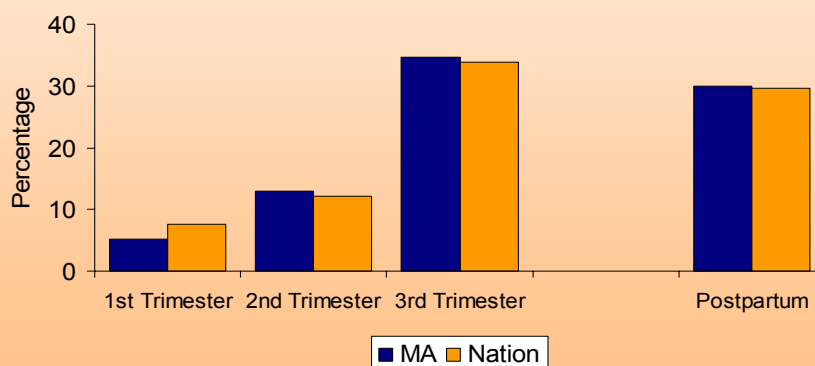


* Ideal weight gain: prepregnancy underweight = 28-40 pounds; prepregnancy normal weight = 25-35 pounds; prepregnancy overweight = 15-25 pounds; and prepregnancy obese = 11-20 pounds. 2009 MA PNSS

- In summary, nearly one-third (28.7%) of mothers in MA PNSS data set gained the ideal amount of weight during pregnancy. Over fifty percent (51.8%) gained more than ideal weight and about a fifth (19.6%) gained less than the ideal amount of weight.
- About thirty percent (30.3%) of mothers in the national PNSS data set gained the ideal amount of weight during pregnancy compared to 28.7% of mothers in MA PNSS with ideal weight gain during pregnancy.

Anemia During and After Pregnancy

Figure 18-Prevalence of Anemia* by Timing of Program Enrollment



* Hb or Hct < 5th percentile, CDC MMWR vol. 47 (No. RR-3), 1998.

2009 MA PNSS

**See Appendix 1 for definitions and cutoff values.*

Anemia (low hemoglobin/ hematocrit) is an indicator of iron deficiency, the most common nutrient deficiency in the world. Iron deficiency during pregnancy is also the most common nutritional deficiency in pregnancy (Doherty et al., 2006). Since pregnant women require higher amounts of iron, a supplementation of iron during pregnancy is often recommended. In addition to iron rich foods, pregnant women often take iron supplements during pregnancy to ensure an adequate amount of iron intake (Conde-Agudelo and Belzian, 2000). Iron-deficiency anemia during the first two trimesters of pregnancy has been associated with inadequate gestational weight gain, a two-fold risk for preterm delivery and a three-fold risk of giving birth to an infant with low birth weight (CDC, 1998). Iron-deficiency anemia during the third trimester of pregnancy is a reflection of inadequate iron intake and can affect a woman's health during the postpartum period (CDC, 1998).

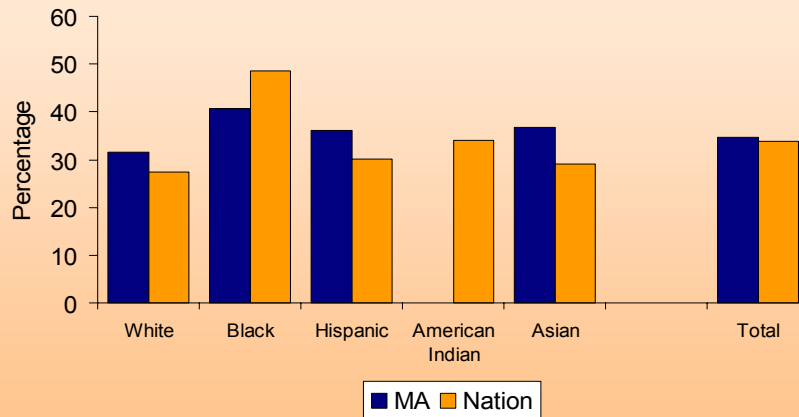
Prevalence of Anemia by Timing of Program Enrollment

- Prevalence of anemia among PNSS participants increased with increasing trimester (lateness) of program enrollment.
- In MA PNSS, anemia was observed in 5.2% of women who enrolled in the 1st trimester, 12.9% of women who enrolled in the 2nd trimester, and 34.7% of women who enrolled in the 3rd trimester.

- A similar pattern was observed in the national PNSS dataset, where 7.6% of women who enrolled in the 1st trimester, 12.1% of women who enrolled in the 2nd trimester, and 33.8% of women who enrolled in the 3rd trimester had anemia.
- The high proportion of women with anemia in the third trimester may reflect the fact that during the late stages of pregnancy, hemoglobin values generally decrease due to physiological changes associated with pregnancy (e.g., hemo-dilution).
- Over twenty-nine percent (29.9%) of women who enrolled in MA PNSS during the postpartum period had anemia, similar to what was seen nationally (29.6%).

Prevalence of Third Trimester Anemia by Race and Ethnicity

Figure 19a-Prevalence of Third-Trimester Anemia*
by Race and Ethnicity



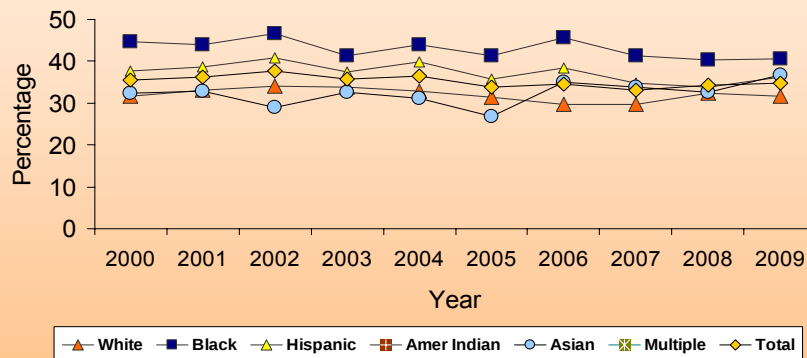
* Hb or Hct < 5th percentile, CDC MMWR vol. 47 (No. RR-3), 1998.

2009 MA PNSS

- Third-trimester anemia varied by race and ethnicity. Specifically, Black non-Hispanic women had the highest percent of third trimester anemia (40.7%) while White non-Hispanic women had the lowest percent (31.6%) in the 2009 MA PNSS.
- It should be noted that these anemia results are based on data from low-income women participating in the WIC program and should therefore be interpreted with caution. Healthy People 2010 Objectives propose reducing the prevalence of third trimester anemia among low income pregnant females to no more than 20% (US-DHHS, 2000). In 2009, the prevalence of third trimester anemia was above the HP2010 target of 20% in both MA PNSS and national PNSS.

Trends in Third Trimester Anemia

Figure 19b-Trends in Prevalence of Third Trimester Anemia* by Race and Ethnicity in MA PNSS.



* Hb or Hct < 5th percentile, CDC MMWR vol. 47 (No. RR-3), 1998.

2009 MA PNSS

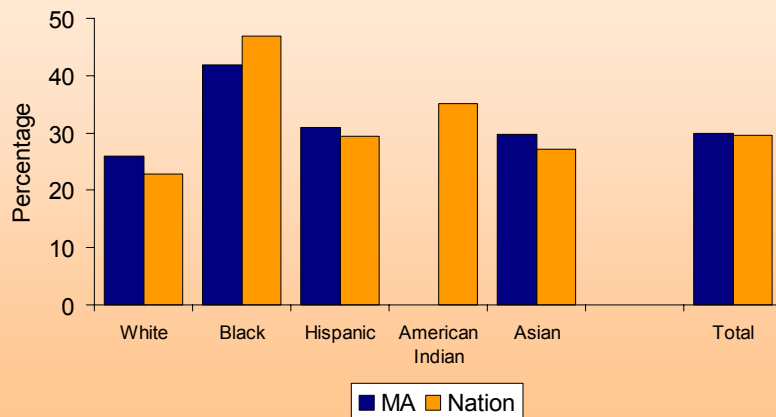
The overall prevalence of third trimester anemia in MA PNSS mothers has declined slightly in the past ten years (from 35.4% in 2000 to 34.7% in 2009).

Among Black non-Hispanic women, the prevalence of third trimester anemia has been consistently higher than among women from other races. Between 2000 and 2009, the percentage of third trimester anemia in MA PNSS among Black non-Hispanic women was consistently high but decreased slightly over ten years (from 44.7% in 2000 to 40.7% in 2009).

The prevalence of third trimester anemia in MA PNSS mothers during the past ten years has been consistently above the HP 2010 target of 20% in all race/ethnicity categories.

Prevalence of Postpartum Anemia by Race and Ethnicity

Figure 20a-Prevalence of Postpartum Anemia*
by Race and Ethnicity



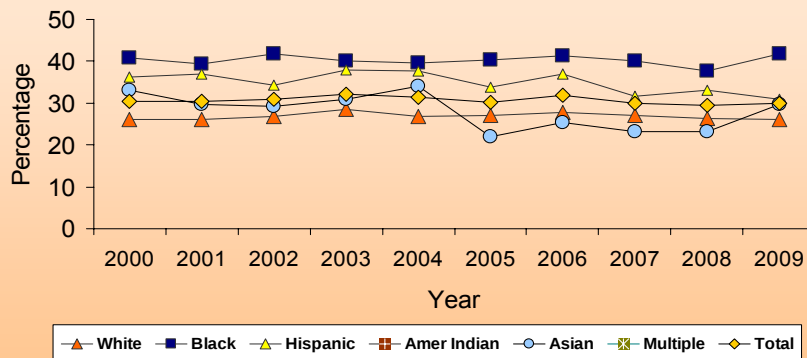
* Hb or Hct < 5th percentile, CDC MMWR vol. 47 (No. RR-3), 1998.

2009 MA PNSS

- Overall, 29.9% of women in 2009 MA PNSS had postpartum anemia, similar to the finding in the national PNSS dataset (29.6%).
- In MA PNSS, Black non-Hispanic women had the highest prevalence of postpartum anemia (41.8%) followed by Hispanic women (31.0%). Asian/Pacific Islander women had the lowest prevalence (29.7%).
- In the 2008 national PNSS data, Black non-Hispanic women had the highest prevalence of postpartum anemia (46.8%), followed by American Indian women (35.1%). White non-Hispanic women had the lowest prevalence of postpartum anemia (22.8%).
- Although the prevalence of postpartum anemia among American Indian mothers was 35.1% in the 2008 national PNSS used for comparison, insufficient data were available in the 2009 MA PNSS so the statistical calculation could not be done.

Trends in the Prevalence of Postpartum Anemia

Figure 20b-Trends in the Prevalence of Postpartum Anemia* by Race and Ethnicity in MA PNSS



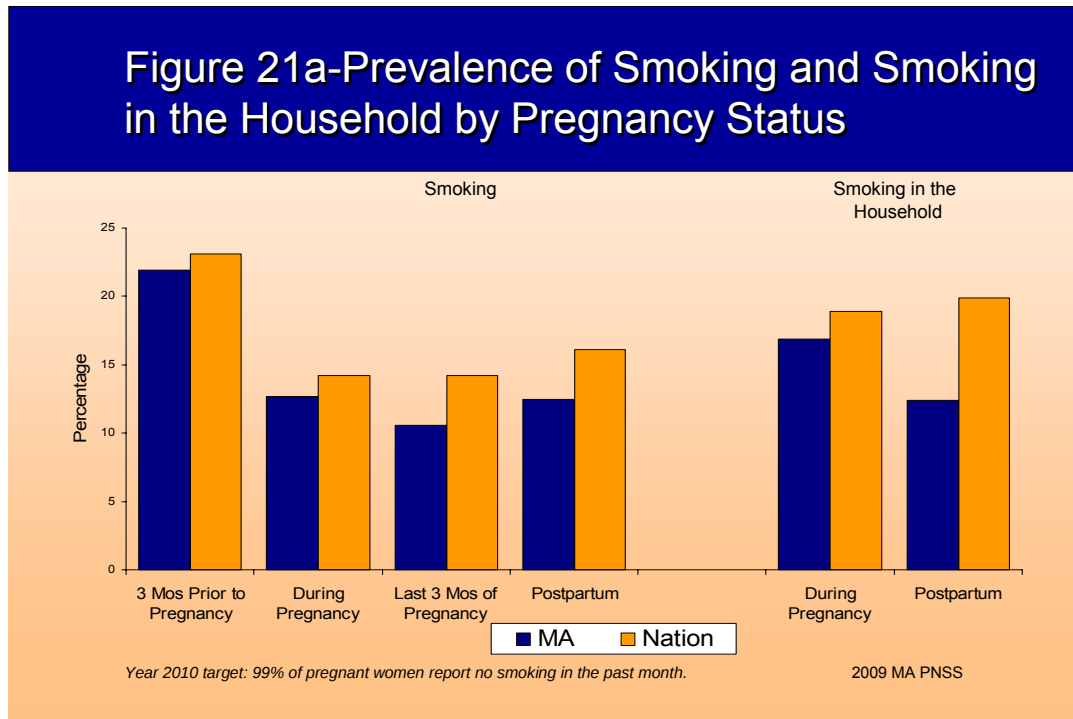
* Hb or Hct < 5th percentile, CDC MMWR vol. 47 (No. RR-3), 1998.

The prevalence of postpartum anemia differed by race and ethnicity, with Black non-Hispanic women having a higher prevalence (40.8%) in 2000 than Hispanic (36.3%), Asian (33.0%) or White non-Hispanic (26.1%). The trend is similar after ten years, with Black non-Hispanic women having a higher prevalence (41.8%) in 2009 than Asian (29.7%), Hispanic (31.0%) and White non-Hispanic (26.0%) women.

The overall prevalence of postpartum anemia in MA PNSS mothers has declined slightly in the past ten years (from 30.5% in 2000 to 29.9% in 2009).

Among Black non-Hispanic women, the prevalence of postpartum anemia has been consistently higher than among women from other races. Between 2000 and 2009, the percentage of postpartum anemia in MA PNSS among Black non-Hispanic women was consistently high and increased slightly over ten years (from 40.8% in 2000 to 41.8% in 2009).

Smoking in the Household



Smoking in the household, including both active smoking by the mother and passive (second-hand) smoking in the household, is detrimental to the infant. The adverse effects of smoking have been well documented (Anderson et al 2005, Hofhuis et al., 2003, US DHSS, 2001). Exposure of a child less than two years old to passive smoking has been associated with higher incidence of sudden infant death syndrome (SIDS), respiratory infection and chest illness.

Smoking has been known to be detrimental to infant health in many ways. Mortality rate is reported to be higher (40.0%) in infants born to mothers who smoked during pregnancy than in infants born to non-smokers (Salihu et al., 2003). According to the CDC, small gestational size, rather than preterm birth, is the mechanism through which smoking causes excess infant mortality. Preterm births do not differ significantly in both smokers and non smokers; however, the percentage of LBW and full term-LBW are significantly higher for infants born to smoking mothers.

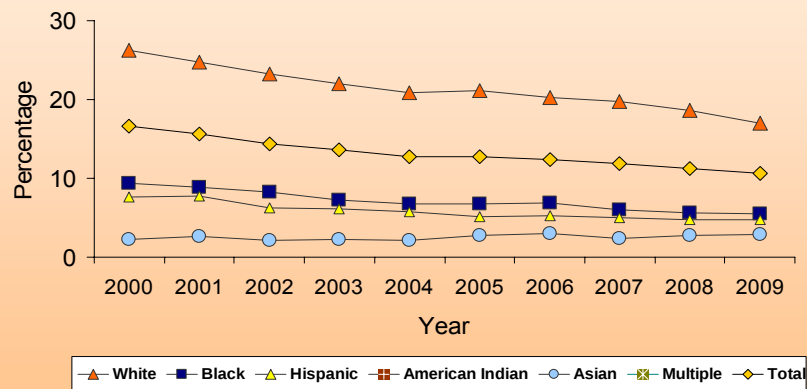
Maternal smoking also increases the risk of Sudden Infant Death Syndrome (SIDS) according to Anderson et al., (2005). It also increases spontaneous abortions (US DHHS, 2001), and has long term negative effects on the growth, development, behavior and cognition of the infant (Samet and Yoon 2001).

Prevalence of Smoking in the Household: Before, During and After Pregnancy.

- In 2009, nearly twenty-two percent (21.9%) of MA PNSS participants reported smoking during the three months prior to pregnancy. Smoking prevalence decreased during pregnancy to 12.7% and was reported at even lower rates for the last trimester (10.6%). Smoking prevalence increased slightly during the postpartum period to 12.5%.
- Almost seventeen percent (16.9%) of women participating in the MA PNSS reported living in a household where someone else smoked during the pregnancy; the percentage reporting household smoking was lower (12.4%) during the postpartum period.
- The percentage of women who reported maternal smoking during pregnancy was lower in MA PNSS (12.7%) than in national PNSS (14.2%). Similarly, the percentage of women who reported maternal smoking after pregnancy was also lower in MA PNSS women (12.5%) than in national PNSS (16.1%).
- The percentage of women who reported household smoking during pregnancy was lower in MA PNSS (16.9%) than in national PNSS (18.9%). The percentage of women who reported household smoking after pregnancy was also lower in MA PNSS women (12.4%) than in their counterparts in the national PNSS (19.9%).

Trends in Prevalence of Maternal Smoking

Figure 21b-Trends in Prevalence of Maternal Smoking during the Last 3 Months of Pregnancy by Race and Ethnicity in MA PNSS



2009 MA PNSS Table 22C

The prevalence of maternal smoking in the last 3 months of pregnancy differed by race and ethnicity, with White non-Hispanic mothers having a higher prevalence (17.0%) in 2009 than Black non-Hispanic (5.5%), Hispanic (4.8%) and Asian (2.9%).

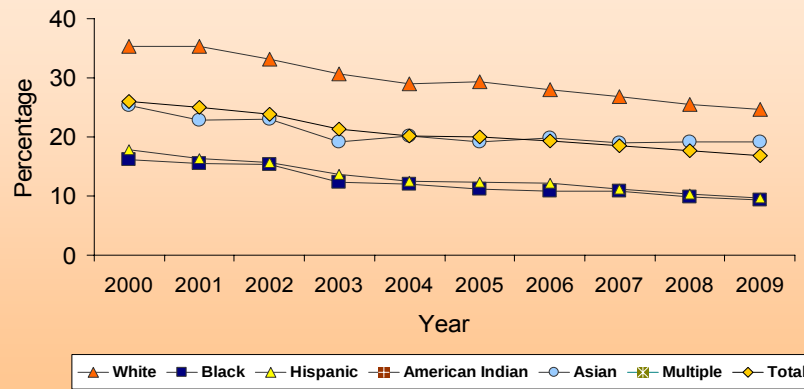
The overall prevalence of third trimester smoking in MA PNSS mothers has declined in the past ten years (from 16.6% in 2000 to 10.6% in 2009).

Among White non-Hispanic women in MA PNSS, the prevalence of third trimester smoking has been consistently higher than among women from other races but has decreased over the past ten years (from 26.2% in 2000 to 17.0% in 2009).

The prevalence of third trimester smoking in MA PNSS mothers during the past ten years has decreased gradually but remains above 10%.

Trends in the Prevalence of Household Smoking

Figure 21c-Trends in the prevalence of Smoking in the Household* by Race and Ethnicity in MA PNSS.



* During the prenatal period.

2009 MA PNSS

The prevalence of household smoking during pregnancy differed by race and ethnicity with White non-Hispanic households having a higher prevalence (24.7%) in 2009 than Asian (19.2%), Hispanic (9.6%) and Black non-Hispanic (9.3%) households and overall state average(16.9%).

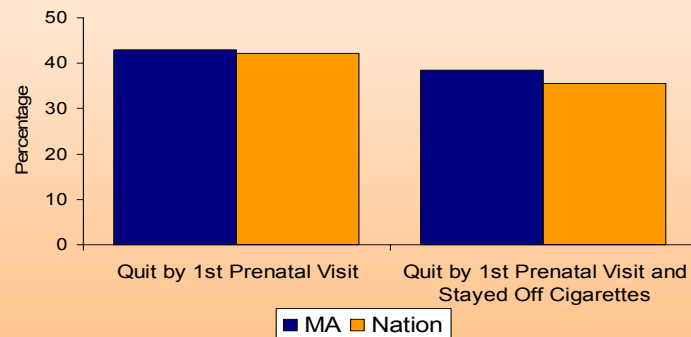
The overall prevalence of household smoking in MA PNSS has declined in the past ten years (from 26.0% in 2000 to 16.9% in 2009).

Among White non-Hispanic households, the prevalence of household smoking has been consistently higher than among households from other races but has decreased over the past ten years (from 35.3% in 2000 to 24.7% in 2009).

The overall prevalence of household smoking in Asian households has also declined in the past ten years (from 25.4% in 2000 to 19.2% in 2009). But when compared to the state average, the rate of household smoking among Asian women in 2009 is still higher than the state average.

Maternal Smoking Changes during Pregnancy

Figure 22-Smoking Changes during Pregnancy
among Women Who Reported Smoking Three Months Prior to Pregnancy



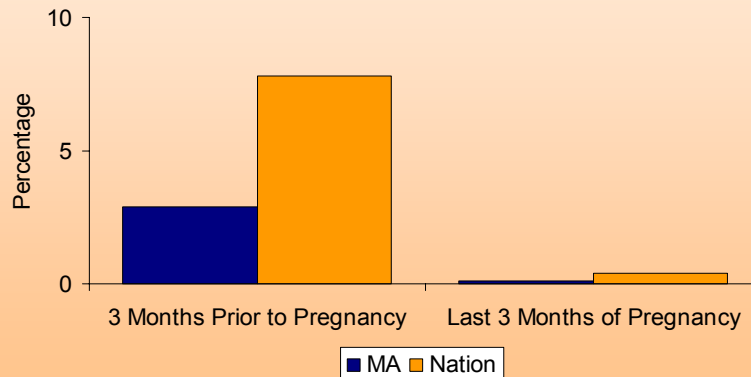
2009 MA PNSS

Smoking Changes during Pregnancy among MA PNSS Pre-Pregnancy Smokers

- In 2009, almost forty-three percent (42.9%) of MA PNSS women who reported smoking prior to pregnancy quit smoking by the first prenatal visit.
- Among the national PNSS women, forty-two percent (42.1%) of those who reported smoking prior to pregnancy quit smoking by the first prenatal visit.
- Over thirty-eight percent (38.5%) of MA PNSS women who reported smoking prior to pregnancy quit smoking by the first prenatal visit and reported remaining smoke-free throughout the data collection period.
- In the national PNSS women, over thirty-five percent (35.5%) of the pre-pregnancy smokers quit smoking and reported remaining smoke-free throughout the data collection period.

Maternal Drinking Before and During Pregnancy

Figure 23-Prevalence of Maternal Drinking



Year 2010 Target: 6% or less of pregnant women report use of alcohol in the previous month.

2009 MA PNSS

Maternal drinking has been known to be detrimental to infant health in many ways (Chiafarino et al., 2006, Mattson et al., 2006, Rasmussen et al., 2008 and Strandberg-Larsen et al., 2009). Alcohol consumption by the mother has resulted in fetal alcohol syndrome in some infants, a term first coined in the 1970s by Jones and Smith (1973). Since then, many other researchers have confirmed the detrimental effects of alcohol on fetal growth and development based on animal and human studies (May 1995, Passaro et al., 1996, US DHSS 2000). Alcohol effects could directly harm the fetus by affecting chemical mediators that guide fetal development. The effects could also indirectly harm the fetus through the mother by decreasing nutrients and oxygen transfer to the fetus, producing certain metabolites of ethanol such as acetaldehyde, which are known to be toxic or by compounding the effects of other drugs that the mother might be taking.

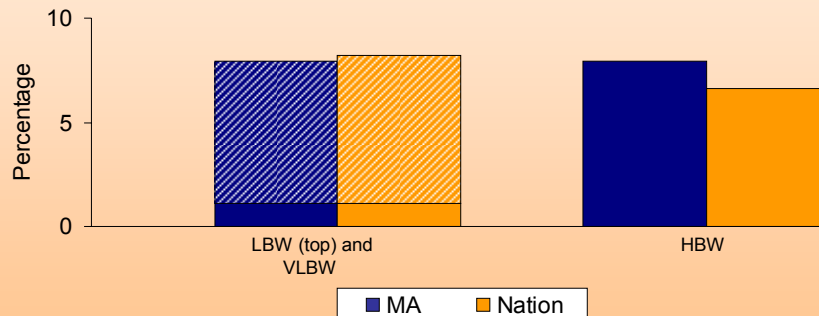
The degree of damage done by ethanol is affected by many factors such as time of gestation when alcohol exposure occurred, quantity, pattern and frequency of alcohol ingestion, genetic makeup of mother and child and other unknown factors. Because of these various factors, it is impossible to determine a safe level of alcohol intake in pregnancy. Therefore, abstinence from drinking is usually recommended.

Prevalence of Maternal Drinking before and during Pregnancy among MA and National PNSS Mothers

- Almost three percent (2.9%) of women in 2009 MA PNSS reported drinking some alcohol in the three months prior to pregnancy, compared to 7.8% of women in national PNSS.
- In 2009 MA PNSS, 0.1% of women reported drinking alcohol in the last 3 months of pregnancy compared to 0.4% of women in the 2008 national PNSS.

Low Birth Weight and High Birth Weight in Infants

Figure 24-Prevalence of Low Birth Weight and High Birth Weight *



* VLBW < 1500 g; LBW = 1500 - < 2500 g; HBW > 4000 g.

** Year 2010 Target: Reduce very low birthweight to < 0.9 percent and low birthweight to < 5.0 percent.

2009 MA PNSS

Low birth weight includes both very low birth weight (VLBW) and low birth weight (LBW). In infants born to PNSS women, VLBW is defined as birth weight less than 1,500 grams, LBW is defined as birth weight equal to or greater than 1,500 grams but less than 2500 grams. High birth weight (HBW) is defined as birth weight greater than 4000 grams. The HP 2010 target is to decrease the prevalence of VLBW to less than 0.9% while decreasing the prevalence of LBW to less than 5%.

Low birth weight is associated with neonatal and post-neonatal mortality in infants (Matthews and MacDorman, 2008). Infants with LBW are also at increased risk for future health problems that range from neuro-developmental health problems to conditions of the lower respiratory tract.

Some LBW infants may be full term (FT) and PNSS monitors this category and regards FT-LBW as an indicator of intrauterine growth retardation or fetal growth restriction (IOM, 1996). An infant is considered FT-LBW if the infant is born at or after 37 weeks of gestation but weighs less than 2500 grams. One of the causes of FT-LBW infants is poor nutrition during pregnancy.

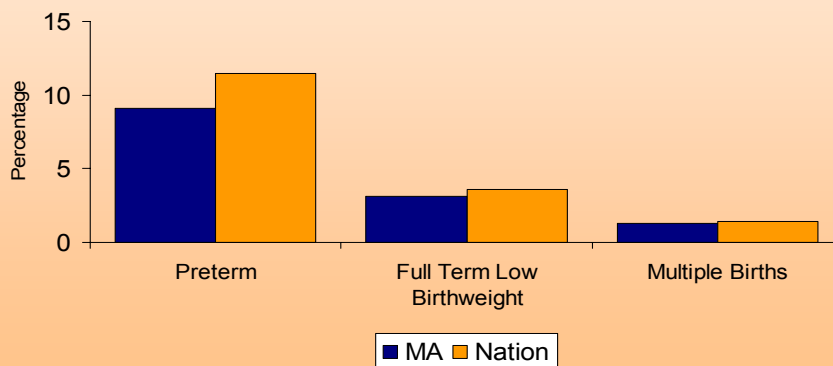
High birth weight can also have its complications. According to the IOM (1996), an infant's size at birth is important because high birth weight (macrosomia) contributes to the risk for respiratory distress, and other health problems in infants.

Prevalence of LBW and HBW among Infants Born to MA PNSS Mothers

- The overall prevalence of LBW among infants born to MA PNSS mothers was 6.8% while the overall LBW prevalence in the national PNSS infants was 7.1%.
- The overall prevalence of VLBW in the MA PNSS infants (1.1%) was similar to that in the national PNSS (1.1%).
- Nearly eight percent (7.9%) of women in 2009 MA PNSS delivered HBW infants compared to about seven percent (6.6%) of women in the 2008 national PNSS dataset.

Prevalence of Selected Birth Outcomes: Preterm, FT-LBW And Multiple Births

Figure 25-Prevalence of Selected Birth Outcomes*



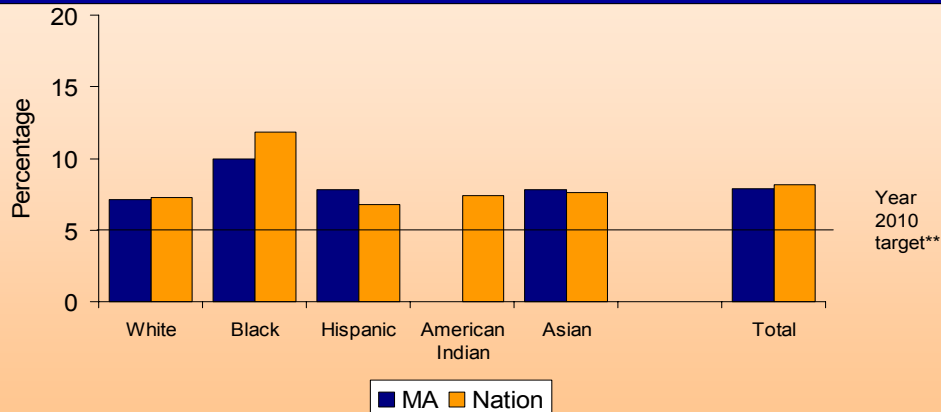
* Preterm: < 37 weeks gestation. Full term low birthweight: 37 or more weeks and < 2500 g.

2009 MA PNSS

- Nine percent (9.1%) of 2009 MA PNSS women delivered pre-term infants, a lower proportion than the 2008 national group (11.5%).
- Three percent (3.1%) of full-term infants were LBW in 2009 MA PNSS compared to 3.6% in national PNSS.
- Only 1.3% of MA PNSS and 1.4% of national PNSS births were multiple births.

Prevalence of Low Birth Weight by Race and Ethnicity

Figure 26a-Prevalence of Low Birth Weight*
by Race and Ethnicity



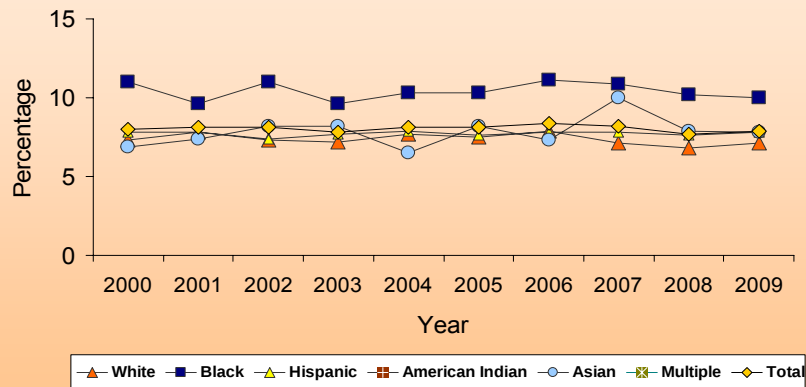
* Low birthweight includes VLBW < 1500 g and LBW = 1500-<2500 g.
 ** Year 2010 target: Reduce low birthweight to < 5.0 percent.

2009 MA PNSS

- Black non-Hispanic infants in the 2009 MA PNSS had the highest prevalence of LBW (10.0%), followed by Asian (7.8%) and Hispanic (7.8%) infants. White non-Hispanic infants in the 2009 MA PNSS had the lowest prevalence (7.1%) of LBW compared to other race/ethnicities.
- Black non-Hispanic infants born to mothers in the 2009 MA PNSS had a lower prevalence of LBW (10.0%) than Black non-Hispanic infants in the national PNSS (11.8%). Similarly, White non-Hispanic infants in MA PNSS (7.1%) had a lower proportion of LBW compared to the White non-Hispanic infants in the national PNSS (7.3%).
- Asian infants in the 2009 MA PNSS had a slightly higher prevalence (7.9%) of LBW than the Asian infants in the national PNSS (7.6%). Hispanic infants in the 2009 MA PNSS had a higher prevalence (7.8%) of LBW than the Hispanic infants in the national PNSS (6.8%).
- Overall, the prevalence of LBW infants is lower in the 2009 MA PNSS (7.9%) than in the national PNSS (8.2%). However the MA PNSS LBW prevalence of 7.9% is higher than the HP 2010 target of 5.0% percent.

Trends in the Prevalence of Low Birth Weight by Race and Ethnicity in MA PNSS

Figure 26b-Trends in the Prevalence of Low Birth Weight* by Race and Ethnicity in Children born to MA PNSS Moms



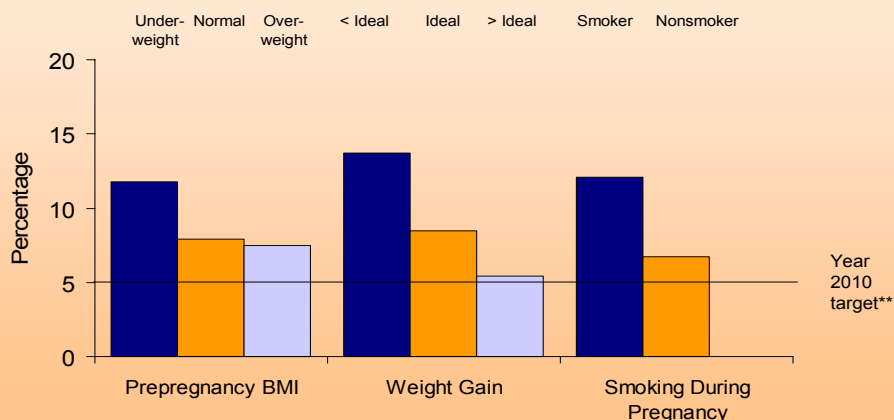
* < 2500 g.

2009 MA PNSS

- The overall prevalence of LBW in MA PNSS infants has been fairly steady in the past ten years (ranging from 8.0% in 2000 to 7.9% in 2009).
- The prevalence of LBW was consistently higher for Black non-Hispanic infants than for White non-Hispanic, Asian, and Hispanic infants from 2000 to 2009.

Prevalence of Low Birth Weight by Selected Health Indicators: Pre-Pregnancy BMI, Weight Gain and Smoking in Pregnancy

Figure 27-Prevalence of Low Birth Weight*
by Selected Health Indicators in Children born to MA PNSS Moms



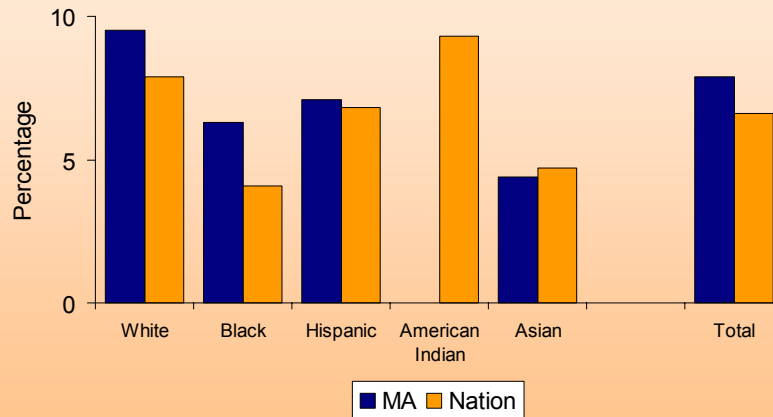
* Low birthweight includes VLBW < 1500 g and LBW = 1500-<2500 g.
** Year 2010 target: Reduce low birthweight to < 5.0 percent.

2009 MA PNSS

- Low pre-pregnancy BMI or maternal underweight, less than ideal weight gain during pregnancy and maternal smoking during pregnancy were all associated with LBW in infants born to PNSS mothers in Massachusetts.
- Data from the 2009 MA PNSS show that 11.8% of PNSS women who were underweight prior to pregnancy delivered LBW infants, compared to 7.9% who were normal weight or 6.8% who were overweight prior to pregnancy.
- Similarly, 2009 MA PNSS women who gained less than the ideal amount of weight had LBW prevalence of 13.7% compared to women who gained the ideal amount (8.5 %) and women who gained more than the ideal amount (5.4%).
- The prevalence of LBW among MA PNSS women who smoked during pregnancy was higher (12.1%) than among non-smokers (6.7%).

High Birth Weight

Figure 28-Prevalence of High Birth Weight*
by Race and Ethnicity



* High birthweight > 4000 g.

2009 MA PNSS

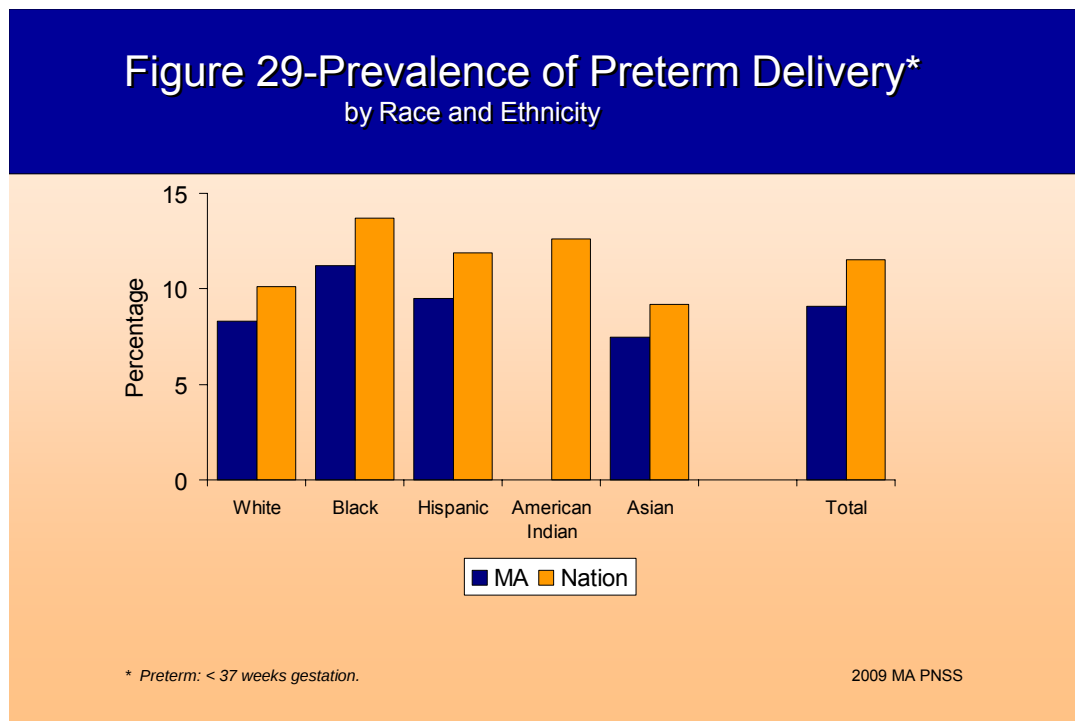
A high birth weight (>4000 grams) or macrosomia is associated with increased risk of birth problems such as shoulder dystocia, nerve injury, fractures, asphyxia or death during infancy. High birth weight infants are also at increased risk for future health problems such as diabetes, obesity, lower respiratory tract conditions, hypertension and future cardiovascular difficulties (Jolly et al 2003, Ramsay et al., 2006, Kabali et al., 2007, and Asplund et al., 2008).

Prevalence of HBW by Race and Ethnicity among Children Born to MA PNSS Women

- High birth weight varied by race and Hispanic ethnicity in the 2009 MA PNSS population. Specifically, White non-Hispanic women had the highest percentage (9.5%), followed by Hispanic (7.1%) and Black non-Hispanic (6.3%), while Asian women had the lowest percentage (4.7%) of HBW infants in MA PNSS. In comparison, in the National PNSS data, American Indian women had the highest percentage (9.3%), followed by White non-Hispanic (7.9%). Hispanic (6.8%) and Asian (4.7%) while Black non-Hispanic women had the lowest percentage (4.1%) of HBW infants.
- Overall, in 2009, the prevalence of HBW infants born to MA PNSS women (7.9%) was higher than in the 2008 national PNSS (6.6%).

- The prevalence of HBW infants among American Indian mothers was 9.3% in the national PNSS, but statistical calculations for MA PNSS could not be done due to insufficient data.

Preterm Delivery



Preterm births refer to infants born before 37 weeks gestation. Preterm delivery is associated with increased risk for newborn health complications, long term disabilities such as mental retardation, cerebral palsy, lung and gastrointestinal problems, vision and hearing loss and even death (March of Dimes 2008, Bhutto et al., 2002). In addition there are other factors that are associated with preterm birth and include iron deficiency anemia in pregnancy, low gestational weight gain, low income, race and ethnicity, young age of the mother, smoking, and low educational attainment (IOM, 1996).

The HP 2010 Objective proposes reducing preterm births to 7.6% or less of the population.

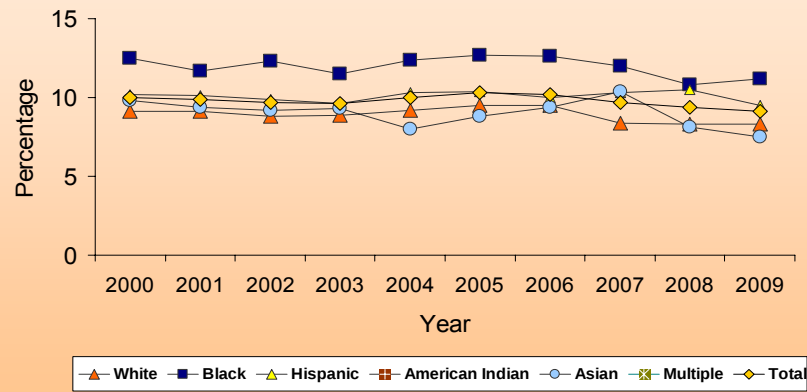
Prevalence of Preterm Delivery by Race and Ethnicity among 2009 MA PNSS Women

- The overall prevalence of preterm delivery for the entire MA PNSS population in 2009 was 9.1%, lower than the total prevalence for the 2008 national PNSS population (11.5%).
- The prevalence of preterm deliveries was highest among Black non-Hispanic women in both MA PNSS (11.2%) in 2009 and national PNSS (13.7%) in 2008. The prevalence of preterm deliveries to Hispanic women was 9.5% in MA PNSS and 11.9% in the national PNSS.

- Asian women and White non-Hispanic women in the MA PNSS dataset had the lowest prevalence of preterm deliveries (7.5% and 8.3%, respectively) when compared to the overall state prevalence (9.1%).
- Similarly, Asian women and White non-Hispanic women in the national PNSS dataset had the lowest percentage of preterm deliveries (9.2% and 10.1%, respectively) when compared to the overall national PNSS prevalence (11.5%).

Trends in the Prevalence of Preterm Delivery by Race and Ethnicity

Figure 30-Trends in the Prevalence of Preterm Delivery* by Race and Ethnicity in MA PNSS



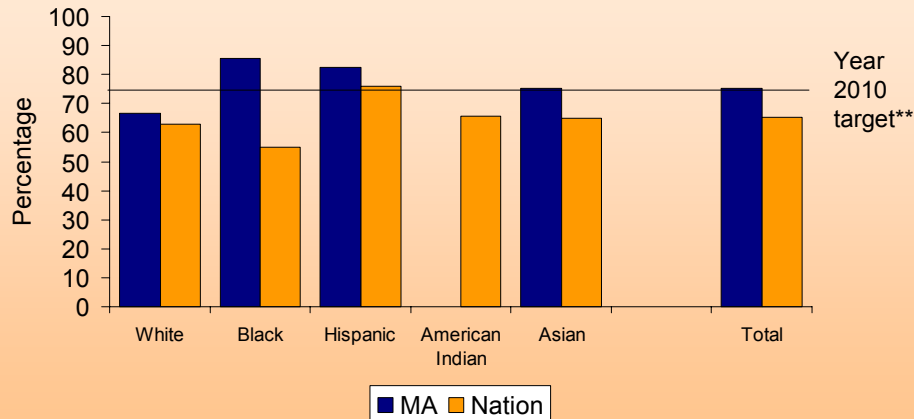
* < 37 weeks gestation.

2009 MA PNSS

- The overall prevalence of preterm delivery by MA PNSS mothers has declined slightly in the past ten years (from 10.0% in 2000 to 9.1% in 2009).
- The prevalence of preterm delivery by MA PNSS mothers during the past ten years has been consistently above the HP 2010 target of 7.6% in all race/ethnicity categories.
- The prevalence of preterm births differed by race and ethnicity, with Black non-Hispanic infants having a higher prevalence (12.5%) in 2000 than Hispanic (10.2%), Asian (9.8%) or White non-Hispanic (9.1%). The trend is similar after ten years, with Black non-Hispanic infants having a higher prevalence (11.2%) in 2009 than Hispanic (9.5%), White non-Hispanic (8.3%) or Asian (7.5%) in 2009.
- Among Black non-Hispanic women, the prevalence of preterm delivery has been consistently high (over 10.0%) compared to overall prevalence for women from other races. Between 2000 and 2009, the percentage of preterm delivery in MA PNSS among Black non-Hispanic women decreased slightly over ten years (from 12.5% in 2000 to 11.2% in 2009).

Breastfeeding

Figure 31-Percentage of Infants Ever Breastfed* by Race and Ethnicity



* Includes infants currently breastfeeding or ever breastfed as reported by mother at postpartum visit.

** Year 2010 Target: Increase the proportion of mothers who breastfeed their babies in the early postpartum period to 75%.

2009 MA PNSS

Breast milk has been known to be the best milk for an infant because of its nutritional superiority when compared to other sources of milk supply for the infant (Gartner et al., 2005). It provides the infant with many benefits such as immunity to many viral and bacterial diseases. In addition breast milk can enhance the immunologic defenses of an infant, prevent or reduce the risk of respiratory or diarrheal diseases, promote correct development of jaw, teeth and oral muscles and enhance speech patterns (Dorea 2009, James and Lessen 2009). Research suggests that breastfed babies are less likely to be obese during childhood. The breastfeeding process facilitates maternal-infant bonding and attachment.

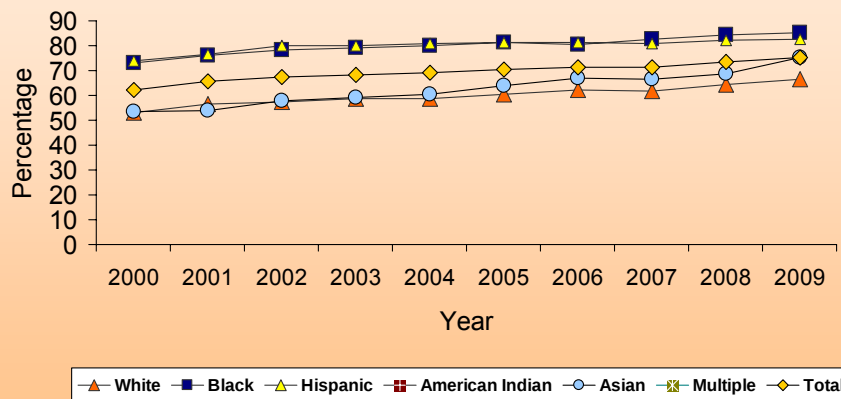
Prevalence of Breastfeeding Initiation by Race and Ethnicity among 2009 MA PNSS women

- Overall, MA PNSS women in 2009 had a higher prevalence of ever breastfeeding (75.1%) compared to women in the 2008 national PNSS dataset (65.4%) used for comparison.
- In 2009, Black non-Hispanic women (85.4%) followed by Hispanic women (82.5%) in MA PNSS had the highest prevalence of ever breastfeeding their infants.

- White non-Hispanic women (66.6%) and Asian women (75.3%) had the lowest prevalence of ever breastfeeding their infants.
- In 2009, the breastfeeding initiation rate for Black non-Hispanic (85.4%) mothers who participated in MA PNSS was more than thirty percent greater than the rate for Black non-Hispanic mothers (55.1%) in the national PNSS. This could be due to the greater diversity of ethnicities included in the Black, non-Hispanic category in MA.
- The Healthy People 2010 Objective for ever breastfeeding is 75% (USDHHS, 2000). The total percentage of infants ever breastfed for the 2009 MA PNSS (75.1%) met this goal.
- Black non-Hispanic mothers, Hispanic and Asian mothers in the 2009 MA PNSS were the only race/ethnicity groups that had breastfeeding initiation rates exceeding the *Healthy People 2010* target of 75%.

Trends in Percentage of Infants Ever Breastfed by Race and Ethnicity

Figure 32-Trends in the Percentage of Infants Ever Breastfed* by Race and Ethnicity in MA PNSS



* Reported by mother at postpartum visit. Year 2010 target: increase the proportion of mothers who breastfeed their babies in the early postpartum period to 75%.

2009 MA PNSS

- In the last ten years, the overall percentage of infants in the MA PNSS that were ever breastfed has increased from 62.3% in 2000 to 75.1% in 2009, with an overall percentage point improvement of 12.8%. Rates have increased in each race/ethnicity category.
- The prevalence of ever breastfeeding among Hispanic infants in MA PNSS rose from 74.1% in 2000 to 82.5% in 2009, an increase of 8.4 percentage points.
- The prevalence of ever breastfeeding in MA PNSS infants has also risen among Black non-Hispanic infants from 72.9% in 2000 to 85.4% in 2009, an overall increase of 12.5 percentage points.
- The prevalence of ever breastfeeding in MA PNSS infants has also risen among White non-Hispanic infants from 53.2% in 2000 to 66.6% in 2009, an increase of 13.4 percentage points.
- Among MA PNSS women, the highest percentage point improvement (21.8%) in breast feeding over the ten year period was recorded by Asian infants (from 53.5% in 2000 to 75.3% in 2009) while the lowest percentage point improvement (8.4%) was recorded by Hispanic infants (from 74.1% in 2000 to 82.5% in 2009).

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APPENDIX 1

Pre-Pregnancy Weight Status, Hemoglobin and Hematocrit Status

Pre-pregnancy Weight Status:

Pre-pregnancy weight status is a major factor affecting infant birth weight. Body Mass Index (BMI) is used to determine the pre-pregnancy weight status categorization, on which recommended weight gain is based. The BMI is calculated by dividing the mother's weight in kilograms by the mother's height in meters squared ($BMI = wt/ht^2$). Cutoffs have been established that are used to determine whether a woman was underweight, normal weight, or overweight prior to pregnancy (see Table 1).

Table 1: Pre-pregnancy weight categories based on BMI (NIH/NHLBI, 1998)

BMI Cutoffs ($BMI = (kg/m^2)$ (WHO)	Pre-pregnancy Weight Status
Less than 18.5	Underweight
18.5 – 24.9	Normal weight
25.0 – 29.9	Overweight
30.0 and over	Obese

Weight Gain during Pregnancy

Inadequate weight gain during pregnancy increases the risk of delivering a low birth weight infant. The recommended weight gain ranges used in this report are based on the 1990 recommendations of the Institute of Medicine (IOM, 1990; Suitor, 1997). Women who are underweight prior to pregnancy have a higher recommended weight gain range than normal weight women, while overweight and obese women are advised to gain less weight. The pre-pregnancy weight status and the corresponding recommended prenatal weight gain ranges are presented in Table 2.

Table 2: Recommended Prenatal Weight Gain by Pre-Pregnancy Weight Status as per new IOM Recommendations (IOM, 2009).

Pre-pregnancy Weight Status	Recommended Prenatal Weight Gain	Rates of weight gain 2 nd and 3 rd Trimester (mean range in lbs/wk)
Underweight	28 - 40 pounds	1.0 (1.0-1.3)
Normal weight	25 - 35 pounds	1.0 (0.8-1.0)
Overweight	15 - 25 pounds	0.6 (0.5-0.7)
Obese (includes all classes)	11-20 pounds	0.5(0.4-0.6)

Low Hemoglobin / Hematocrit status

Hemoglobin (Hgb) and hematocrit (Hct) are used as crude indicators of iron status. During pregnancy, normal physiologic changes occur in the blood to support the maternal and fetal demands of pregnancy. In the first and second trimesters, the maternal blood volume increases, causing a decrease in both Hgb and Hct concentration. During the third trimester, the increased fetal growth rate results in an increased need for iron. For these reasons, the cutoffs for Hgb and Hct are adjusted by trimester. Cut-off points are higher for smokers, because compromised oxygenation status due to smoking increases the amount of Hgb required for adequate oxygenation. The cutoffs for Hct and Hgb (Table 3) include adjustments for trimester of pregnancy and smoking.

Table 3: Cutoff Values for Anemia for Pregnant Women (CDC, 1998)

		Quantity Smoked in Cigarettes Per Day (CPD)		
	Nonsmokers	10 - 19 CPD	20 - 39 CPD	40+ CPD
Hemoglobin (g/dl)				
First Trimester	11.0	11.3	11.5	11.7
Second Trimester	10.5	10.8	11.0	11.2
ThirdTrimester	11.0	11.3	11.5	11.7
Hematocrit (%)				
First Trimester	33.0	34.0	34.5	35.0
Second Trimester	32.0	33.0	33.5	34.0
ThirdTrimester	33.0	34.0	34.5	35.0

In this report, data for Hgb are used where available. If data on Hgb are missing, Hct is used.

Table 4: Birth Weight Categories for Infants Born to PNSS Mothers

Birth Weight Category	Infant Weight
Very Low Birth Weight or VLBW	Less than 1500 grams
Low Birth Weight or LBW	1500 grams or more but less than 2500 grams
Normal Birth Weight or NBW	2500 grams to 4000 grams
High Birth Weight or HBW	Over 4000 grams

APPENDIX 2: 2009 Participating Local WIC Programs in MA

2009 MA WIC Programs:

1. Berkshire North
2. Berkshire South
3. Blue Hill Corridor
4. Brighton/Roslindale
5. Brockton
6. Cambridge/Somerville
7. Cape Cod
8. Chelsea/Revere
9. Dorchester North
10. Dorchester South
11. East Boston
12. Fall River
13. Framingham/Waltham
14. Franklin/ Hampshire/No Quabbin
15. Holyoke/Chicopee
16. Jamaica Plain
17. Lawrence
18. Lowell
19. New Bedford
20. North Central
21. North Shore
22. North Suburban
23. Northern Essex
24. Outer Cape
25. Plymouth
26. Quincy
27. Roxbury
28. South Boston
29. South Central
30. South Cove
31. South End
32. Springfield North
33. Springfield South
34. Taunton/Attleboro
35. Worcester

APPENDIX 3 – STATE MAPS OF COUNTY DATA

Maps

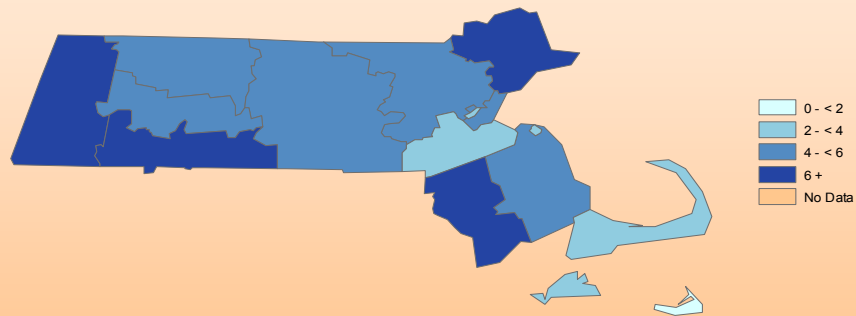
State Maps of County Data

2007-2009

Pregnancy Nutrition
Surveillance System

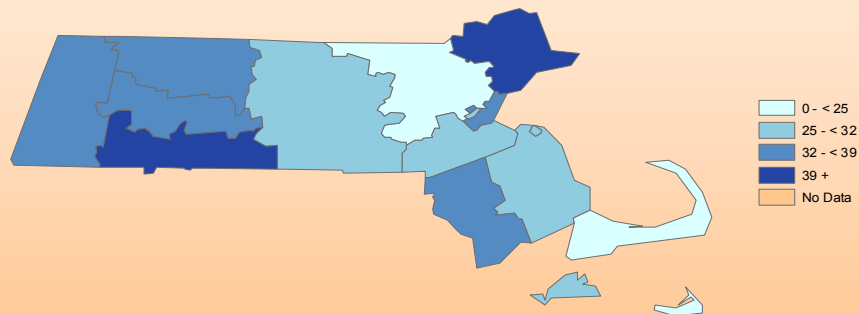


Percentage of pregnancies among females aged ≤ 17 years, by county



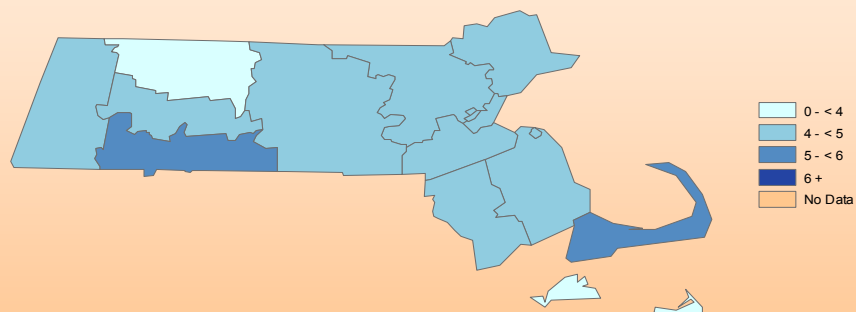
2007-2009 MA PNSS Table 4B

Percentage of women enrolling in WIC during their first trimester, by county



2007-2009 MA PNSS Table 6B

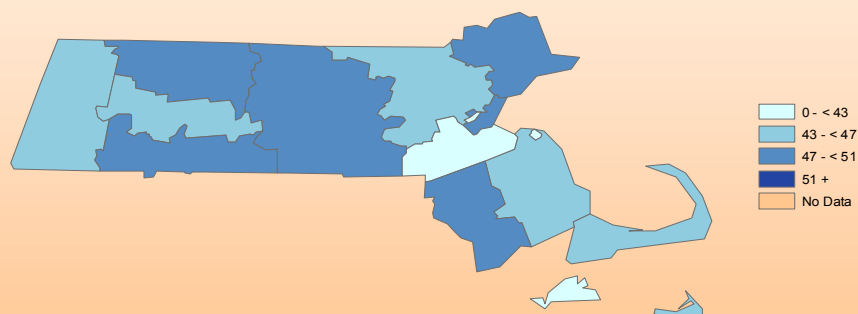
Prevalence of prepregnancy underweight*, by county



* BMI < 18.5.

2007-2009 MA PNSS Table 5B

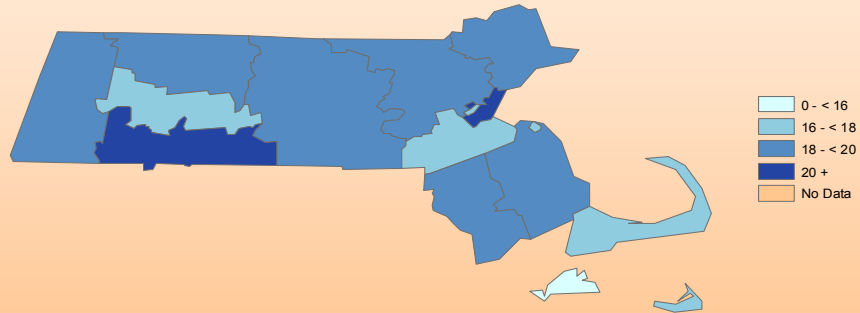
Prevalence of prepregnancy overweight*, by county



* BMI ≥ 25.0.

2007-2009 MA PNSS Table 5B

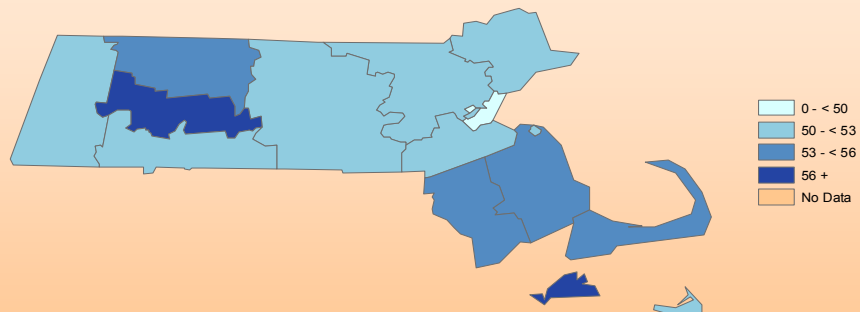
Prevalence of < ideal weight gain*, by county



* Ideal weight gain: prepregnancy underweight = 28-40 pounds; prepregnancy normal weight = 25-35 pounds; prepregnancy overweight = 15-25 pounds; and prepregnancy obese = 11-20 pounds.

2007-2009 MA PNSS Table 5B

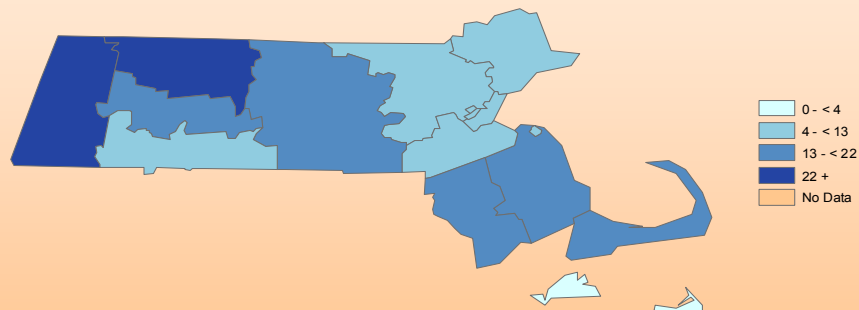
Prevalence of > ideal weight gain*, by county



* Ideal weight gain: prepregnancy underweight = 28-40 pounds; prepregnancy normal weight = 25-35 pounds; prepregnancy overweight = 15-25 pounds; and prepregnancy obese = 11-20 pounds.

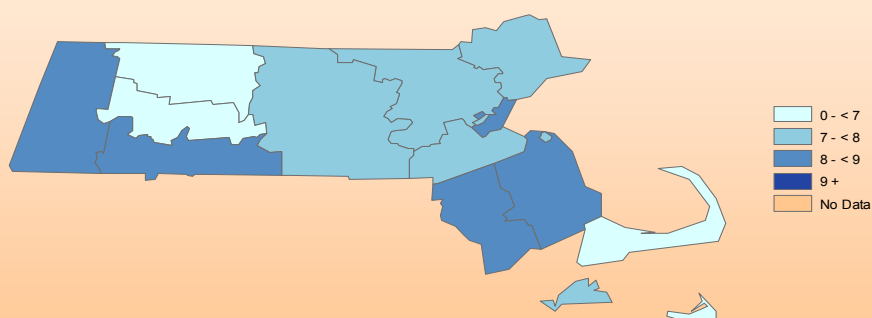
2007-2009 MA PNSS Table 5B

Prevalence of smoking during the last 3 months of pregnancy, by county



2007-2009 MA PNSS Table 7B

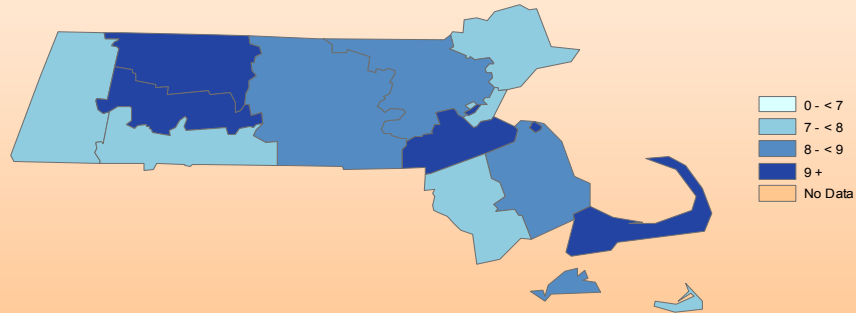
Prevalence of low birthweight*, by county



* < 2500 grams.

2007-2009 MA PNSS Table 8B

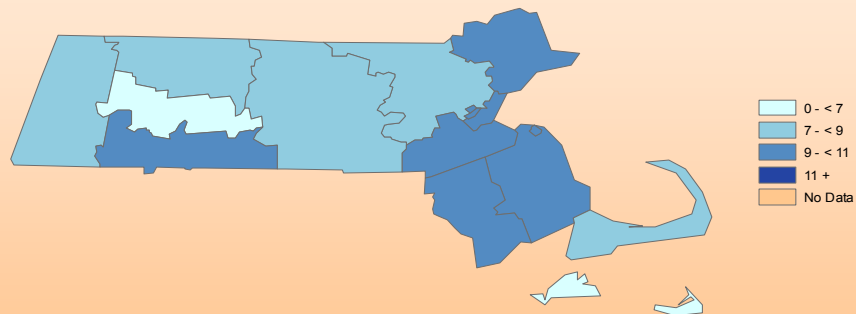
Prevalence of high birthweight*, by county



* > 4000 grams.

2007-2009 MA PNSS Table 8B

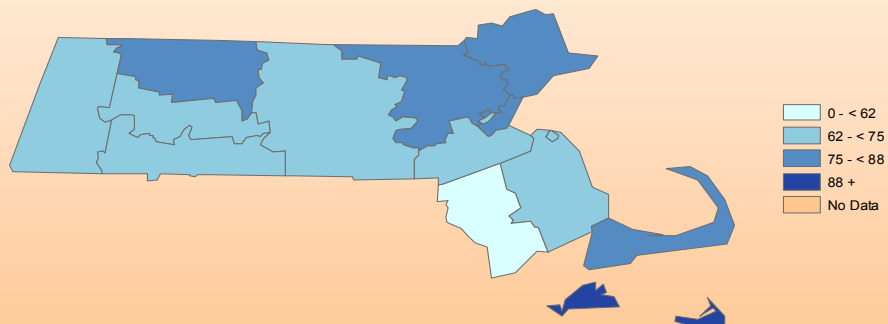
Prevalence of preterm delivery*, by county



* < 37 weeks gestation.

2007-2009 MA PNSS Table 8B

Percentage of infants ever breastfed*, by county



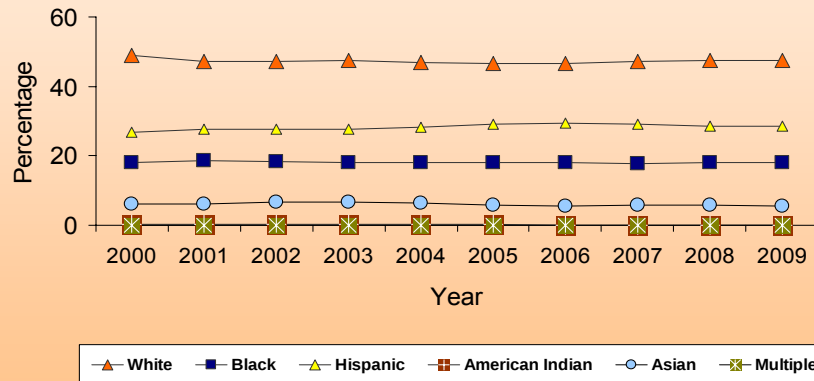
* Reported by mother at postpartum visit..

2007-2009 MA PNSS Table 8B



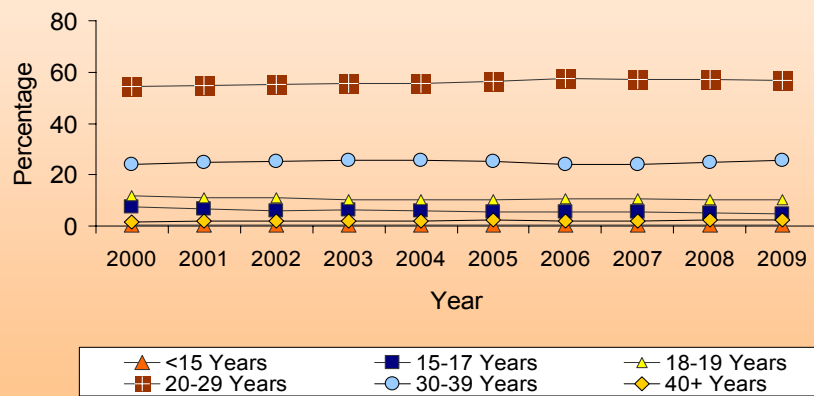
APPENDIX 4: TREND CHARTS FOR PNSS 2009

Trends in racial and ethnic distribution



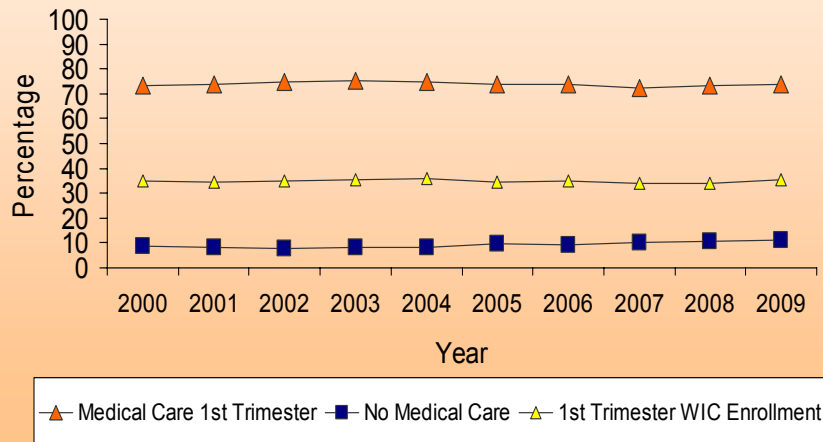
2009 MA PNSS Table 14C

Trends in age distribution



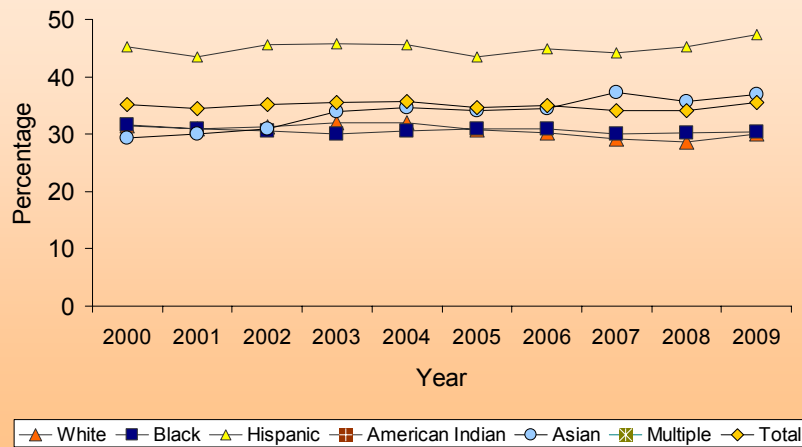
2009 MA PNSS Table 15C

Trends in WIC enrollment and medical care



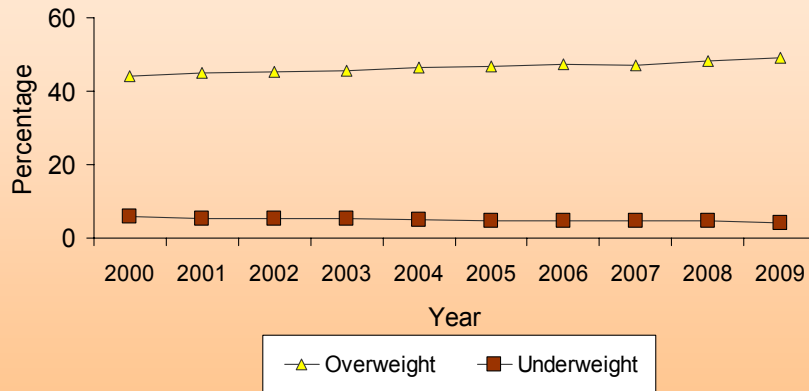
2009 MA PNSS Table 17C

Trends in first trimester WIC enrollment by race and ethnicity



2009 MA PNSS Table 21C

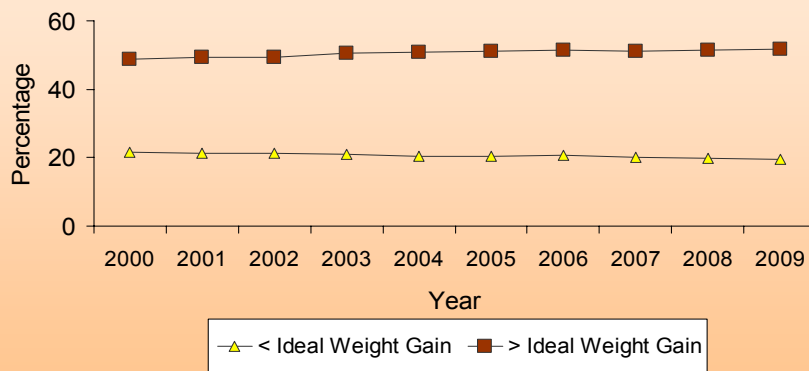
Trends in prevalence of prepregnancy overweight and underweight*



* Underweight (BMI < 18.5); overweight (BMI ≥ 25.0; includes overweight and obese).

2009 MA PNSS Table 16C

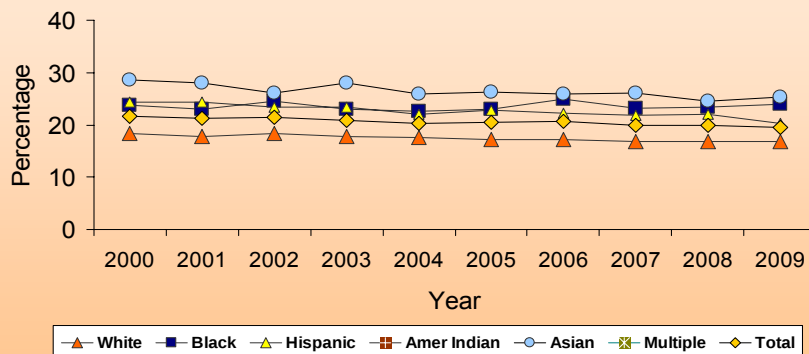
Trends in prevalence of less than ideal and greater than ideal weight gain*



* Ideal weight gain: prepregnancy underweight = 28-40 pounds; prepregnancy normal weight = 25-35 pounds; prepregnancy overweight 15-25 pounds and prepregnancy obese = 11-20 pounds.

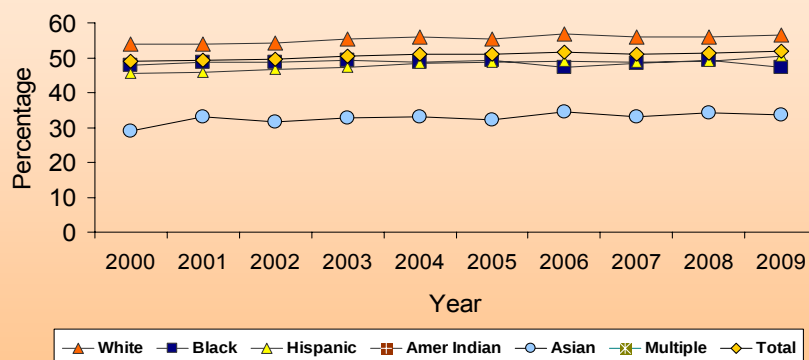
2009 MA PNSS Table 16C

Trends in the prevalence of less than ideal maternal weight gain* by race and ethnicity



* Ideal weight gain: prepregnancy underweight = 28-40 pounds; prepregnancy normal weight = 25-35 pounds; prepregnancy overweight = 15-25 pounds; and prepregnancy obese = 11-20 pounds. 2009 MA PNSS Table 20C

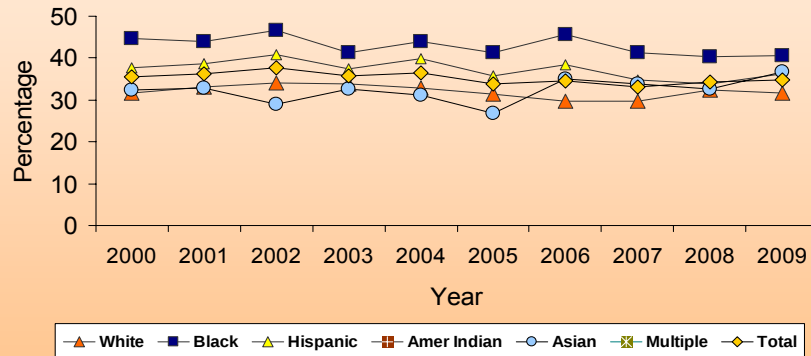
Trends in the prevalence of greater than ideal maternal weight gain* by race and ethnicity



* Ideal weight gain: prepregnancy underweight = 28-40 pounds; prepregnancy normal weight = 25-35 pounds; prepregnancy overweight = 15-25 pounds; and prepregnancy obese = 11-20 pounds. 2009 MA PNSS Table 20C

Trends in prevalence of third trimester anemia*

by race and ethnicity

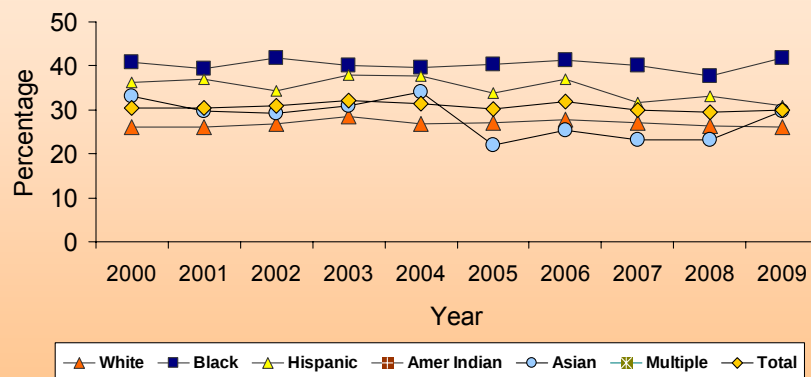


* Hb or Hct < 5th percentile, CDC MMWR vol. 47 (No. RR-3), 1998.

2009 MA PNSS Table 20C

Trends in the prevalence of postpartum anemia*

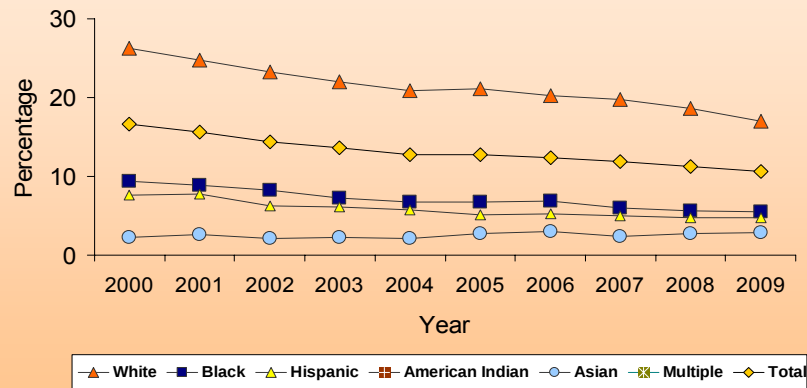
by race and ethnicity



* Hb or Hct < 5th percentile, CDC MMWR vol. 47 (No. RR-3), 1998.

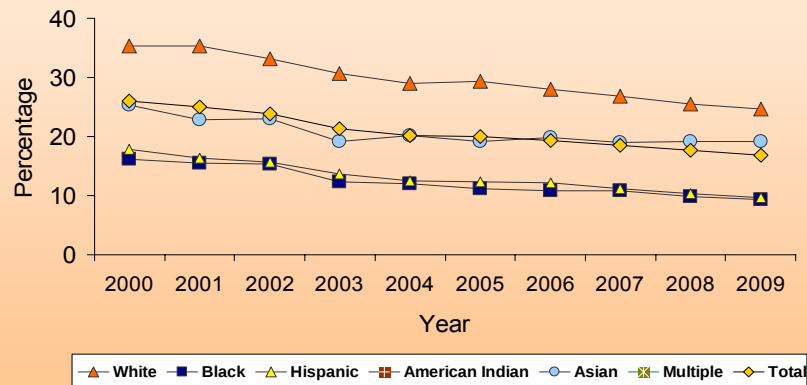
2009 MA PNSS Table 20C

Trends in prevalence of smoking during the last 3 months of pregnancy by race and ethnicity



2009 MA PNSS Table 22C

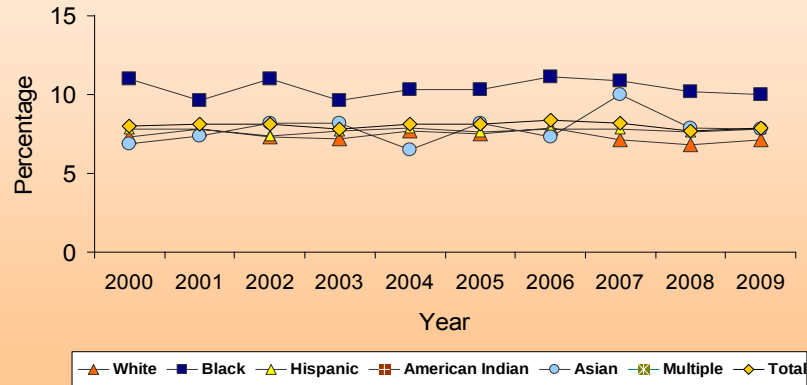
Trends in the prevalence of smoking in the household* by race and ethnicity



* During the prenatal period.

2009 MA PNSS Table 22C

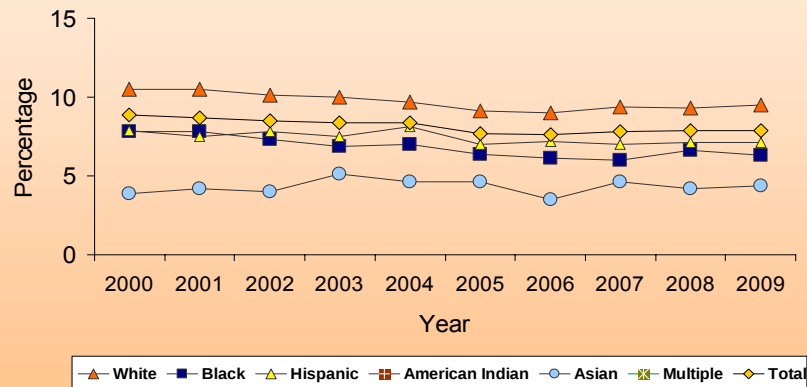
Trends in the prevalence of low birthweight* by race and ethnicity



* < 2500 g.

2009 MA PNSS Table 23C

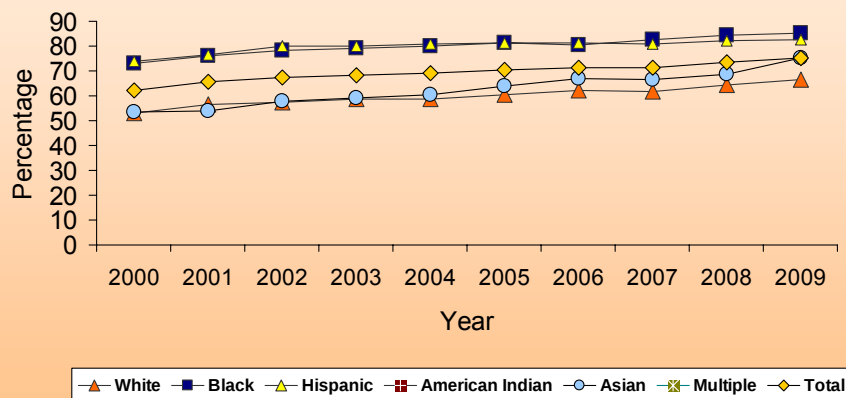
Trends in the prevalence of high birthweight* by race and ethnicity



* > 4000 g.

2009 MA PNSS Table 23C

Trends in the percentage of infants ever breastfed* by race and ethnicity



* Reported by mother at postpartum visit. Year 2010 target: increase the proportion of mothers who breastfeed their babies in the early postpartum period to 75%.

2009 MA PNSS Table 23C

