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

2011 PREGNANCY DATA REPORT

JANUARY 2015

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2011 Pregnancy Data Report

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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 benefits to purchase specific nutritious foods for participating women, infants, and children. In 2011, 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, multivitamin use prior to & during pregnancy, diabetes during pregnancy, hypertension during pregnancy and timing of prenatal care; Other maternal data collected also include alcohol use, and tobacco use before, during, and after pregnancy as well as smoking in the household.. Collected information related to the infant includes date of birth, gestational age at birth, birth weight, parity, sex, infant feeding behavior, selected birth outcomes 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 2011, data contributions were included for 29 states, the District of Columbia, one US territory and 3 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 2011, 32,137 women participated in the Massachusetts PNSS (MA PNSS), and 1,005,177 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 2011 Massachusetts WIC Program. Starting with the 2002 report and for all subsequent reports through 2011, 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 2011 Massachusetts PNSS Pregnancy Data Report includes records for women served by the Massachusetts WIC Program during the 2011 calendar year (from January 01, 2011 to December 31, 2011). In this report, the 2011 Massachusetts PNSS data are directly compared to the 2011 national PNSS data. 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, American Indian/Alaskan Native, Black non-Hispanic, and Hispanic women) accounted for 56.7% of the women served by the Massachusetts WIC program in 2011 (Figure 2a).
- More than twelve percent (12.4%) of the 2011 MA PNSS women were less than 20 years old, 56.6% were 20 to 29 years old, 28.5% were 30 to 39 years old and slightly over two percent (2.6%) were 40 years or older (Figure 3a).
- About twenty-one percent (21.5%) of the 2011 MA PNSS women did not finish high school (Figure 4).
- Most of the 2011 MA PNSS women (96.6%) were at or below 185% of the federal poverty level (FPL) (Figure 6).
- The participation rates for MA PNSS women in various programs at initial prenatal visit were as follows: WIC (100%), Food Stamps, now known as Supplemental Nutrition Assistance Program or SNAP (28.0%), Medicaid (76.3%) and Temporary Assistance for Needy Families or TANF (9.2%) (Figure 7).

Maternal Health Characteristics

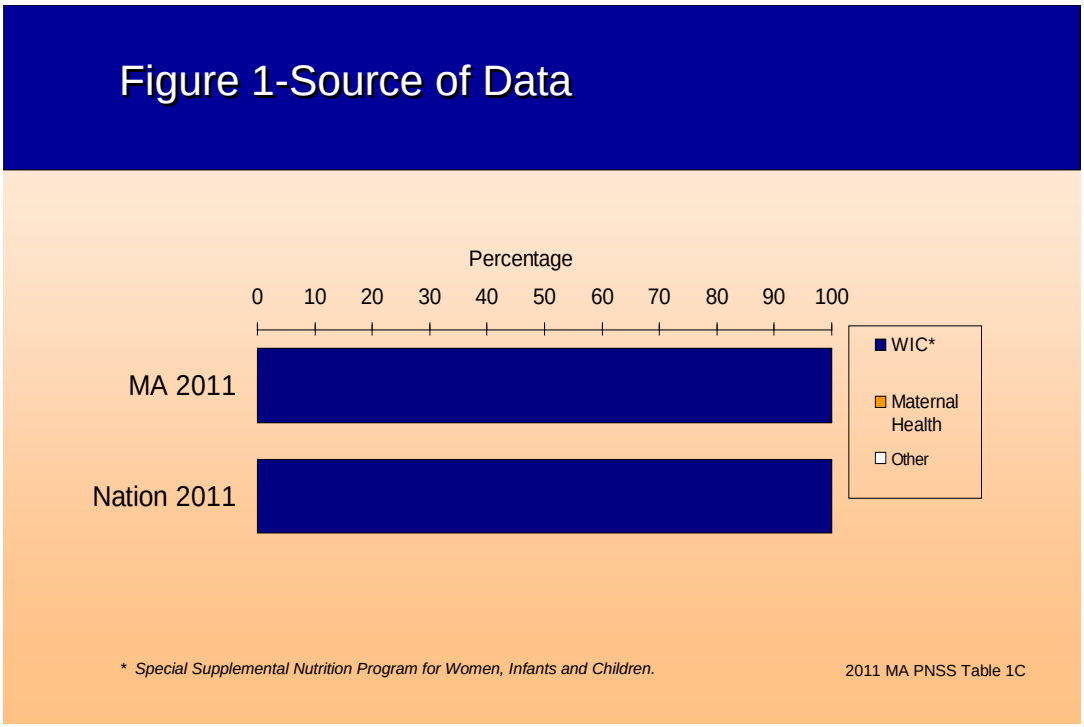
- Over seventy-seven percent (77.5%) of all 2011 MA PNSS women began prenatal medical care during the first trimester of pregnancy (Figure 8).
- More than one-third (35.0%) of PNSS women were enrolled in the WIC program in the first trimester and 34.1% of PNSS women enrolled in WIC in the second trimester (Figure 8).
- Fifty-one percent (51.2%) of the women had a pre-pregnancy body mass index (BMI) above normal (either overweight (23.8%) or obese (27.4%) prior to their current pregnancy) (Figure 11a).
- The prevalence of low hemoglobin/hematocrit (Hgb/Hct) status or anemia was slightly higher in women who enrolled in WIC during the third trimester period (34.1%) than in women who enrolled in WIC during the post-partum period (31.7%) (Figure 18).

- Almost twenty percent (19.2%) of WIC participants in 2011 MA PNSS reported smoking in the three months prior to pregnancy. The prevalence of smoking decreased both during pregnancy (11.2%) and in the last 3 months of pregnancy (9.7%) but rose again in the post-partum period (11.1%) (Figure 21a).
- Prevalence of maternal drinking in 2011 MA PNSS was 4.7% at 3 months prior to pregnancy but was 0.2% during the last 3 months of pregnancy (Figure 23).
- Prevalence of diabetes during pregnancy in 2011 MA PNSS was 5.2% and was highest among Asian women (6.9%) (Figure 24b).
- Prevalence of hypertension during pregnancy was 6.6% and was highest among Black non-Hispanic women (8.0%) (Figure 24c).
- In 2011 MA PNSS, the overall prevalence of multivitamin use prior to pregnancy was 22.9% and the overall prevalence of multivitamin use during pregnancy was 100% (Figure 25a).
- White non-Hispanic women had the highest prevalence (24.7%) of multivitamin use prior to pregnancy (Figure 25b).

Infant Characteristics

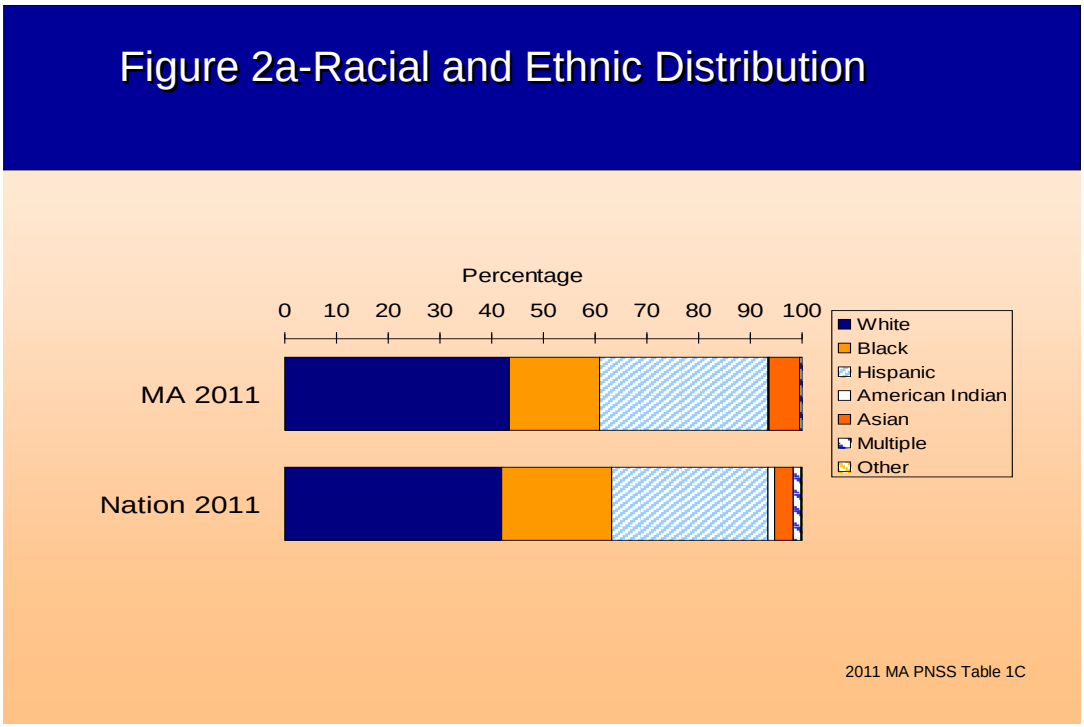
- Black non-Hispanic infants in 2011 MA PNSS had the highest prevalence of low birth weight (9.7%) while White non-Hispanic infants had the lowest prevalence of low birth weight (7.1%) (Figure 28a).
- Among selected birth outcomes, the overall prevalence of preterm delivery (i.e. less than 37 weeks gestation) among MA PNSS participants was nine percent (9.0%) (Figure 31a). Black non-Hispanic women (10.7%) had the highest prevalence of preterm deliveries while multiple race women (8.0%) had the lowest prevalence of preterm deliveries (Figure 31a).
- Almost a hundred percent (100.0%) of MA PNSS women reported breastfeeding their infants during the early postpartum period, meeting and surpassing the Healthy People 2020 goal of 81.9% for breastfeeding initiation (Figure 32a).

Source of Data



- In Massachusetts, the entire 2011 PNSS data set (100%) was derived from the WIC Program.
- Nationally, all records also came from WIC participant data in 2011.

Demographic Characteristics: Racial and Ethnic Distribution



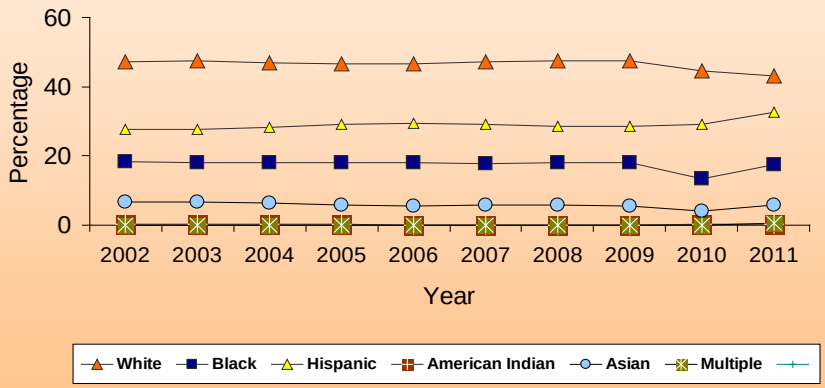
- In 2011, the MA PNSS population (32,137) was comprised of 43.3% White non-Hispanic, 17.5% Black non-Hispanic, 32.6% Hispanic, 5.8% Asian /Pacific Islander, 0.3% American Indian/Alaskan Native and 0.5% multiple race.

- The national PNSS population (1,005,177) in 2011 was comprised of 41.9% White non-Hispanic, 21.2% Black non-Hispanic, 30.3% Hispanic, 1.2% American Indian/Alaskan Native, 3.7% Asian, 1.5% multiple race and 0.1% other race.

- The percentage of White non-Hispanic women served in WIC was higher for MA PNSS (43.3%) than for the National PNSS (41.9%). 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 (5.8%) was slightly higher than that of their counterparts (3.7%) 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 (17.5%) than in national PNSS (21.2%) 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 in MA PNSS



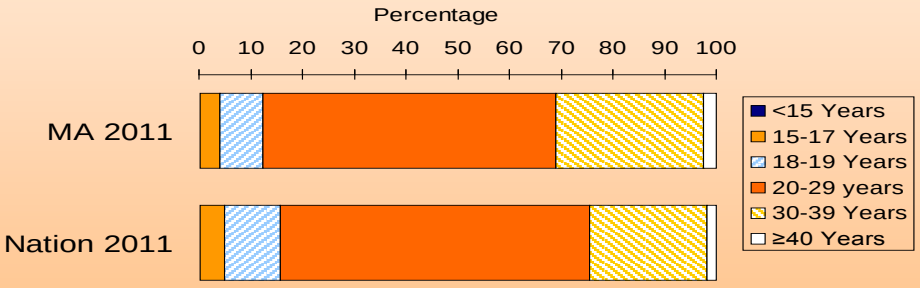
2011 MA PNSS Table 14C

- The racial and ethnic distributions among MA PNSS participants followed similar trends between 2002 and 2011.

- White non-Hispanic was the largest racial and ethnic group (47.1% in 2002 and 43.2% in 2011) and American Indian/Alaskan Native was the smallest racial and ethnic group (0.2% in 2002 and 0.3% in 2011).

Demographic Characteristics: Age Distribution

Figure 3a-Age Distribution

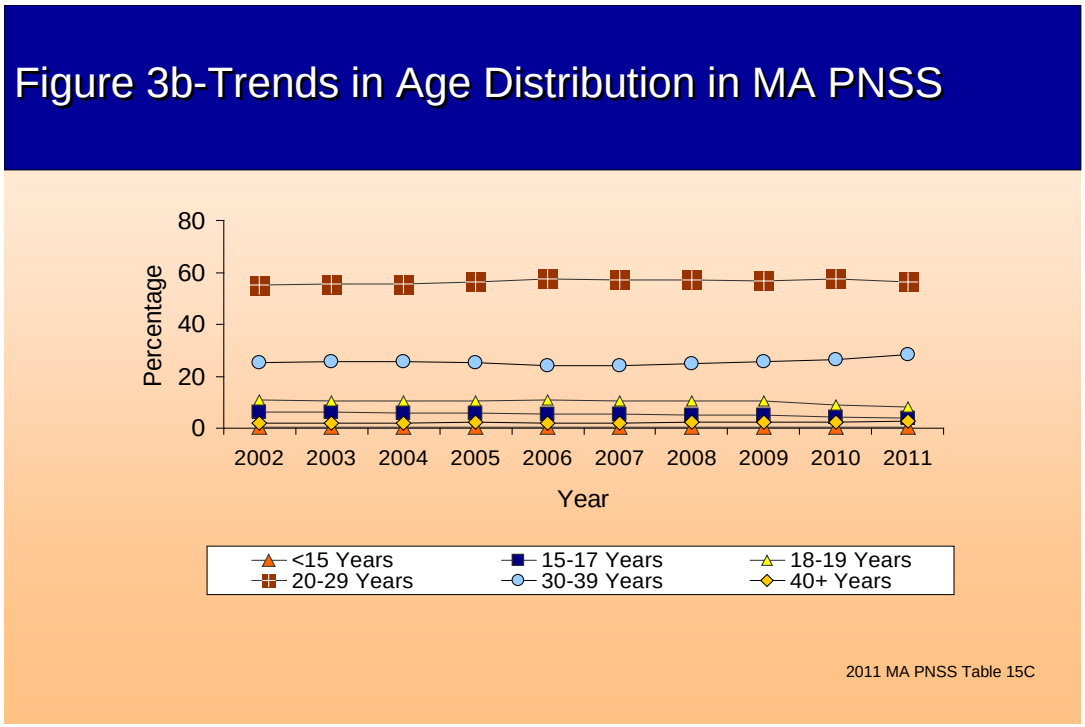


2011 MA PNSS Table 1C

- In 2011, about twelve percent (12.4%) of the total MA PNSS population was younger than 20 years old. Over half (56.6%) were between 20 and 29 years old and over a fourth (28.5%) were between the ages of 30 and 39 years. Over two percent (2.6%) of the MA PNSS population were 40 years of age or above.

- In the 2011 national PNSS data, 15.8% of the total national PNSS population was less than 20 years old. Almost two-thirds (59.8%) of participants were between 20 and 29 years old and about a fifth (22.7%) were between the ages of 30 and 39 years. Just over one and half percent (1.8%) of national PNSS population were 40 years of age or above.

Demographic Characteristics: Age Distribution Trends



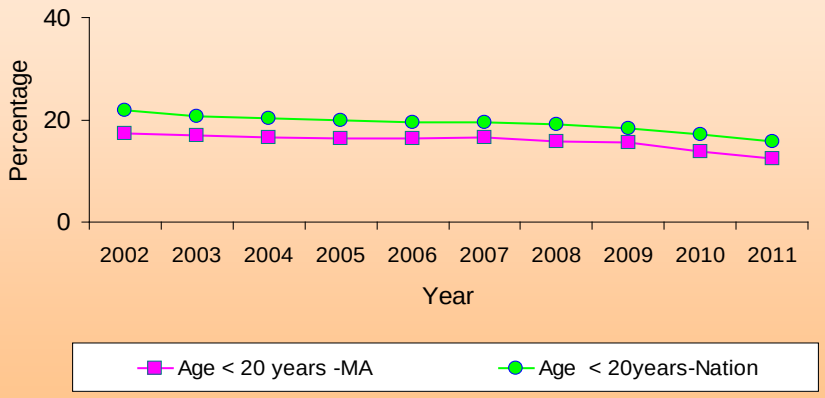
- The proportion of teenage mothers (aged less than 20 years) in MA PNSS population declined in the past ten years from 17.4% in 2002 to 12.4% in 2011.

- The proportion of pregnant women aged 20 to 29 years in MA PNSS population increased from 55.2% in 2002 to 56.5% in 2011. This was the largest age group among MA PNSS participants over the past ten years.

- The proportion of pregnant women aged 30 years or older in MA PNSS population increased from 25.4% in 2002 to 28.5% in 2011.

Demographic Trends: Teen Age Distribution

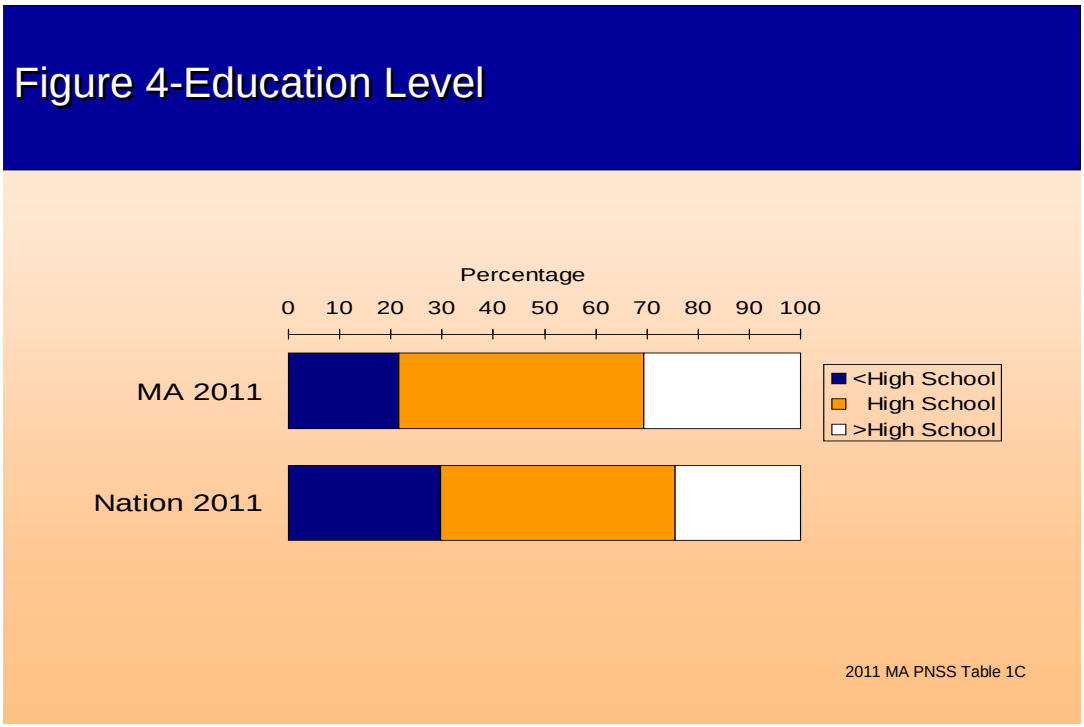
Figure 3c-Trends in Teen Age Distribution in MA PNSS vs National PNSS (women below 20 years of age)



2011 MA PNSS Table 15C

- The proportion of teenage mothers (aged less than 20 years) in both MA PNSS and national PNSS population declined over the ten year period from 2002 to 2011.
- The percentage of teenage moms in the MA PNSS was lower (ranging from 17.4% in 2002 to 12.4% in 2011) compared to the percentage in the national PNSS (which ranged from 21.9% in 2002 to 15.7% in 2011).

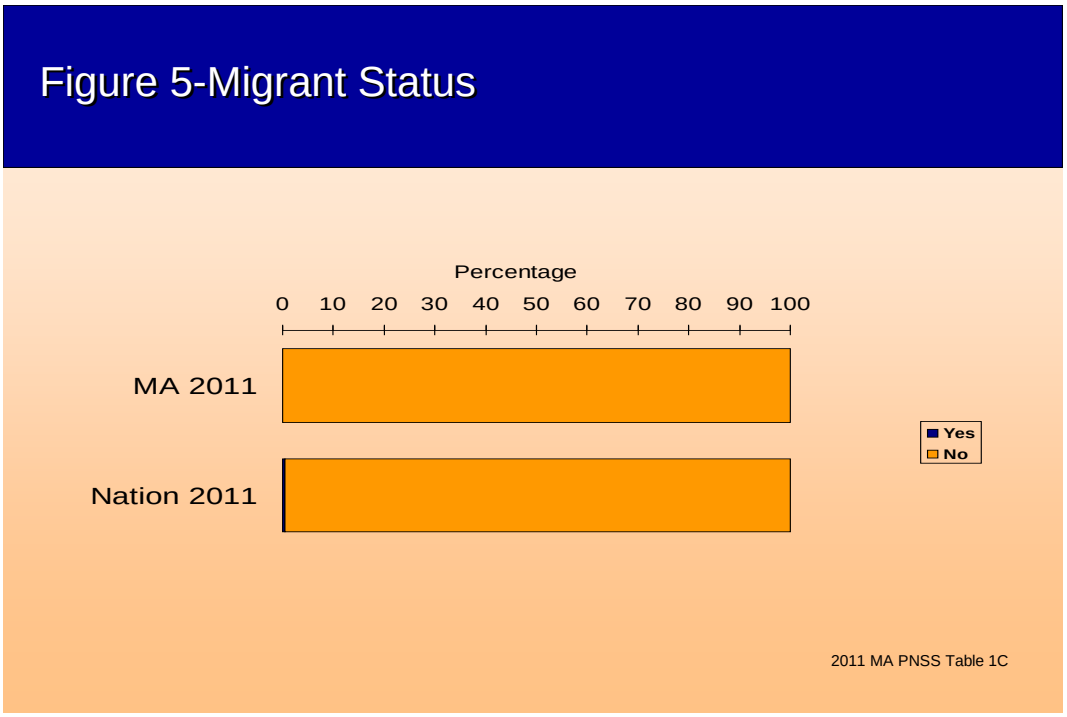
Demographic Characteristics: Educational Level



- About twenty-one percent (21.5%) of MA PNSS women in 2011 had not finished high school, 47.8% had a high school diploma, and over thirty percent (30.7%) continued education beyond high school.

- In the 2011 national PNSS data set, a larger proportion (29.8%) of PNSS women had not finished high school, 45.7% had a high school diploma, and 24.5% continued education beyond high school.

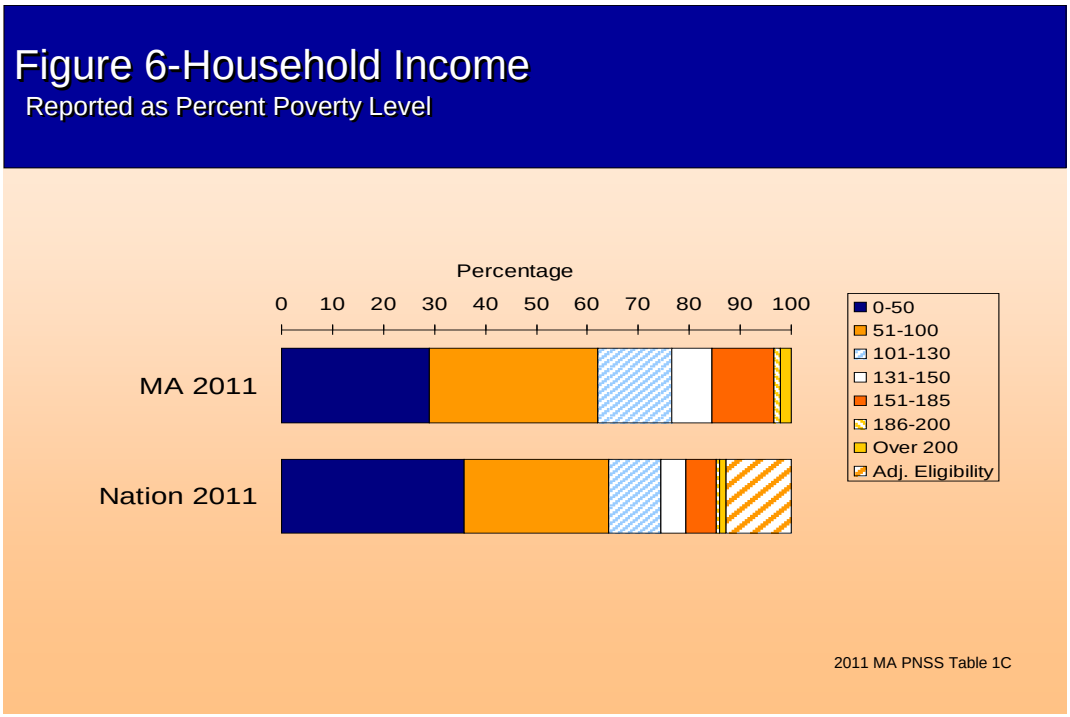
Demographic Characteristics: Migrant Status



- Of the total number (32,137) of MA PNSS women, none (zero) were migrants. Therefore, no statistics were generated for migrants among women in the 2011 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 0.4% of the national PNSS women were migrants.

Demographic Characteristics: Household Income



- WIC participation is dependent upon income eligibility, nutrition risk eligibility criteria and other requirements. It should be noted that for a participant to be income eligible for WIC Nutrition Program, applicants must have an income at or below a specified 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 2011 US Department of Health and Human Services poverty guidelines (http://aspe.hhs.gov/poverty/11pov)

- Sometimes an applicant with a gross income greater than 185% of the 2011 US Department of Health and Human Services Poverty Guidelines may still qualify for the WIC Nutrition Program through adjunctive eligibility participation in SNAP, TANF, or Medicaid.

- In 2011, 29.0% of women in MA PNSS were at or below 50% of the federal poverty level (FPL) compared to the national PNSS with 35.8% 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/11poverty.htm)

- Approximately one third (33.0%) of women in MA PNSS had a household income between 51% and 100% of the FPL, higher than the figure seen in in their counterparts in the national PNSS population (28.3%).

- Similarly about fifteen percent (14.6%) of women in MA PNSS had a household income between 101% and 130% of the FPL, higher than the figure seen in their counterparts in the national PNSS population (10.4%).

- Approximately eight percent (7.9%) of women in MA PNSS had a household income between 131% and 150% of the FPL, higher than the figure seen in their counterparts in the national PNSS population (4.9%).

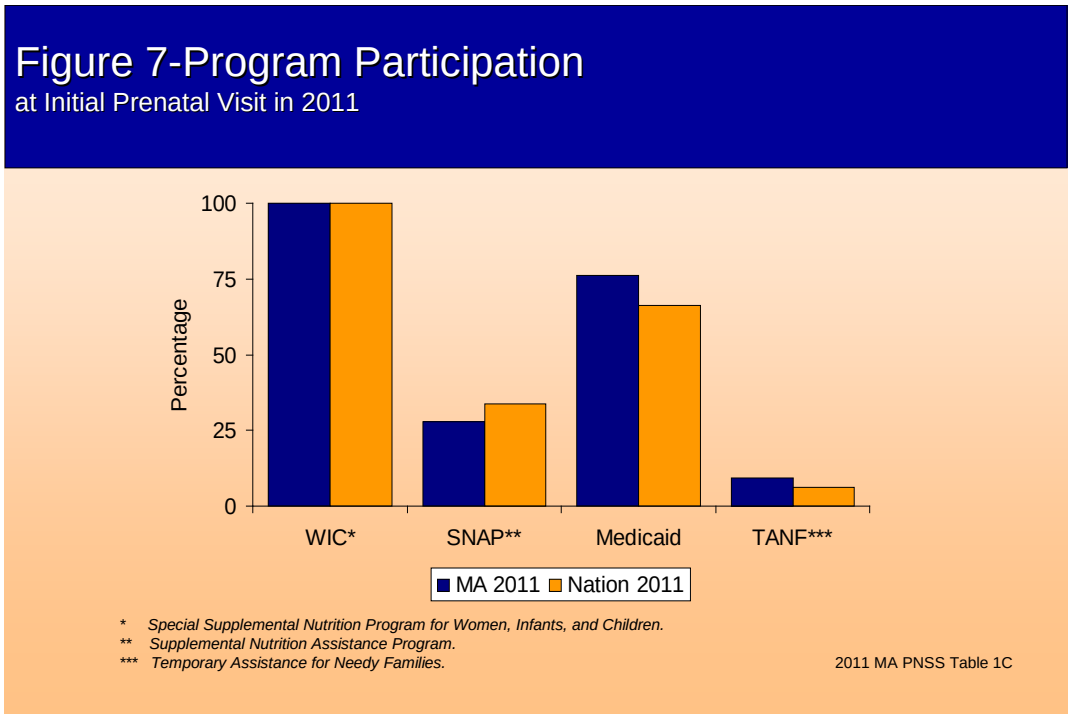
- The percentage of women in MA PNSS at 151% to 185% FPL was 12.1%, higher than the percentage observed in the national PNSS population (5.9%).

- Similarly, the percentage of women in MA PNSS at 186% to 200% FPL was 1.2%, double the percentage observed in the national PNSS population (0.6%).

- About two percent (2.2%) of MA PNSS women were over the 200% FPL while 1.3% of national PNSS women were over the 200% FPL.

- The percentage of women who were adjunctively eligible is not available from MA PNSS since MA PNSS captures income regardless of adjunctive eligibility. The adjunctive eligibility observed in the 2011 national PNSS population was 12.8%.

Program Participation at Initial Prenatal Visit

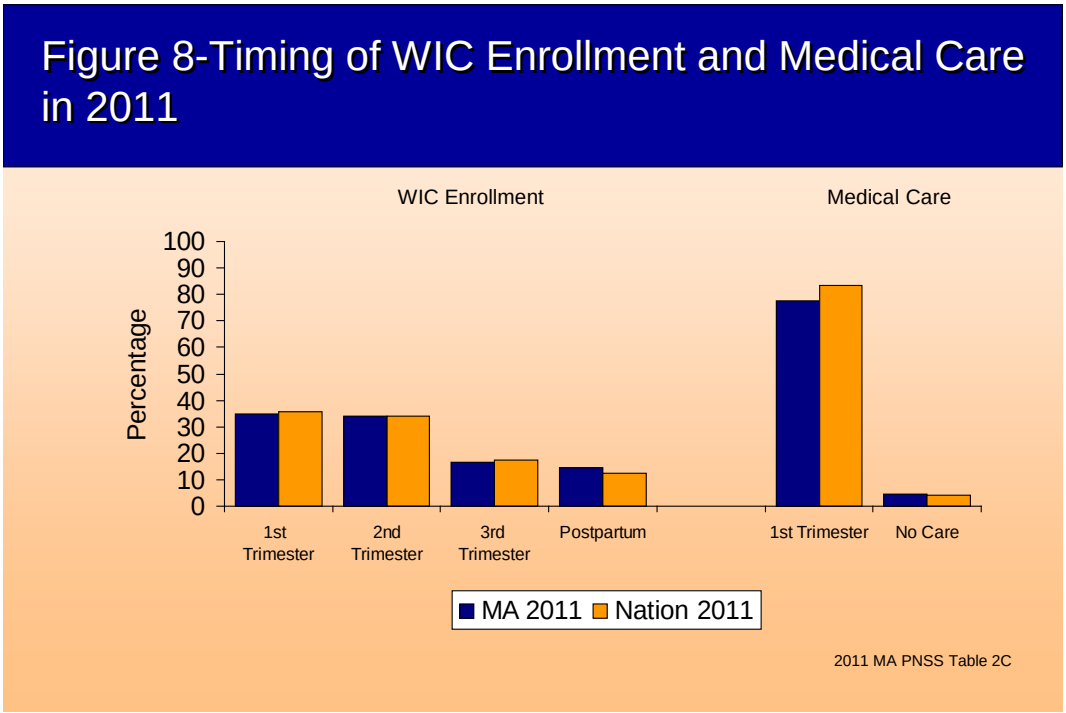


- All MA PNSS women (100.0%) were enrolled in the WIC Program in 2011. Similarly, 100% of national PNSS women were enrolled in WIC in 2011.

- Twenty-eight percent (28.0%) of the women in MA PNSS also received Food Stamps or Supplemental Nutrition Assistance Program (SNAP), 76.3% were on Medicaid, and 9.2% received Temporary Assistance for Needy Families (TANF).

- Over thirty-three percent (33.8%) of women in the national PNSS received Food Stamps or SNAP, 66.4% were on Medicaid, and 6.1% 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 and longer enrollment in the WIC program was linked to healthier infants (Khanani 2010, Crawford et al 2004; Ahluwalia et al., 1998).

Timing of WIC enrollment and medical care varied in both MA PNSS and national PNSS in 2011.

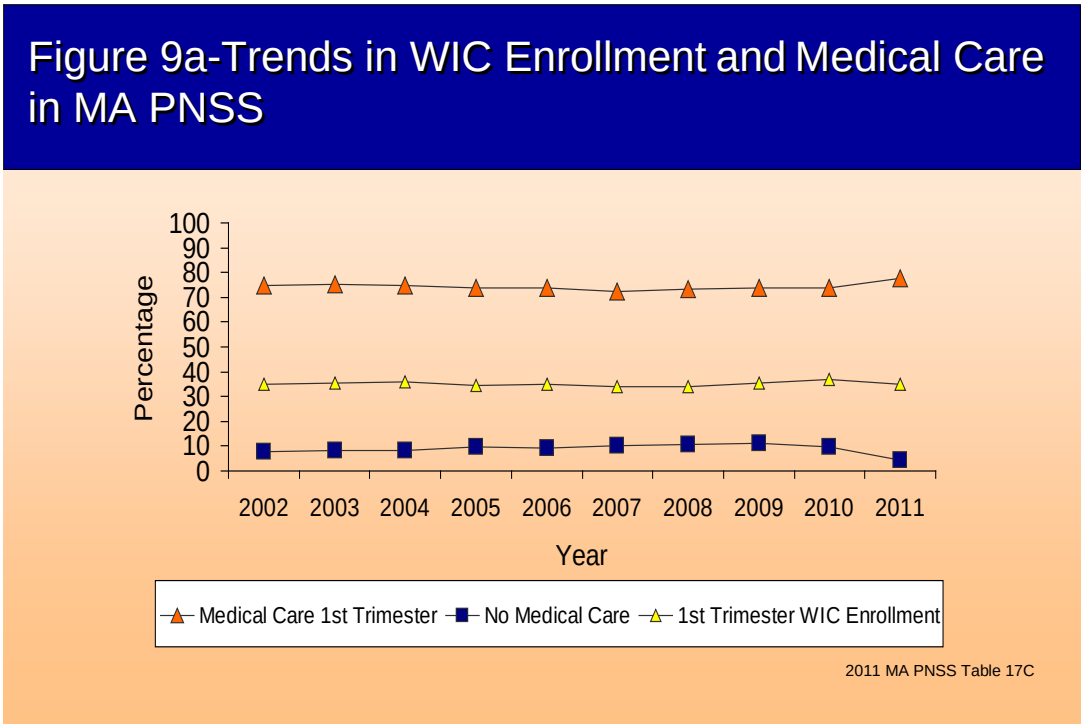
- Over a third (35.0%) of the women in 2011 MA PNSS enrolled in WIC during their first trimester of pregnancy, 34.1% enrolled in the second trimester, 16.4% enrolled in the third trimester and 14.5% enrolled in the postpartum period. In the national PNSS, almost thirty-six percent (35.8%) of women enrolled in WIC during their first trimester of pregnancy, 34.0% enrolled in the second trimester,17.6% enrolled during the third trimester and 12.5% enrolled in the postpartum period.

- The proportion of PNSS women entering prenatal care differed between the MA PNSS and the national PNSS populations. Specifically, over three quarters (77.5%) of the women in the 2011 MA PNSS and over eighty-three percent (83.6%) in the national PNSS entered medical care during their first trimester of pregnancy. Both of these figures met the

Healthy People 2020 (HP 2020) target of 77.9% of women entering prenatal care during the first trimester of pregnancy.

- The proportion of PNSS women receiving no care is almost the same for the MA PNSS and national PNSS populations. Specifically, 4.4% of women in the 2011 MA PNSS and 4.1% in the national PNSS received no care during pregnancy.

Trends in WIC Enrollment and Medical Care

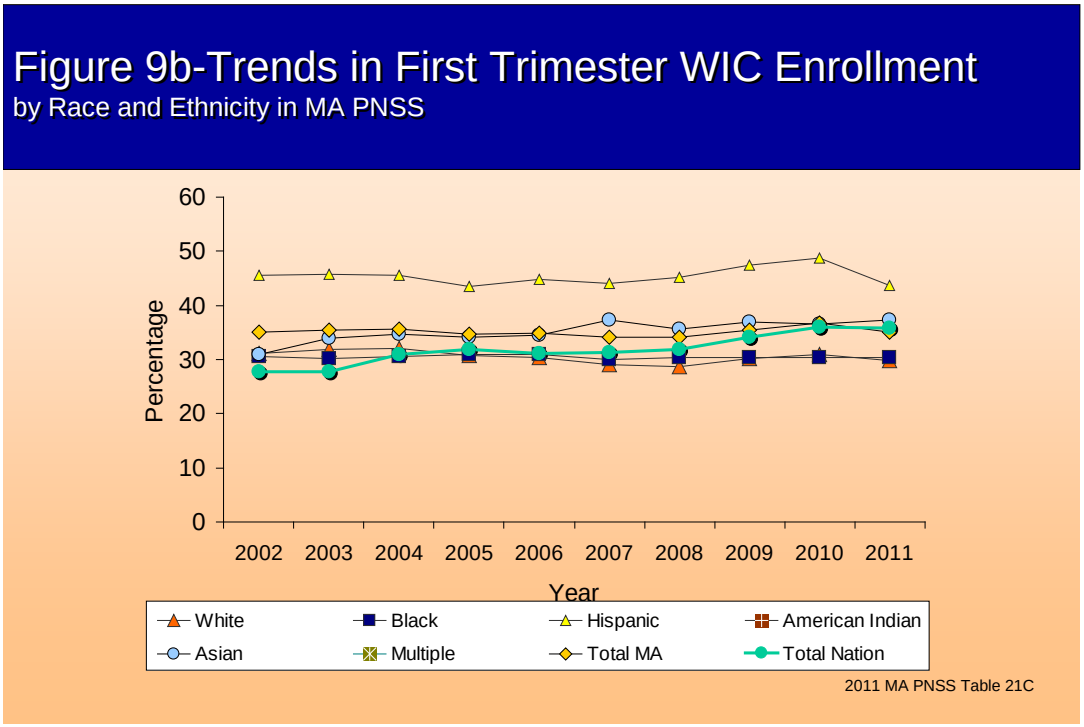


- The proportion of PNSS women in Massachusetts who received medical care during their first trimester of pregnancy has increased from 74.8% in 2002 to 77.5% in 2011. The proportion of women receiving medical care reached its peak in 2011 (77.5%) and in 2003 (75.2%).

- 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 2002 to 35.0% in 2011.

- The proportion of Massachusetts WIC women who reported they did not receive medical care during pregnancy was 7.9% in 2002 but decreased to 4.4% in 2011 showing a dramatic improvement in prenatal care.

Trends in First Trimester WIC Enrollment



- The overall prevalence of first trimester WIC enrollment by MA PNSS mothers has remained almost steady in the past ten years (from 35.1% in 2002 to 35.0% in 2011).

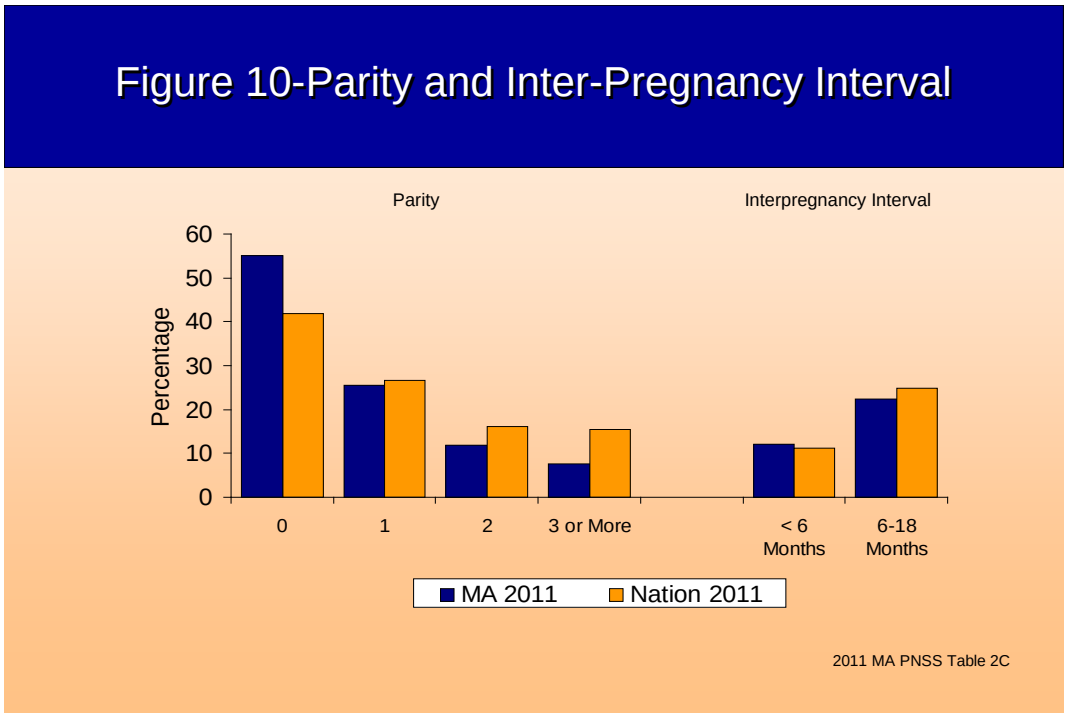
- The prevalence of first trimester WIC enrollment by MA PNSS mothers during the past ten years has been consistently below fifty percent in all race/ethnicity categories.

- The prevalence of first trimester WIC enrollment differed by race and ethnicity, with Hispanic mothers having a higher prevalence (45.6%) in 2002 than White non-Hispanic (31.2%), Asian (31.0%) and Black non-Hispanic (30.5) women.

- The enrollment trend is similar after ten years, with Hispanic PNSS women having a higher prevalence (43.6%) of first trimester WIC enrollment in 2011 than Asian (37.3%), Black non-Hispanic (30.3%) and White non-Hispanic (29.9%) women.

- The greatest increase in first trimester WIC enrollment was observed among Asian women whose enrollment increased by 6.3% from 31.0% in 2002 to 37.3% in 2011.

Parity Level 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, however 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 2011, 55.0% of women in the MA PNSS had never been pregnant, 25.6% had one previous pregnancy, 11.8% had two previous pregnancies, and 7.6% had three or more previous pregnancies.

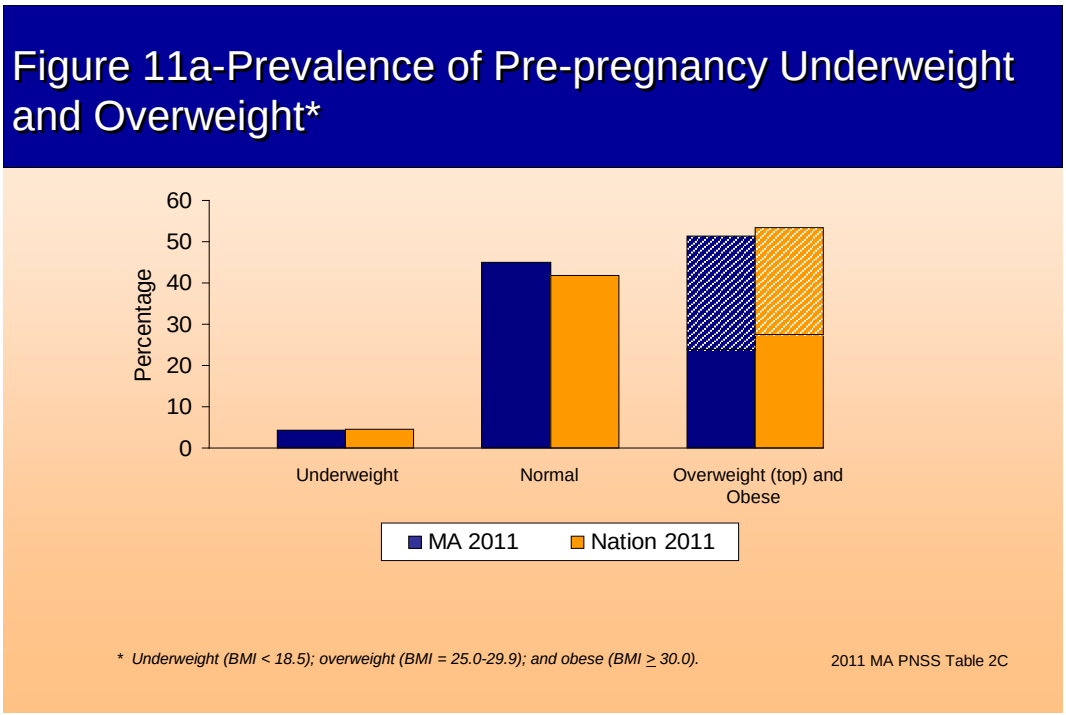
- Twelve percent (12.0%) of MA PNSS women had less than 6 months between their previous pregnancy and the current pregnancy; over a fifth (22.3%) of the women had 6 to 18 months between the previous pregnancy and the current pregnancy.

- Before their pregnancy in 2011, 41.8% of women in the national PNSS had never been pregnant, 26.7% had one previous pregnancy, 16.2%

had two previous pregnancies and 15.4% had three or more previous pregnancies.

- The proportion of the national PNSS women who had less than 6 months between their previous pregnancy and the current pregnancy was 11.2%, while the proportion that had 6 to 18 months between the previous pregnancy and the current pregnancy was 24.8%.

Prevalence of Pre-pregnancy Underweight and Overweight



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 an increased risk for pre-eclampsia, gestational diabetes mellitus (GDM), cesarean delivery, and failure to initiate breastfeeding (Li et al., 2003; Doherty et al 2006). 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 2011, 4.3% of the women in 2011 MA PNSS were underweight prior to their current pregnancy. This percentage was comparable to the 2011 national PNSS where 4.5% of women were underweight prior to their current pregnancy.

- About 45 percent (45.1%) of the women in 2011 MA PNSS were at a normal weight prior to their current pregnancy. This percentage was comparable to the 2011 national PNSS where 41.9% of women were at a normal weight prior to their current pregnancy.

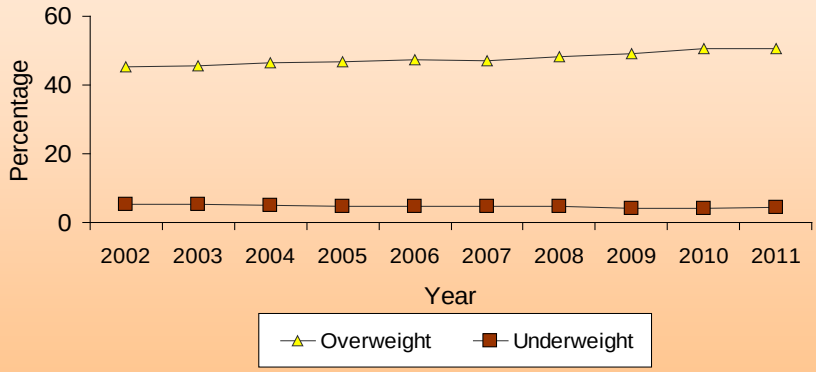
- Approximately, fifty percent (51.2%) of the women in the MA PNSS population had excess weight and were either overweight (23.8%) or obese (27.4%), based on their BMI prior to pregnancy.

- Over fifty-three percent (53.6%) of national PNSS women had excess weight pre-pregnancy (27.6% overweight and 26.0% 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



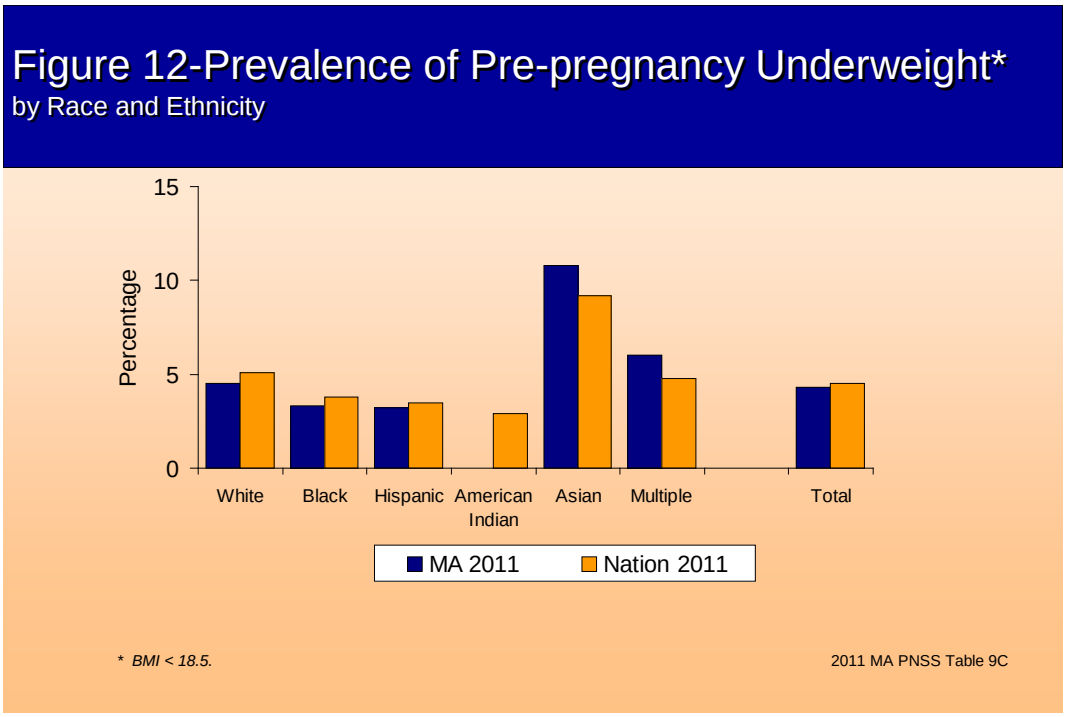
* *Underweight (BMI < 18.5); overweight (BMI ≥ 25.0; includes overweight and obese).*

2011 MA PNSS Table 16C

- The proportion of PNSS women in Massachusetts who were overweight before pregnancy has gradually increased from 45.2% in 2002 to 50.7% in 2011. A modest portion of the increase from 2008 to 2011 could be related to the change in IOM definitions of BMI categories (IOM 2009) for pregnant women.

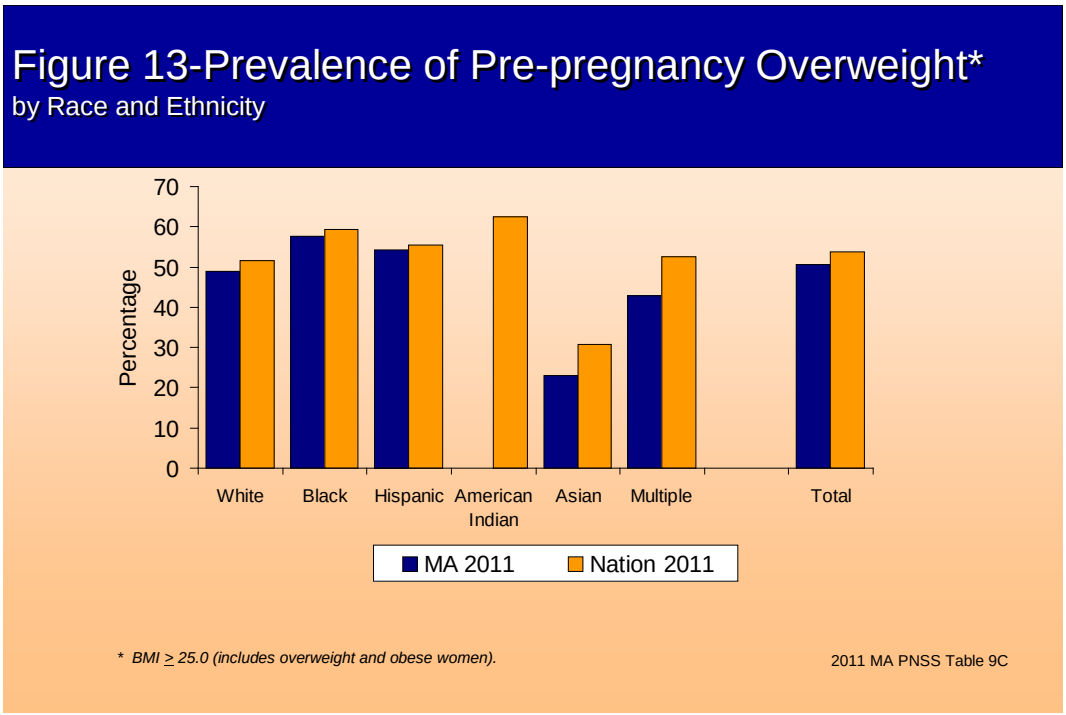
- The proportion of Massachusetts WIC women who were underweight before pregnancy fell slightly from 5.3% in 2002 to 4.3% in 2011. A portion of the change from 2008 to 2011 could also be due to the more narrow definition of underweight in the new guidelines (IOM 2009).

Pre-pregnancy Underweight



- The percent of PNSS women who were underweight prior to pregnancy varied by race and ethnicity in both MA PNSS and national PNSS.
- Asian women both in MA PNSS (10.8%) and national PNSS (9.2%) exhibited the highest prevalence of underweight prior to pregnancy in 2011.
- Black non-Hispanic (3.3%) and Hispanic (3.2%) women exhibited the lowest prevalence of pre-pregnancy underweight in the MA PNSS.
- Similarly, in the 2011 national PNSS, American Indian (2.9%), Hispanic (3.5%) and Black non-Hispanic (3.8%) women exhibited the lowest prevalence of pre-pregnancy underweight.

Pre-pregnancy Overweight



- Over half (57.7%) of Black non-Hispanic women in the MA PNSS had the highest prevalence of overweight before the current pregnancy, higher than Hispanic women (54.2%) and the overall prevalence of pre-pregnancy overweight in the state of MA (50.7%).

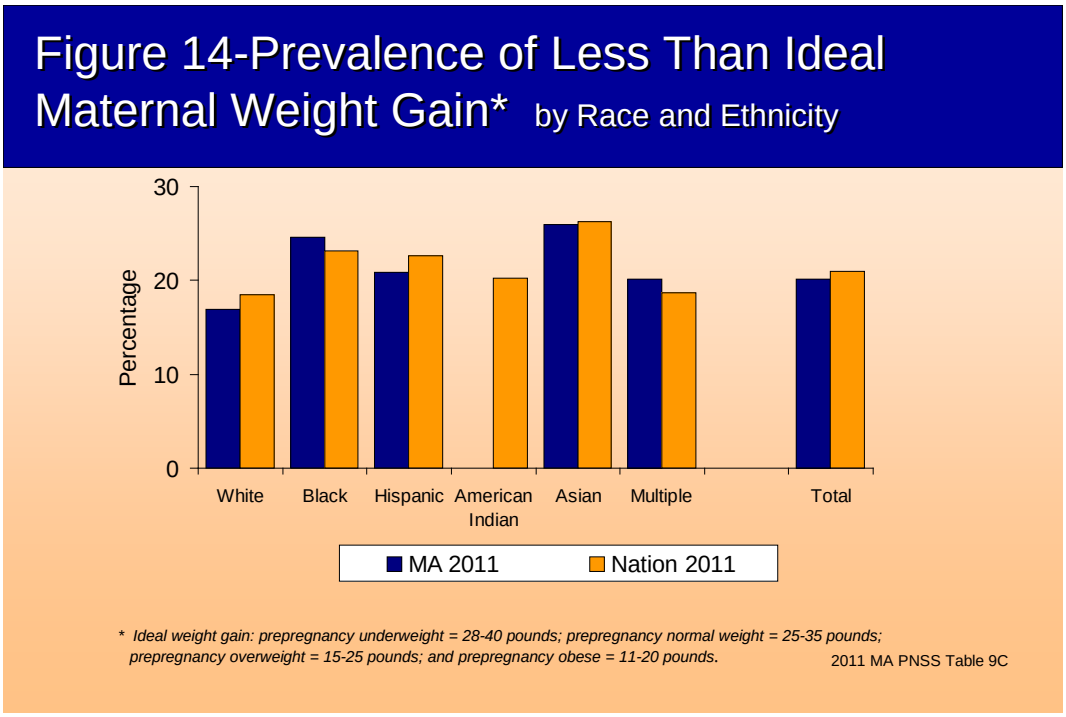
- Asian women in MA PNSS had the lowest prevalence of pre-pregnancy overweight (23.0%) compared to the overall state prevalence (50.5%) for all race and ethnicity categories.

- Similarly, Asian women in the national PNSS had the lowest prevalence of pre-pregnancy overweight (30.7%) compared to the overall national prevalence (53.7%) in 2011.

- The overall prevalence of pre-pregnancy overweight in MA PNSS women was lower (50.5%), compared to the overall prevalence of pre-pregnancy overweight in national PNSS women (53.4%).

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

Less than Ideal Maternal Weight Gain



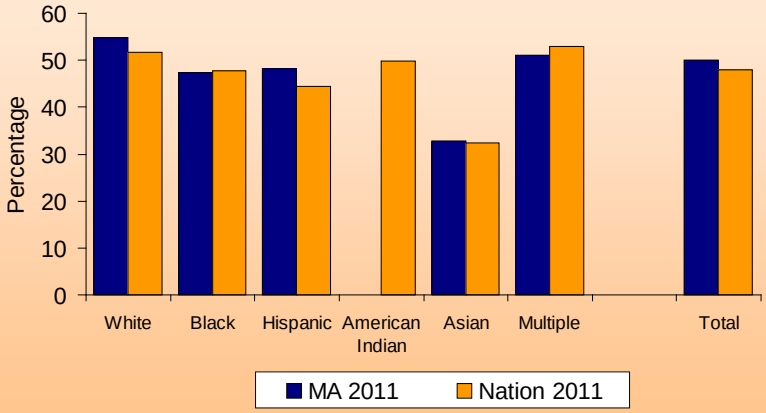
The 2009 IOM report recommended a weight gain of 28-40 pounds for underweight women, 25-35 pounds for women of normal weight, 15-25 pounds for overweight women and 11-20 pounds for obese women (IOM 2009). Women who gain less than the IOM (2009) recommended weight gain are at an increased risk of giving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

- The overall prevalence of less than ideal maternal weight gain (20.1%) in 2011 MA PNSS was slightly less than the prevalence of 21.0% in the 2011 national PNSS women.

- Asian women in 2011 MA PNSS had the highest prevalence of less than ideal maternal weight gain (26.0%) during the current pregnancy. In contrast, White non-Hispanic women had the lowest prevalence of less than ideal maternal weight gain (16.9%) in 2011 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.*

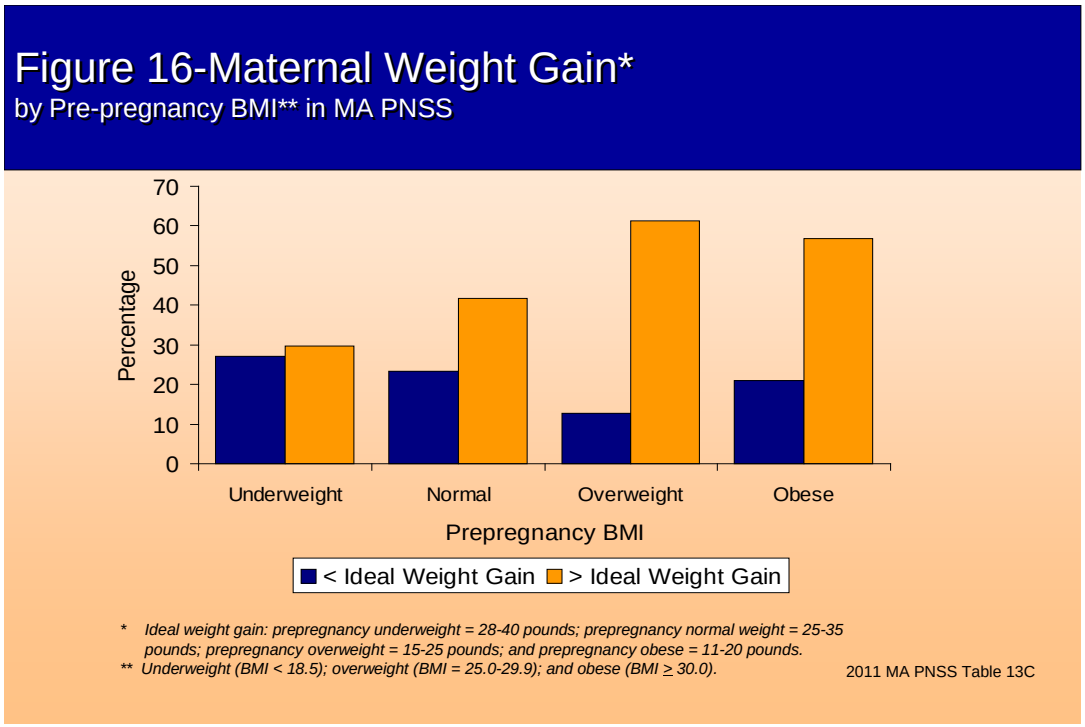
2011 MA PNSS Table 9C

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 (Salihu et al 2008). In addition, women who gain excess weight during pregnancy may have more difficulty returning to their pre-pregnancy weight (Rooney and Schauberger, 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 Schauberger 2002, Kabali and Werler 2007).

- Asian women in the 2011 MA PNSS data set had the lowest prevalence of greater than ideal maternal weight gain (32.9%) during the current pregnancy. Similarly, Asian women in the 2011 national PNSS data set had the lowest prevalence of greater than ideal maternal weight gain (32.3%). In contrast, White non-Hispanic women had the highest prevalence of greater than ideal maternal weight gain both in MA PNSS (54.8%) and national PNSS (51.7%).

- Overall in 2011, 50.0% of MA PNSS participants gained more than the recommended amount of weight during their pregnancy compared to the national 2011 PNSS where 48.0% 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 2009 to 2011.

Overall Maternal Weight Gain by Pre-pregnancy BMI



- Overall, 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.

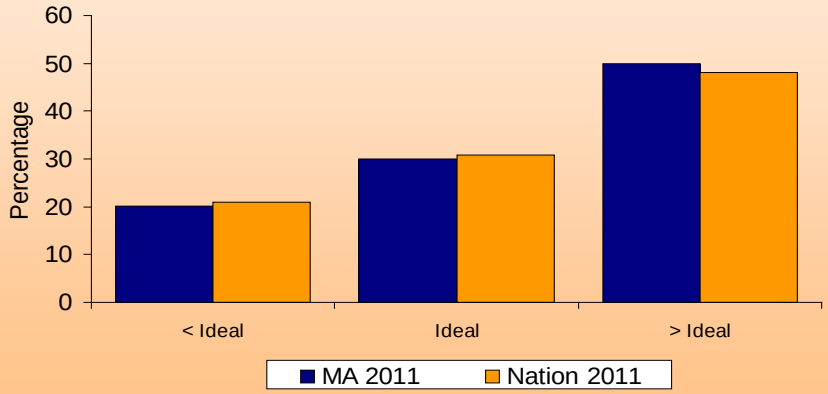
- About a fifth (20.9%) of MA PNSS participants who were obese before pregnancy gained less than the recommended amount of weight, while 56.7% of obese women gained more than the recommended ideal weight.

- Similarly, 12.8% of participating women who were overweight before pregnancy gained less than the recommended amount of weight while 61.2% gained more than the ideal amount of weight.

- In 2011, 27.2% of participating women who were underweight before pregnancy gained less than the recommended amount of weight while 29.6% of underweight women gained more than the ideal amount of weight.

Prevalence of Maternal Weight Gain:
Less than Ideal, Ideal and Greater than Ideal

Figure 17a-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.*

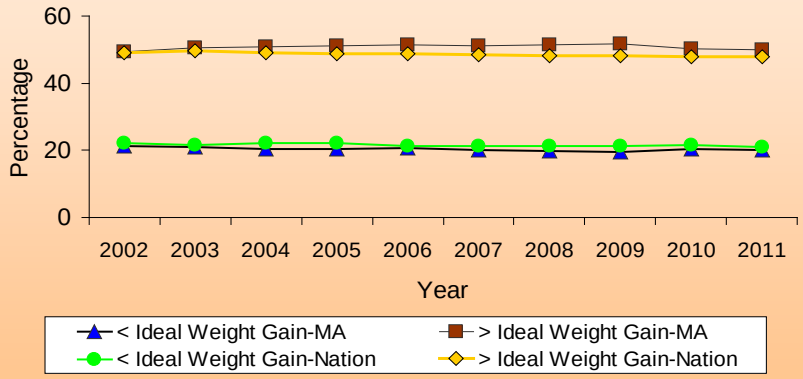
2011 MA PNSS Table 2C

- In summary, nearly one-third (29.9%) of mothers in MA PNSS data set gained the ideal amount of weight during pregnancy. Fifty percent (50.0%) gained more than the ideal amount of weight and about a fifth (20.1%) gained less than the ideal amount of weight.

- Almost thirty-one percent (30.9%) of mothers in the national PNSS data set gained the ideal amount of weight during pregnancy. Compared to MA PNSS, the national PNSS had a lower percentage of women gaining more than ideal weight (48.0%) but a higher percentage of women gaining less than ideal weight (21.0%).

Trends in Less than Ideal and Greater than Ideal Maternal Weight Gain

Figure 17b-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.*

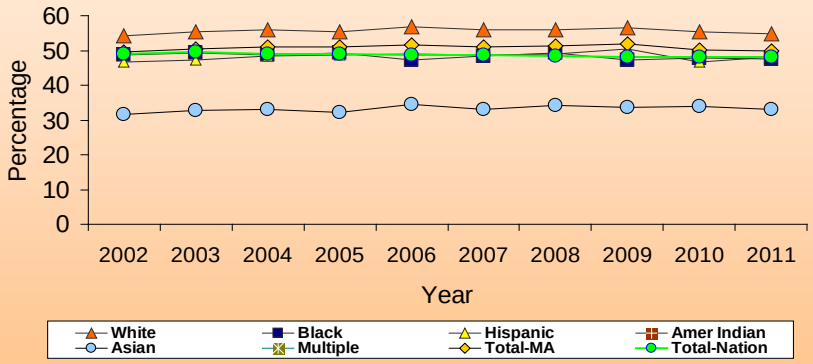
2011 MA PNSS Table 16C

- The proportion of MA PNSS women who gained more than ideal amount of weight in pregnancy has gradually increased from 49.5% in 2002 to 50.0% in 2011. A modest portion of the increase from 2008 to 2011 could be related to the change in IOM definitions of BMI and weight gain categories (IOM 2009).

- The proportion of MA PNSS women who gained less than ideal amount of weight in pregnancy fell slightly from 21.4% in 2002 to 20.1% in 2011. A portion of the change from 2008 to 2011 could be due to the more narrow definition of underweight in the new guidelines (IOM 2009).

Trends in Greater than Ideal Maternal Weight

Figure 17c-Trends in the Prevalence of Greater than Ideal Maternal Weight Gain* in MA PNSS 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.*

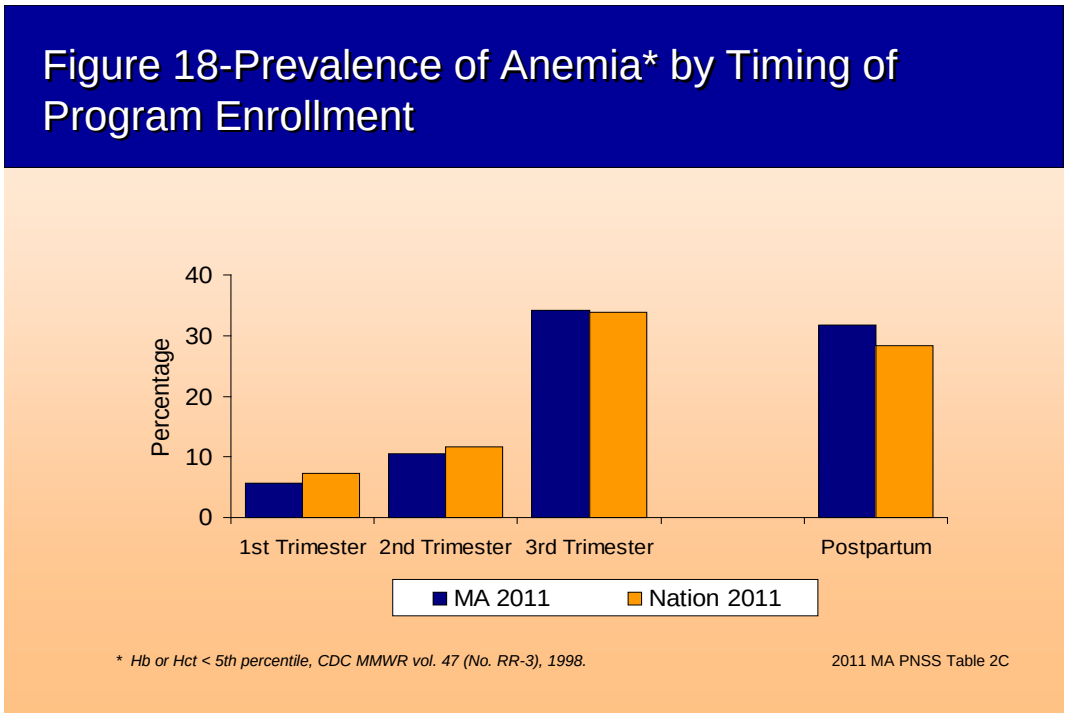
2011 MA PNSS Table 20C

- The overall prevalence of greater than ideal maternal weight gain by MA PNSS mothers has increased slightly in the past ten years (from 49.5% in 2002 to 50.0% in 2011) while the overall prevalence of greater than ideal maternal weight gain by national PNSS mothers has decreased slightly in the past ten years (from 49.0% in 2002 to 48.0% in 2011).

- The prevalence of greater than ideal maternal weight gain differed by race and ethnicity in 2002 MA PNSS with White non-Hispanic women having a higher prevalence (54.1%) than Black non-Hispanic (48.6%), Hispanic (46.6%) or Asian (31.6%) women.

- The trend for greater than ideal maternal weight gain is similar after ten years in 2011, where White non-Hispanic women still have higher prevalence (54.8%) than Black non-Hispanic (47.48%), Hispanic (48.1%) and Asian (32.9%) women.

Prevalence of Anemia by Timing of Program Enrollment



**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 among PNSS participants increased with increased delay of program enrollment.

- In MA PNSS, anemia was observed in 5.6% of women who enrolled in the first trimester, 10.5% of women who enrolled in the second trimester, and 34.1% of women who enrolled in the third trimester.

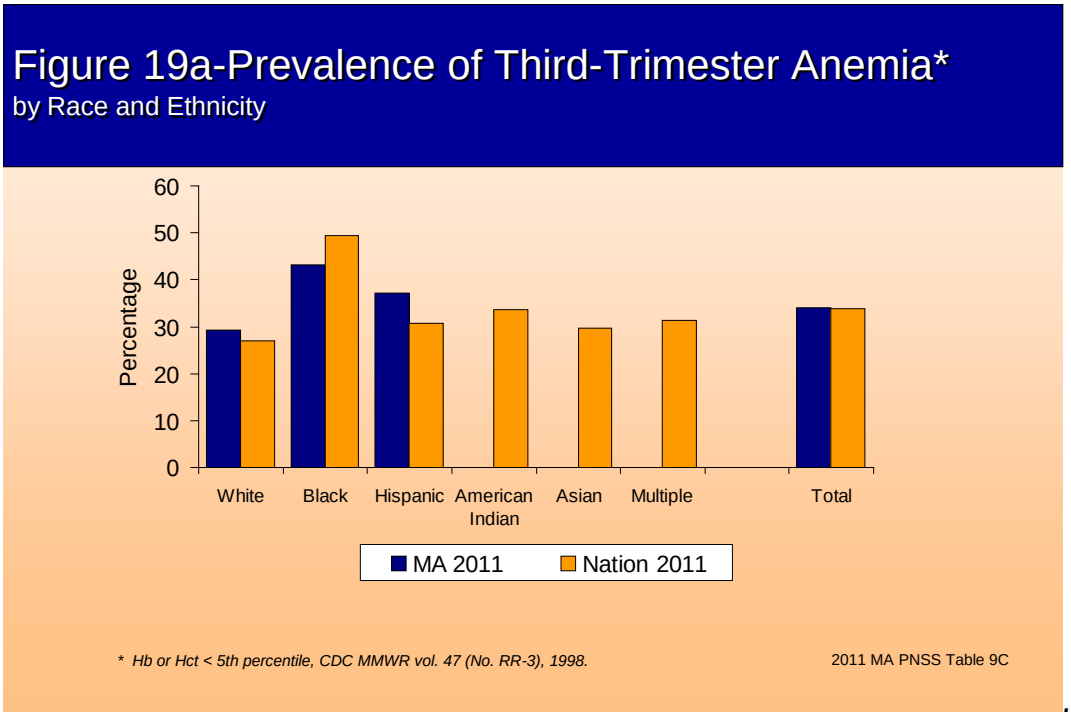
- A similar pattern was observed in the national PNSS dataset, where 7.3% of women who enrolled in the first trimester, 11.6% of women who

enrolled in the second trimester, and 33.8% of women who enrolled in the third 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).

- Thirty-one percent (31.7%) of all women who enrolled in MA PNSS during the postpartum period had anemia, higher than what was observed in PNSS women nationally (28.3%) in 2011.

Prevalence of Third Trimester Anemia



- The overall prevalence of third trimester anemia in 2011 was 34.1% in MA PNSS and 33.8% in the national PNSS.

- In 2011, third trimester anemia varied by race and ethnicity both in MA and national PNSS. Specifically, Black non-Hispanic women had the highest prevalence of third trimester anemia (43.1%), while White non-Hispanic women had the lowest prevalence (29.2%) in the 2011 MA PNSS. Anemia prevalence in other races was 37.1% in Hispanic and there was insufficient data for American Indian, Asian and multiple race women.

- In the 2011 national PNSS, Black non-Hispanic women had the highest prevalence of third trimester anemia (49.5%), followed by American Indian women (33.6%). Multiple race (31.3%), Hispanic (30.8%), Asian (29.7%) and White non-Hispanic women (27.0%) had the lowest prevalence.

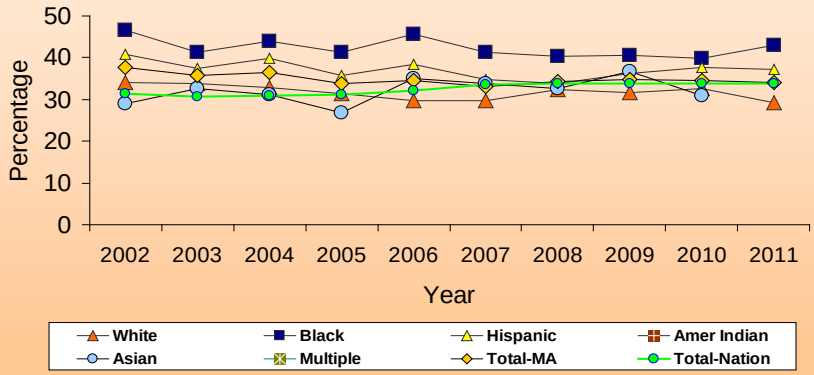
- It should be noted that these anemia results are based on data from low-income, diverse and disadvantaged women participating in the WIC program and should therefore be interpreted with caution as they do not reflect the overall picture in the state of Massachusetts as a whole.

- Healthy People 2020 Objectives propose reducing the prevalence of third trimester anemia among low income pregnant females to no more than 20% (US-DHHS, 2000). In 2011, the prevalence of third trimester anemia

did not meet the HP-2020 target of 20% in any ethnicity both in MA PNSS and national PNSS. More work needs to be done to reduce anemia in these population groups by laying emphasis on prenatal nutrition, iron supplementation and outreach health programs.

Trends in Prevalence of Third Trimester Anemia

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



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

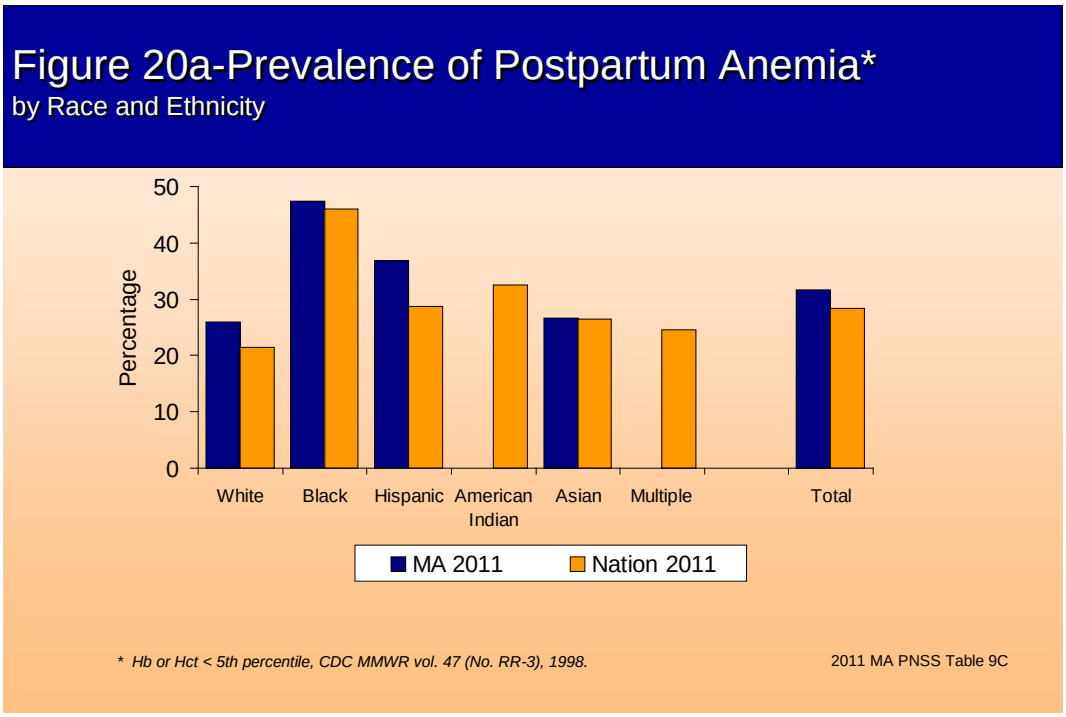
2011 MA PNSS Table 20C

- The overall prevalence of third trimester anemia in MA PNSS mothers has declined slightly in the past ten years (from 37.6% in 2002 to 34.1% in 2011) and is slightly higher than overall prevalence in the national trends in the same period (from 31.3% in 2002 to 33.8% in 2011).

- Among Black non-Hispanic women, the prevalence of third trimester anemia has been consistently higher than among women from other races in MA PNSS. Over the past ten years, the prevalence of third trimester anemia among Black non-Hispanic women decreased slightly (from 46.6% in 2002 to 43.1% in 2011).

- The MA PNSS during the past ten years has not met the HP 2020 target of 20% prevalence of third trimester anemia in any race/ethnicity category. More work needs to be done to lower the prevalence of third trimester anemia in MA PNSS to the HP 2020 target or lower.

Prevalence of Postpartum Anemia

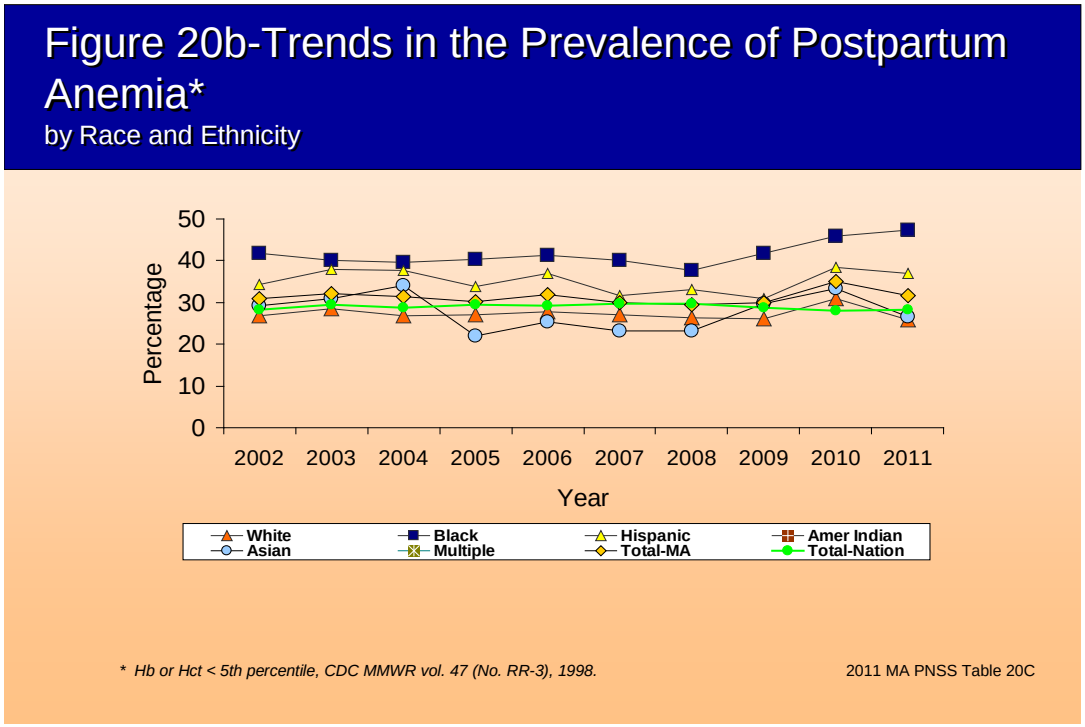


- Overall, 31.7% of women in 2011 MA PNSS had postpartum anemia, higher than the finding in the national PNSS dataset (28.3%).

- In MA PNSS, Black non-Hispanic women had the highest prevalence of postpartum anemia (47.4%) followed by Hispanic women (36.9%) and Asian/Pacific Islander women (26.6%). White non-Hispanic women (25.9%) had the lowest prevalence of postpartum anemia. Insufficient data were available for American Indian women.

- In the 2011 national PNSS data, Black non-Hispanic women had the highest prevalence of postpartum anemia (46.1%), followed by American Indian (32.6%), Hispanic (28.7%), Asian, (26.5%), and multiple race women (24.6%). White non-Hispanic women (21.5%) had the lowest prevalence of postpartum anemia.

.Trends in the Prevalence of Postpartum Anemia

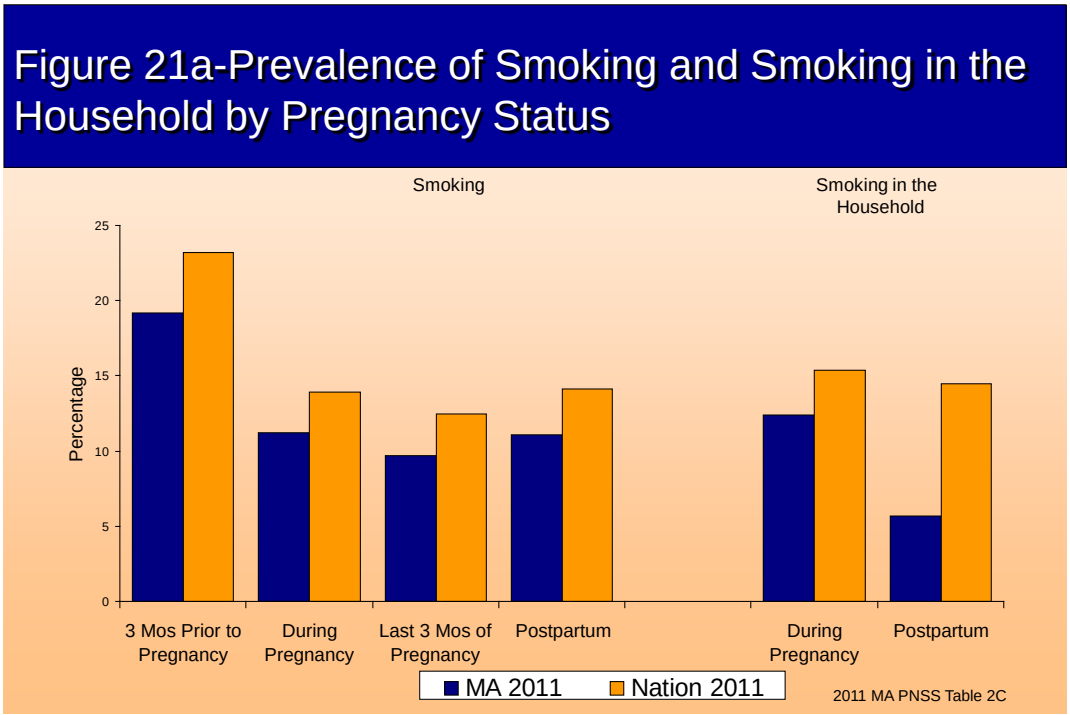


- The overall prevalence of postpartum anemia in MA PNSS mothers has increased in the past ten years (from 30.8% in 2002 to 31.7% in 2011).

- The prevalence of postpartum anemia differed by race and ethnicity, with Black non-Hispanic women having a higher prevalence (41.8%) in 2002 than Hispanic (34.3%), Asian (29.3%) or White non-Hispanic (26.9%). The trend is similar after ten years in 2011, where Black non-Hispanic women (47.4%) have a higher prevalence of postpartum anemia than Hispanic (36.9%), Asian (26.6%) and White non-Hispanic (25.9%) women.

- The prevalence of postpartum anemia has been consistently higher among Black non-Hispanic women than among women from other races at both state and national levels. Over the past ten years, the percentage of postpartum anemia in MA PNSS among Black non-Hispanic women increased slightly (from 41.8% in 2002 to 47.4% in 2011). Similarly, between 2002 and 2011, the percentage of postpartum anemia in national PNSS among Black non-Hispanic women increased slightly (from 43.6% in 2002 to 46.1% in 2011).

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 to passive smoking for children less than two years of age has been associated with higher incidence of sudden infant death syndrome (SIDS), respiratory infection and 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 increased 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 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).

- In 2011, nearly one-fifth (19.2%) of MA PNSS participants reported smoking during the three months prior to pregnancy. Smoking prevalence decreased during pregnancy to 11.2% and was reported at even lower rates for the last trimester (9.7%). Smoking prevalence increased slightly during the postpartum period to 11.1%.

- About twelve percent (12.4%) 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 (5.7%) during the postpartum period.

- The percentage of women who reported maternal smoking during pregnancy was lower in MA PNSS (11.2%) than in national PNSS (13.9%). Similarly, the percentage of women who reported maternal smoking after pregnancy was also lower in MA PNSS women (11.1%) than in national PNSS (14.1%).

- The percentage of women who reported household smoking during pregnancy was lower in MA PNSS (12.4%) than in national PNSS (15.4%). The percentage of women who reported household smoking after pregnancy was also lower in MA PNSS women (5.7%) than in their counterparts in the national PNSS (14.5%).

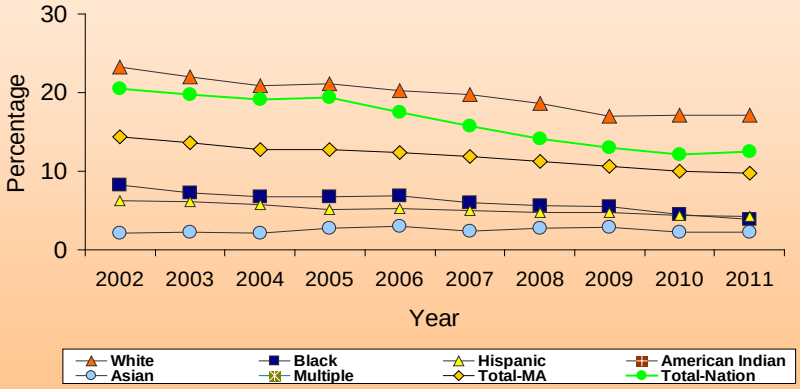
- The HP 2020 target is to decrease prevalence of cigarette smoking prior to pregnancy to 14.6%. Neither MA PNSS women (19.2%) nor their national counterparts (23.2%) in 2011 reduced prevalence of pre-pregnancy cigarette smoking to the target level of 14.6% and did not meet this HP 2020 target; therefore, more intervention work needs to be done.

- Similarly, the HP 2020 target is to decrease prevalence of cigarette smoking during pregnancy to 1.4%. Neither MA PNSS women (11.2%) nor their national counterparts (13.9%) in 2011 reduced prevalence of cigarette smoking during pregnancy to the target level of 1.4% and did not meet the HP 2020 target; therefore, more intervention work needs to be done.

Trends in Prevalence of Maternal Smoking

Figure 21b-Trends in Prevalence of Smoking during the Last Three Months of Pregnancy

by Race and Ethnicity



2011 MA PNSS Table 22C

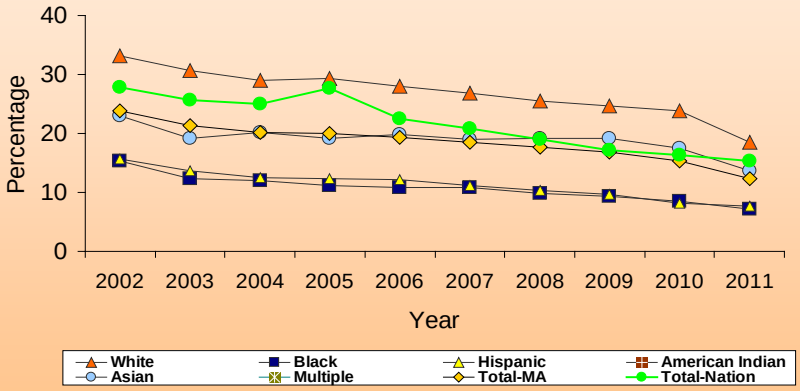
- The overall prevalence of third trimester smoking in MA PNSS mothers has declined in the past ten years (from 14.4% in 2002 to 9.7% in 2011).

- The prevalence of maternal smoking in the last 3 months of pregnancy differed by race and ethnicity in 2011 MA PNSS, with White non-Hispanic mothers having a higher prevalence (17.1%) of smoking than Black non-Hispanic (3.9%), Hispanic (4.3%) and Asian (2.2%) mothers.

- 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 23.3% in 2002 to 17.1% in 2011).

Trends in the Prevalence of Household Smoking

Figure 21c-Trends in the Prevalence of Smoking in the Household* **During Pregnancy** by Race and Ethnicity



* *During the prenatal period.*

2011 MA PNSS Table 22C

- The overall prevalence of household smoking in MA PNSS has declined in the past ten years (from 23.9% in 2002 to 12.4% in 2011).

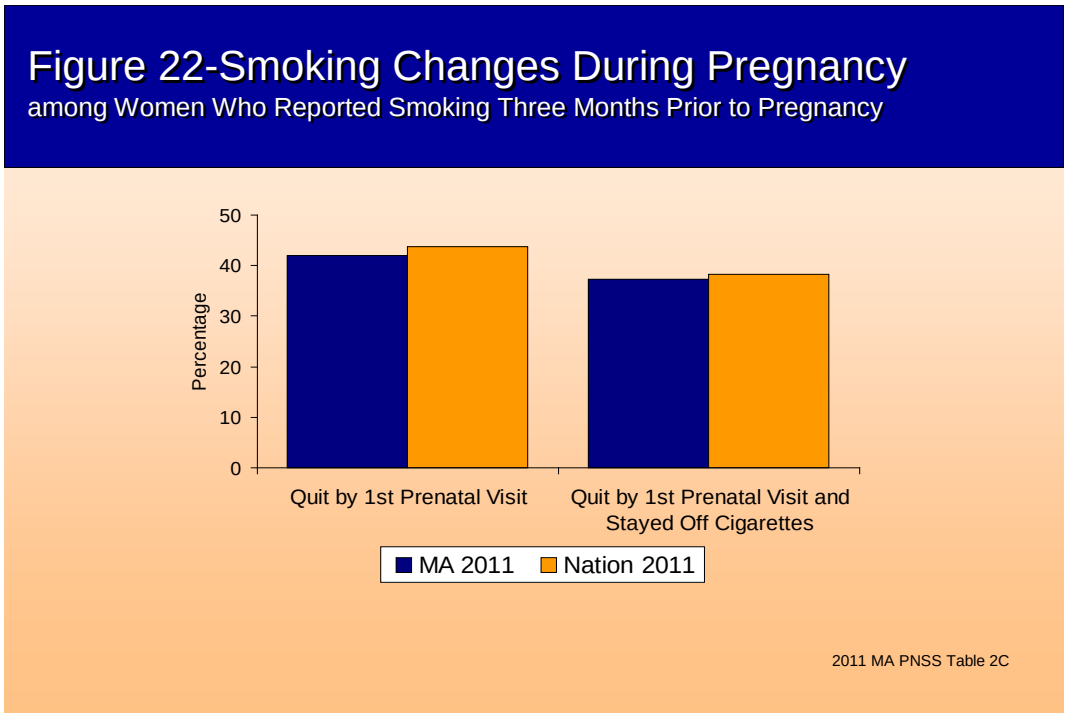
- In 2011, the prevalence of household smoking was lower in MA PNSS (12.4%) than in national PNSS (15.4%).

- The prevalence of household smoking during pregnancy differed by race and ethnicity in MA PNSS, with White non-Hispanic households having a higher prevalence (18.5%) in 2011 than Asian (13.6%), Hispanic (7.7%) and Black non-Hispanic (7.1%) households. A similar observation was made in the national PNSS where White non-Hispanic had higher prevalence (24.0%) of household smoking compared to overall national PNSS average (15.4%).

- Among White non-Hispanic households in MA PNSS, the prevalence of household smoking has been consistently higher than among households from other races but has decreased over the past ten years (from 33.2% in 2002 to 18.5% in 2011).

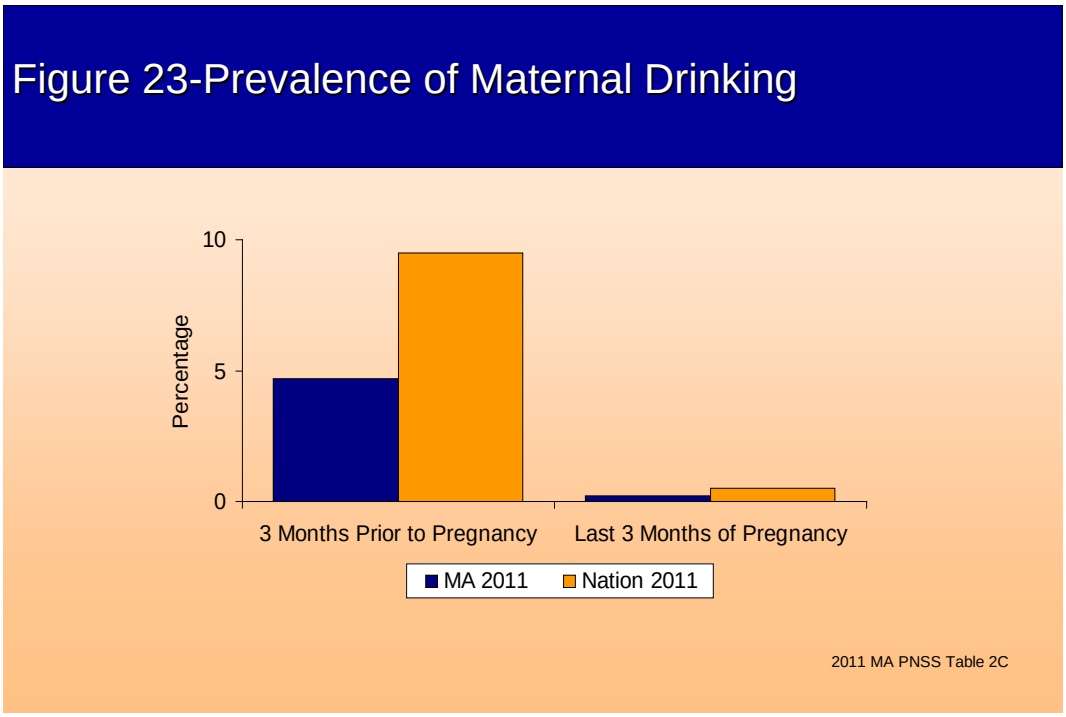
- The overall prevalence of household smoking in Asian households has also declined in the past ten years (from 23.0% in 2002 to 13.6% in 2011); but, when compared to the state average, the rate of household smoking among Asian women in 2011 is still higher.

Maternal Smoking Changes during Pregnancy



- In 2011, almost forty-two percent (41.9%) of MA PNSS women who reported smoking prior to pregnancy had quit smoking by the first prenatal visit.
- Among the national PNSS women, over forty-three percent (43.7%) of those who reported smoking prior to pregnancy had quit smoking by the first prenatal visit.
- Over thirty-seven percent (37.3%) of MA PNSS women who reported smoking prior to pregnancy had quit smoking by the first prenatal visit and reported remaining smoke-free throughout the data collection period.
- In the national PNSS women, about thirty-eight percent (38.2%) of the pre-pregnancy smokers had quit smoking and reported remaining smoke-free throughout the data collection period.
-

Prevalence of Maternal Drinking



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, the recommendation is abstinence from drinking.

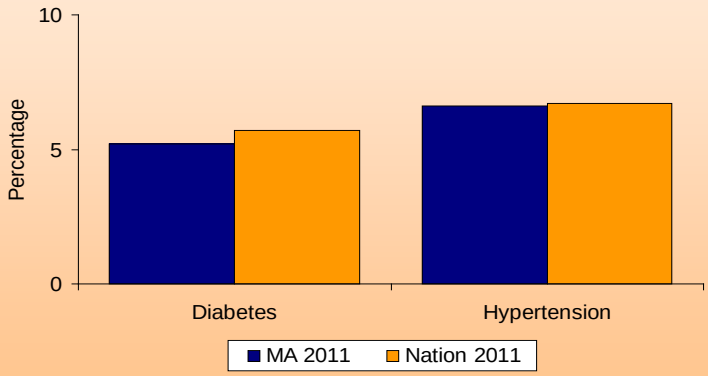
- Over four percent (4.7%) of women in 2011 MA PNSS reported drinking some alcohol in the three months prior to pregnancy, compared to 9.5% of women in 2011 national PNSS.

- In 2011 MA PNSS, 0.2% of women reported drinking alcohol in the last 3 months of pregnancy compared to 0.5% of women in the 2011 national PNSS.

- The HP 2020 target is to decrease prevalence of alcohol drinking prior to pregnancy to 43.6%. Both MA PNSS women (4.7%) and their national counterparts (9.5%) in 2011 reduced prevalence of pre-pregnancy drinking well below the target level of 43.6% and thus did meet this HP 2020 target.
-
-

Prevalence of Medical Conditions during Pregnancy

Figure 24a-Prevalence of Medical Conditions During Pregnancy*

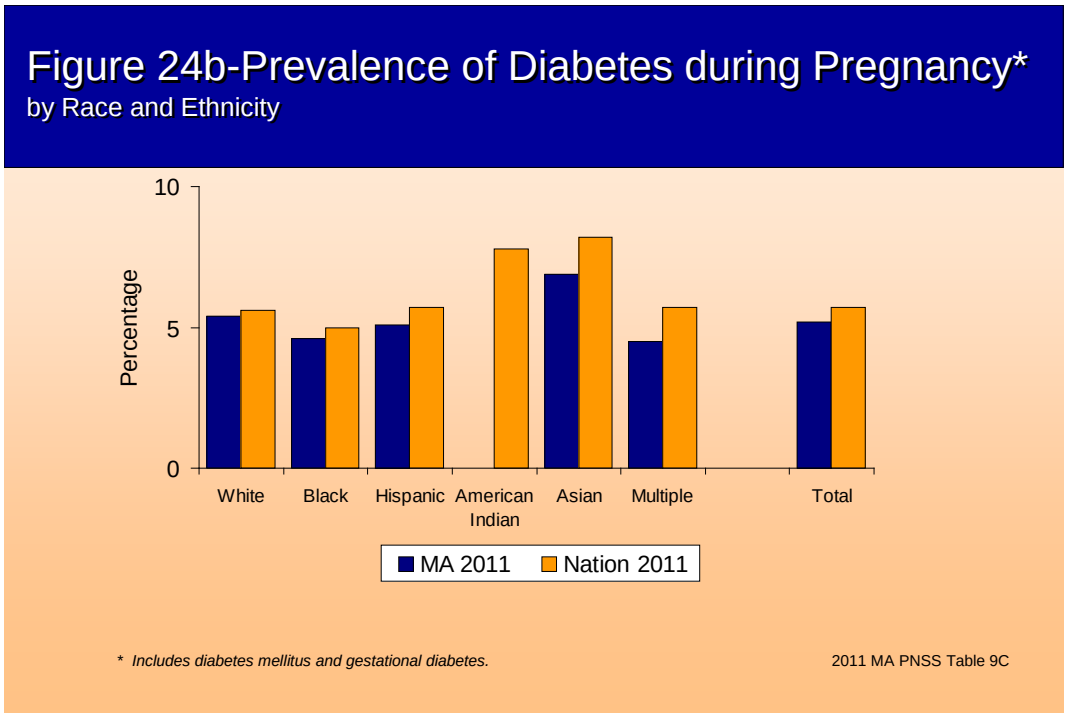


* *Woman reports being told by doctor she had diabetes prior to and/or during pregnancy.*
Woman reports being told by doctor she had hypertension prior to and/or during pregnancy.

2011 MA PNSS Tables 2C

- Over five percent (5.2%) of women in 2011 MA PNSS reported having diabetes during pregnancy compared to 5.7% of women in national PNSS.
- In 2011 MA PNSS, 6.6% of women reported having hypertension during pregnancy compared to 6.7% of women in the 2011 national PNSS.

Prevalence of Diabetes during Pregnancy



- Overall, 5.2% of women in 2011 MA PNSS had diabetes during pregnancy, a slightly lower prevalence than the finding in the national PNSS dataset (5.7%).

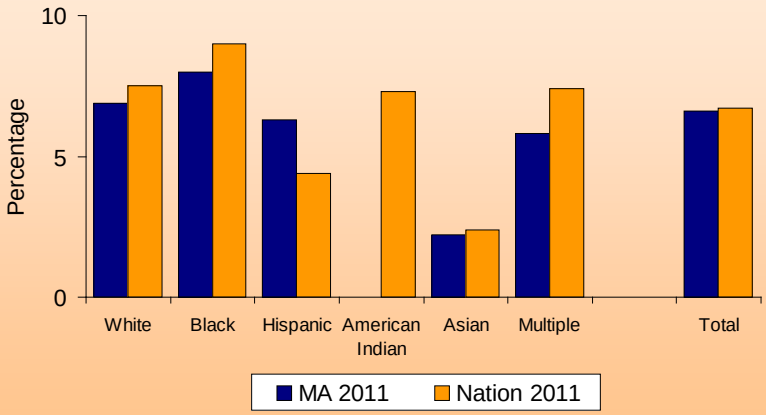
- In MA PNSS, multiple race women (4.5%) had the lowest prevalence of diabetes during pregnancy followed by Black non-Hispanic (4.6%) and Hispanic women (5.1%), and White non-Hispanic (5.4%) while Asian women (6.9%) had the highest prevalence of diabetes during pregnancy. Insufficient data were available for American Indian women.

- In the 2011 national PNSS data, Asian women (8.2%), followed by American Indian (7.8%) women had the highest prevalence of diabetes during pregnancy. Black non-Hispanic women had the lowest prevalence of diabetes during pregnancy (5.0%), followed by White non-Hispanic (5.6%), Hispanic (5.7%) and multiple race women (5.7%).

Prevalence of Hypertension during Pregnancy

Figure 24c-Prevalence of Hypertension during Pregnancy*

by Race and Ethnicity



* *Includes chronic hypertension and pregnancy-induced hypertension.*

2011 MA PNSS Table 9C

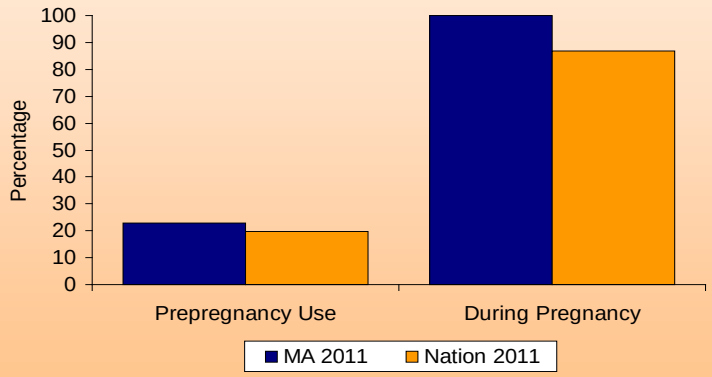
- Overall, 6.6% of women in 2011 MA PNSS had hypertension during pregnancy, a similar prevalence compared to the finding in the national PNSS dataset (6.7%).

- In MA PNSS, Asian women (2.2%) had the lowest prevalence of hypertension during pregnancy followed by multiple race (5.8%), Hispanic (6.3%) and White non-Hispanic (6.9%) women. Black non-Hispanic women (8.0%) had the highest prevalence hypertension during pregnancy. Insufficient data were available for American Indian women.

- Similarly in the 2011 national PNSS data, Asian women (2.4%) and Hispanic women (4.4%) had the lowest prevalence of hypertension during pregnancy. Black non-Hispanic (9.0%) women had the highest prevalence of hypertension during pregnancy, followed by White non-Hispanic (7.5%), multiple race (7.4%), and American Indian (7.3%) women.

Prevalence of Multivitamin Use Prior to and During Pregnancy

Figure 25a-Prevalence of Multivitamin Use Prior to and during Pregnancy*

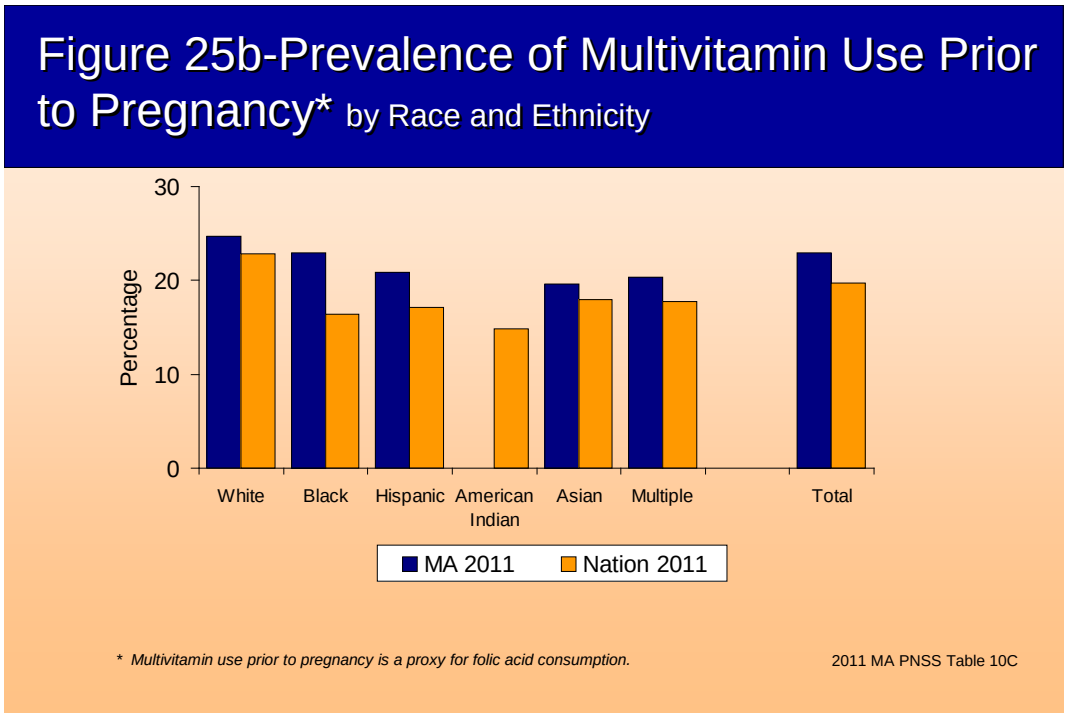


* *Multivitamin use prior to pregnancy is a proxy for folic acid consumption. Multivitamin use during pregnancy is a proxy for iron consumption.*

2011 MA PNSS Tables 2C

- Almost twenty-three percent (22.9%) of women in 2011 MA PNSS reported having used multivitamins prior to pregnancy, compared to 19.7% of women in national PNSS.
- In 2011 MA PNSS, 100% of women reported having used multivitamins during pregnancy compared to 86.8% of women in the 2011 national PNSS.

Prevalence of Multivitamin Use Prior to Pregnancy



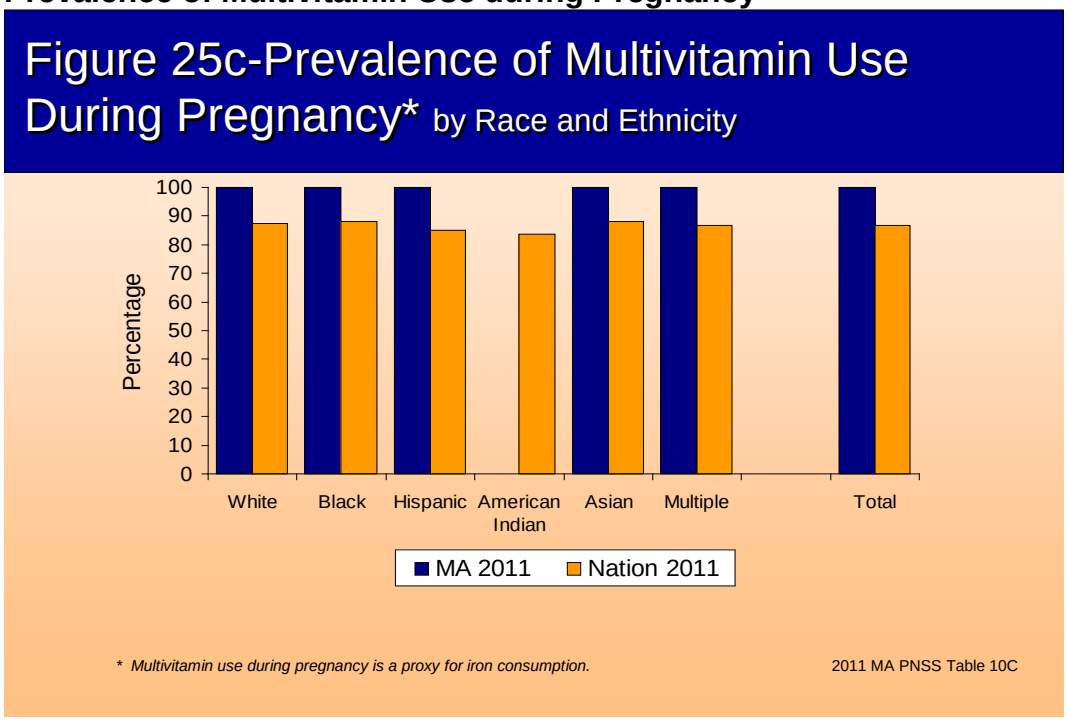
- Overall, 22.9% of women in 2011 MA PNSS used multivitamins prior to pregnancy, a higher prevalence than the finding in the national PNSS dataset (19.7%).

- In MA PNSS, Asian women (19.6%), had the lowest prevalence of multivitamin use prior to pregnancy, followed by multiple race (20.3%), Hispanic (20.9%) and Black non-Hispanic women (22.9%). White non-Hispanic (24.7%) women had the highest prevalence of pre-pregnancy vitamin use. There was insufficient pre-pregnancy vitamin data for American Indian women in MA PNSS.

- In the 2011 national PNSS data, American Indian (14.8%) had the lowest prevalence of multivitamin use prior to pregnancy. White non-Hispanic women (22.8%) had the highest prevalence of multivitamin use prior to pregnancy, followed by Asian (18.0%), multiple race (17.8%), Hispanic (17.1%) and Black non-Hispanic (16.4%) women.

- The HP 2020 target is to increase prevalence of pre-pregnancy use of multivitamin/folic acid to 33.1%. Neither MA PNSS women (22.9%) nor their national counterparts (19.7%) in 2011 met the HP 2020 target of 33.1% for pre-pregnancy multivitamin use; therefore more intervention work needs to be done.

Prevalence of Multivitamin Use during Pregnancy



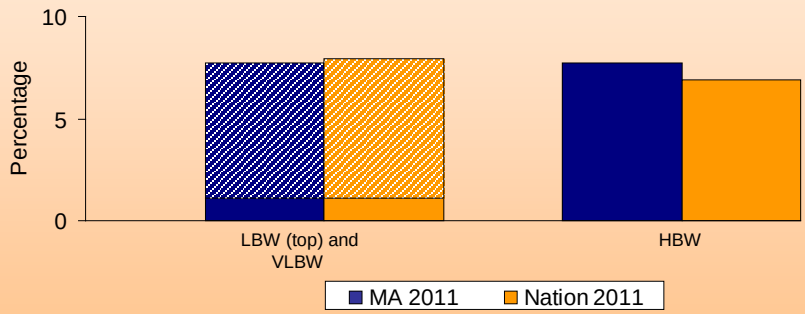
- Overall, 100% of women in 2011 MA PNSS had used multivitamins during pregnancy, a much higher prevalence than the finding in the national PNSS dataset (86.8%).

- In MA PNSS, all race and ethnicity groups had 100% prevalence of multivitamin use during pregnancy. Insufficient data were available for American Indian women with regards to multivitamin use.

- However in the 2011 national PNSS data, Black non-Hispanic women (88.0%) and Asian women (88.0%) had the highest prevalence of multivitamin use during pregnancy, followed by White non-Hispanic women (87.5%), multiple race (86.6%), Hispanic (85.1%) and American Indian (83.6%) women.

Low Birth Weight and High Birth Weight

Figure 26-Prevalence of Low Birth Weight and High Birth Weight *



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

2011 MA PNSS Table 2C

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 and 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 2020 target is to decrease the prevalence of VLBW to less than 1.4% and to decrease the prevalence of LBW to less than 7.8%.

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 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.

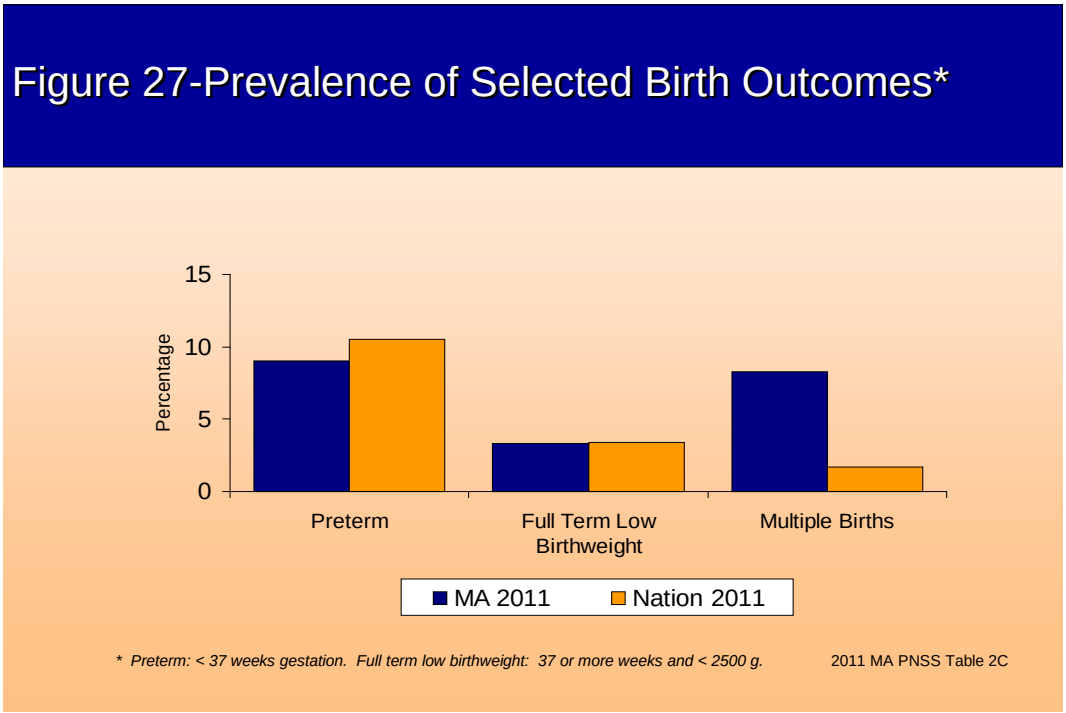
- The overall prevalence of LBW among infants born in 2011 to MA PNSS mothers was 6.6% while the overall LBW prevalence in the national PNSS infants was 6.8%.

- The overall prevalence of VLBW in the MA PNSS infants (1.1%) was similar to that in the national PNSS (1.1%) in 2011.

- Nearly eight percent (7.7%) of women in 2011 MA PNSS delivered HBW infants compared to about seven percent (6.9%) of women in the 2011 national PNSS dataset.

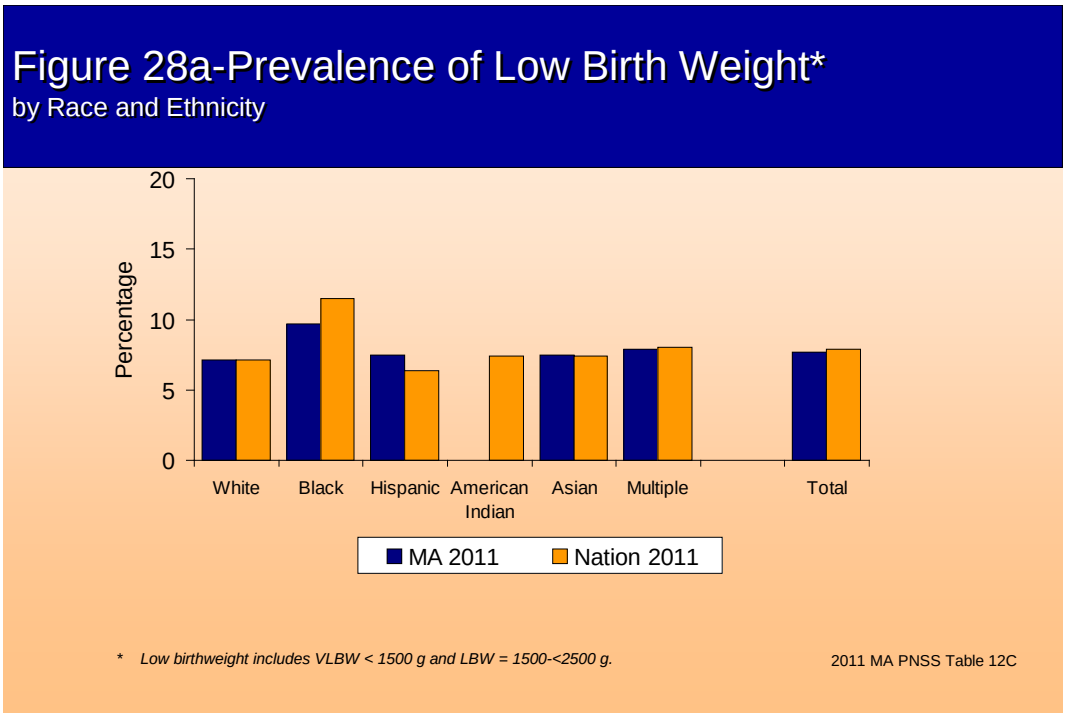
- The HP 2020 target is to reduce prevalence of VLBW to 1.4% or lower. Both MA PNSS women (1.1%) and their national counterparts (1.1%) in 2011 met the HP 2020 target of 1.4% or lower for VLBW.

Prevalence of Selected Birth Outcomes



- Nine percent (9.0%) of 2011 MA PNSS women delivered pre-term infants, a slightly lower proportion than the 2011 national group (10.5%).
- Three percent (3.3%) of full-term infants were LBW in 2011 MA PNSS compared to 3.4% in national PNSS.
- The MA PNSS rate of multiple births (8.3%) was more than four times as high as the rate in the national PNSS (1.7%).

Prevalence of Low Birth Weight



- Black non-Hispanic infants in the 2011 MA PNSS had the highest prevalence of LBW (9.7%), followed by multiple race (7.9%), Asian (7.5%) and Hispanic (7.5%) infants. White non-Hispanic infants in the 2011 MA PNSS had the lowest prevalence (7.1%) of LBW compared to other race/ethnicities. Insufficient data were available for American Indian infants.

- Black non-Hispanic infants born to mothers in the 2011 MA PNSS had a lower prevalence of LBW (9.7%) than Black non-Hispanic infants in the national PNSS (11.5%). White non-Hispanic infants in MA PNSS (7.1%) had a similar prevalence of LBW compared to the White non-Hispanic infants (7.1%) in the national PNSS.

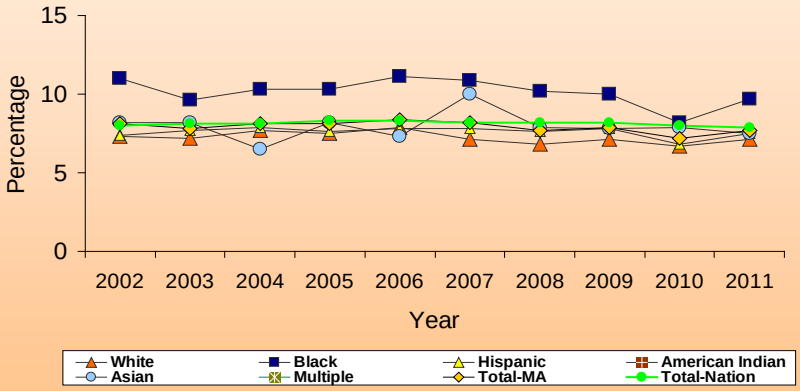
- Asian infants (7.5%) in the 2011 MA PNSS had a similar prevalence of LBW compared to the Asian infants in the national PNSS (7.4%). Hispanic infants in the 2011 MA PNSS had a slightly higher prevalence (7.5%) of LBW than the Hispanic infants in the national PNSS (6.4%).

- Overall, the prevalence of LBW infants is slightly lower in the 2011 MA PNSS (7.7%) than in the national PNSS (7.9%). Both the MA and the national PNSS did meet the HP 2020 target for LBW which requires reduction of LBW to a level of 7.9% or lower. More intervention efforts are still required in those racial/ethnic population groups whose LBW prevalence did not meet the HP target.

Trends in the Prevalence of Low Birth Weight

Figure 28b-Trends in the Prevalence of Low Birth Weight* in Children Born to MA PNSS Moms

by Race and Ethnicity



* < 2500 g.

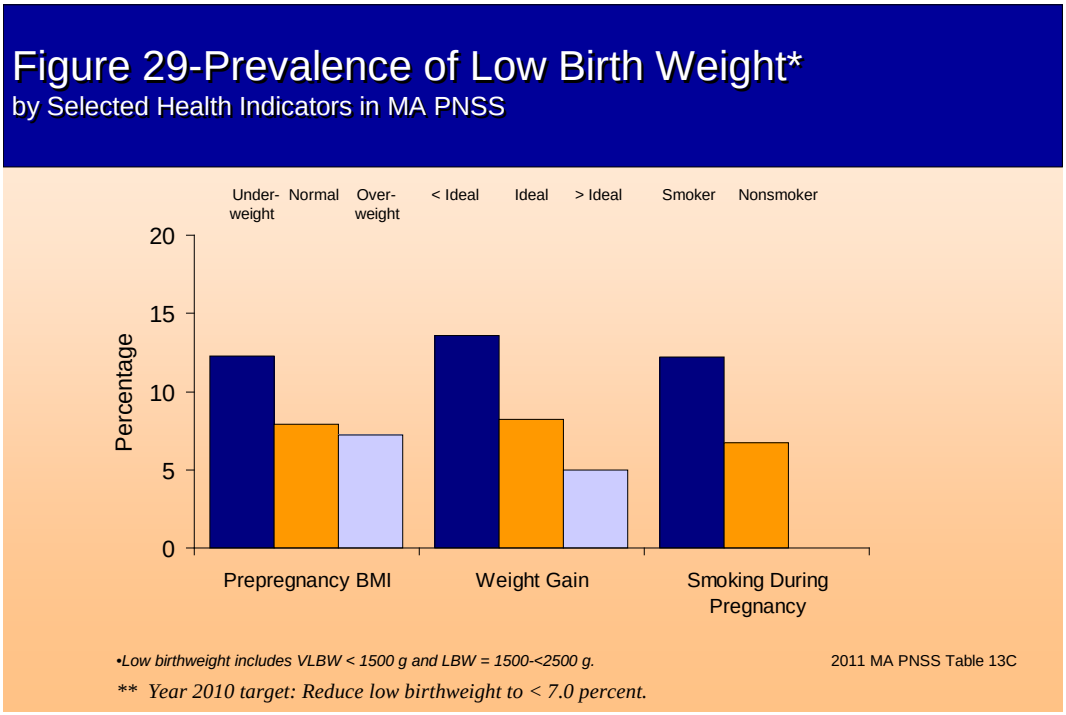
2011 MA PNSS Table 23C

- The overall prevalence of LBW in MA PNSS infants has been fairly steady in the past ten years and showed a small decreasing trend; (LBW prevalence ranged from 8.1% in 2002 to 7.7% in 2011).

- The prevalence of LBW was consistently higher for Black non-Hispanic infants than for White non-Hispanic, Asian, and Hispanic infants from 2002 to 2011. (LBW prevalence for Black non Hispanic mothers ranged from 11.0% in 2002 to 9.7% in 2011).

- The HP 2020 target is to reduce prevalence of LBW to 7.9%. Both MA PNSS women (7.7%) and their national counterparts (7.9%) in 2011 met the HP 2020 target of 7.9% or lower for LBW. Similarly, both MA PNSS (1.1%) and National PNSS (1.1%) also met the HP2020 VLBW target of 1.4% or lower.
-

Prevalence of Low Birth Weight by Selected Health Indicators



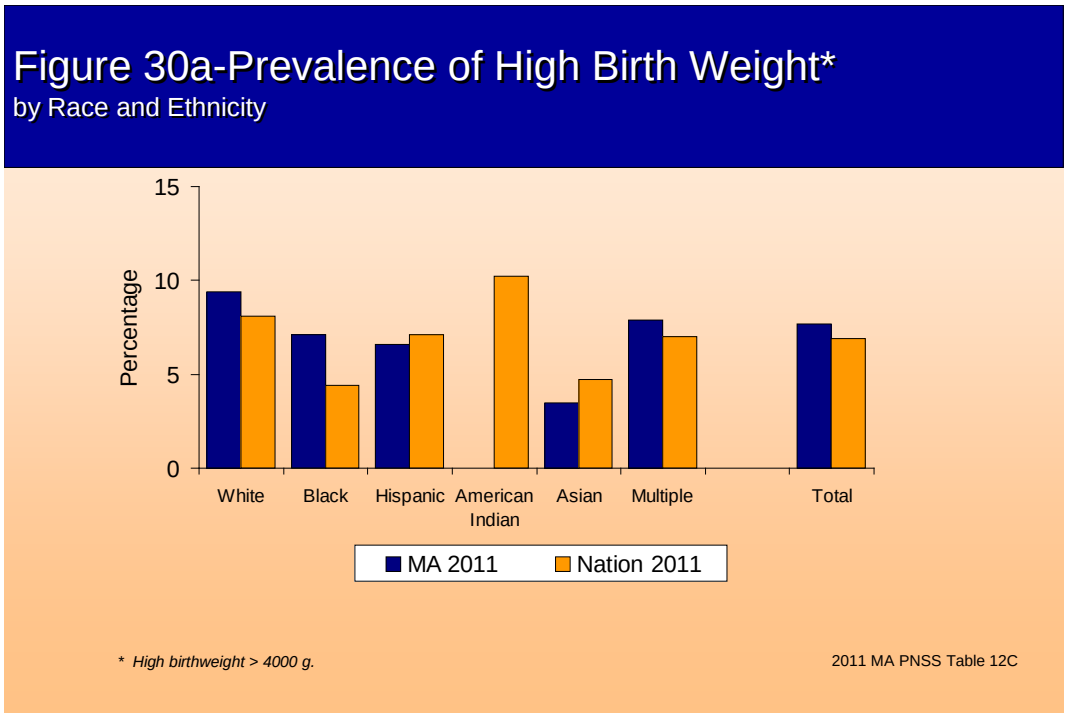
- Low pre-pregnancy BMI or maternal underweight, less than ideal weight gain during pregnancy and maternal smoking during pregnancy were all associated with LBW in infants born to PNSS mothers in Massachusetts.

- Data from the 2011 MA PNSS showed that 12.3% of PNSS women who were underweight prior to pregnancy delivered LBW infants, compared to 7.9% who were normal weight or 7.2% who were overweight prior to pregnancy.

- Similarly, 2011 MA PNSS women who gained less than the ideal amount of weight had LBW prevalence of 13.6% compared to LBW prevalence of 8.2% in women who gained the ideal amount and LBW prevalence of 5.0% for women who gained more than the ideal amount.

- The prevalence of LBW among MA PNSS women who smoked during pregnancy was higher (12.2%) than among non-smokers (6.7%).

High Birth Weight



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).

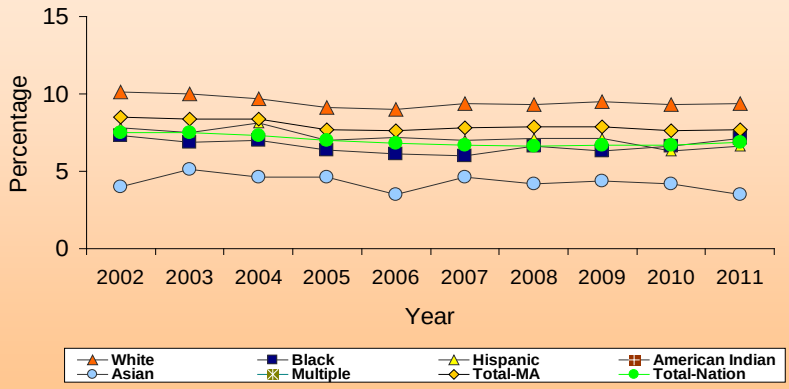
- Overall, in 2011, the prevalence of HBW infants born to MA PNSS women (7.7%) was higher than in the 2011 national PNSS (6.9%).

- High birth weight varied by race and ethnicity in the 2011 MA PNSS population. Specifically, White non-Hispanic women had the highest percentage of HBW (9.4%), followed by multiple race (7.9%), Black non-Hispanic (7.1%) and Hispanic (6.6%) while Asian women had the lowest percentage (3.5%) of HBW infants in MA PNSS. There was insufficient HBW data for American Indian infants.

- In comparison, in the national PNSS dataset, American Indian women had the highest percentage (10.2%) of HBW, followed by White non-Hispanic (8.1%), Hispanic (7.1%), multiple race (7.0%) and Asian (4.7%). Black non-Hispanic women had the lowest percentage (4.4%) of HBW infants.

Trends in the Prevalence of High Birth Weight

Figure 30b-Trends in the Prevalence of High Birth Weight* by Race and Ethnicity



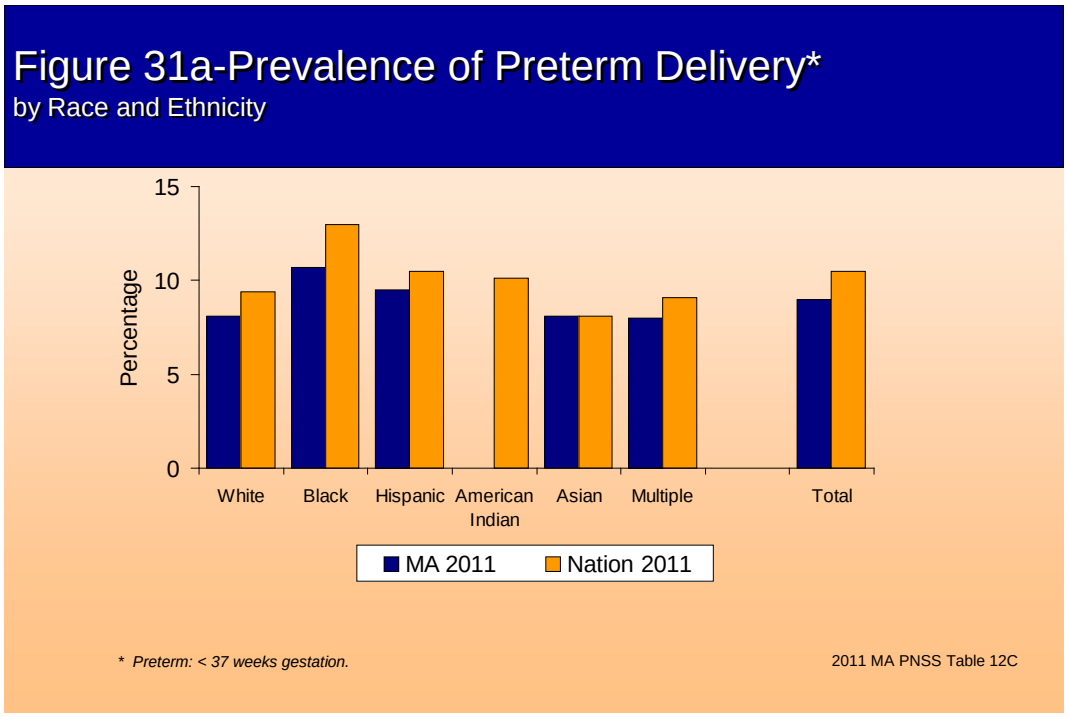
* > 4000 g.

2011 MA PNSS Table 23C

- The overall prevalence of HBW in MA PNSS infants has slightly decreased in the past ten years (ranging from 8.5% in 2002 to 7.7% in 2011).

- The prevalence of HBW was consistently higher for White non-Hispanic infants than for Black non-Hispanic, Hispanic and Asian infants from 2002 to 2011.

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 2010, 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 2020 Objective proposes reducing preterm births to 11.4% or less of the live births.

- The overall prevalence of preterm delivery for the entire MA PNSS population in 2011 was 9.0%, and was lower than the total prevalence for the 2011 national PNSS population (10.5%).

- The prevalence of preterm deliveries in 2011 was highest among Black non-Hispanic women in both MA PNSS (10.7%) and national PNSS (13.0%). The prevalence of preterm deliveries to Hispanic women was 9.5% in MA PNSS and 10.5% in the national PNSS.

- Multiple race (8.0%) women in the MA PNSS dataset had the lowest prevalence of preterm deliveries and were closely followed by White non-Hispanic (8.1%) and Asian (8.1%) women.

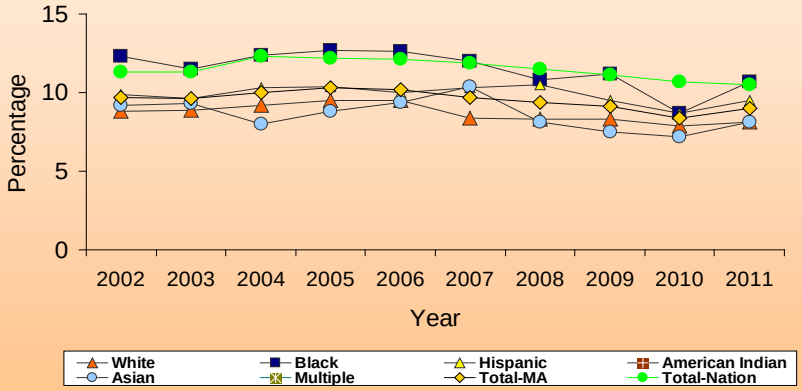
- Asian women in the national PNSS dataset had the lowest percentage of preterm deliveries (8.1%) followed by multiple race women (9.1%).

- The HP 2020 target is to reduce prevalence of total preterm births to 11.4% or lower. Both MA PNSS women (9.0%) and their national counterparts (10.5%) in 2011 met the HP 2020 target of 11.4% or lower for preterm births.

Trends in the Prevalence of Preterm Delivery

Figure 31b-Trends in the Prevalence of Preterm Delivery*

by Race and Ethnicity



* *< 37 weeks gestation.*

2011 MA PNSS Table 23C

- The overall prevalence of preterm delivery by MA PNSS mothers has declined slightly in the past ten years (from 9.7% in 2002 to 9.0% in 2011).

- The prevalence of preterm delivery by MA PNSS mothers during the past ten years (from 2002 to 2011) has consistently met the HP 2020 target of 11.4% in all race/ethnicity categories.

- The prevalence of preterm births differed by race and ethnicity in 2002, with Black non-Hispanic infants having a higher prevalence (12.3%) than Hispanic (9.9%), Asian (9.2%) and White non-Hispanic (8.8%). The trend is similar after ten years in 2011, though with declining rates with Black non-Hispanic infants having a higher prevalence (10.7%) than Hispanic (9.5%), Asian (8.1%) and White non-Hispanic (8.1%).

- Among Black non-Hispanic women, the prevalence of preterm delivery have been consistently high (over 10.0%) compared to overall prevalence for women from other races. Over the past ten years, the percentage of preterm delivery in MA PNSS among Black non-Hispanic women decreased slightly by one and half percentage points (from 12.3% in 2002 to 10.7% in 2011).

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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 new 2009 instead of the old 1990 recommendations of the Institute of Medicine (IOM, 1990; Suitor, 1997 IOM 2009). 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 new pre-pregnancy weight status and the corresponding recommended prenatal weight gain ranges are presented in Table 2a. While Table 2b compares the old and new IOM recommendations after almost 20 years.

Table 2a: 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 2nd and 3rd Trimester (mean range in lbs/wk)
Underweight (BMI <18.5)	28 - 40 pounds	1.0 (1.0-1.3)
Normal weight (BMI 18.5-24.9)	25 - 35 pounds	1.0 (0.8-1.0)
Overweight (BMI 25.0-29.9)	15 - 25 pounds	0.6 (0.5-0.7)
Obese (BMI =or > 30.0) (includes all classes)/sizes e.g. short women, & ethnicities	11-20 pounds	0.5(0.4-0.6)

Table 2b: Comparison of Recommended Prenatal BMI Status as per OLD (1990) vs. NEW (2009) IOM Recommendations For adults and pregnant teenagers (after almost 20 years)

Pre-pregnancy Weight Status	BMI Recommendation OLD IOM (**1990)**	BMI Recommendation **NEW IOM (2009**)
Underweight	<19.8	<18.5
Normal weight	19.8-26.0	18.5-24.9
Overweight	26.1-29.0	25.0-29.9
Obese (includes all classes)	>29.0	= OR > 30.0

Table 2c: Recommended Prenatal Weight Gain by Pre-Pregnancy Weight Status as per old IOM Recommendations (IOM, 1990).

Pre-pregnancy Weight Status	Recommended Prenatal Weight Gain	Rates of weight gain 2nd and 3rd Trimester (mean range in lbs/wk)
Underweight (BMI <18.5)	28 - 40 pounds	1.0 (1.0-1.3)
Normal weight (BMI 18.5-24.9)	25 - 35 pounds	1.0 (0.8-1.0)
Overweight (BMI 25.0-29.9)	15 - 25 pounds	0.6 (0.5-0.7)
Obese (BMI =or > 30.0) (includes all classes).all sizes/ethnicities	At least 15 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:
2011 Participating Local WIC Programs in MA

2011 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

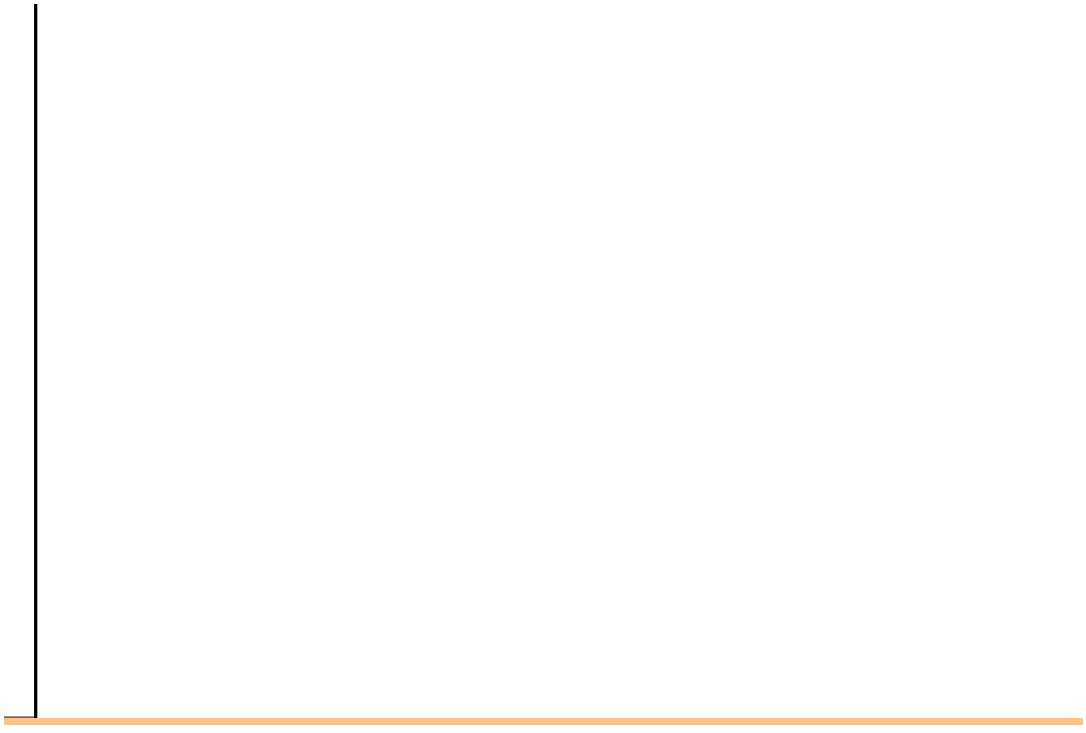
APPENDIX 3:
STATE MAPS OF COUNTY DATA

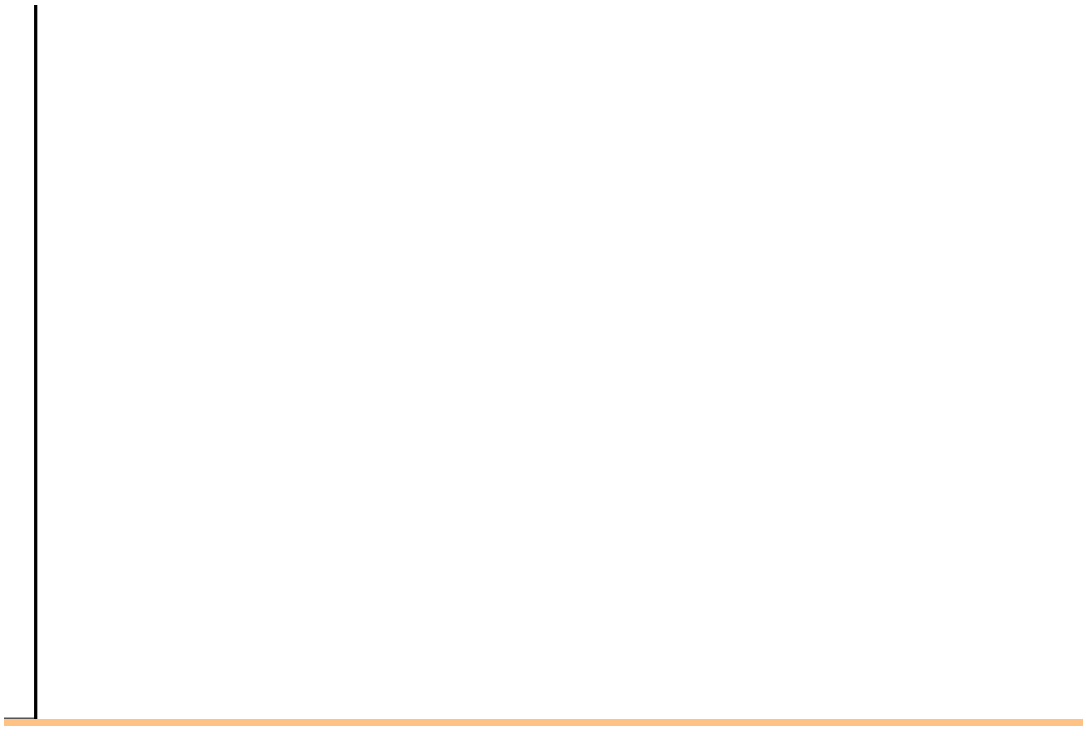
Maps

State Maps of County Data

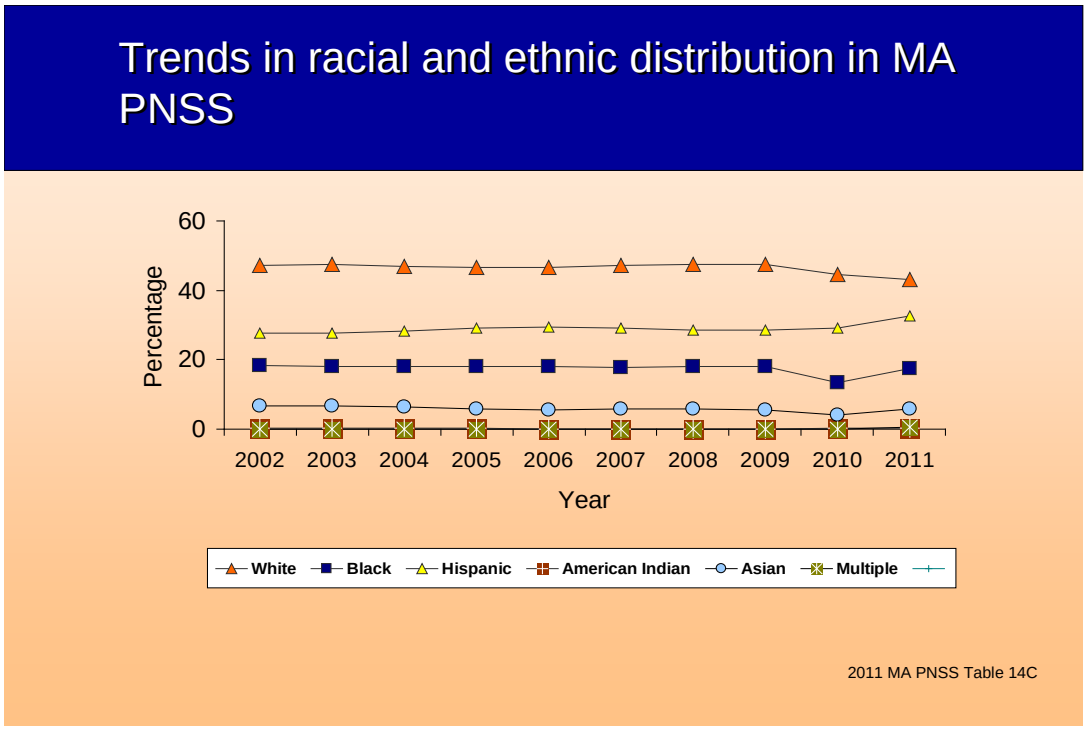
2009-2011

Pregnancy Nutrition
Surveillance System

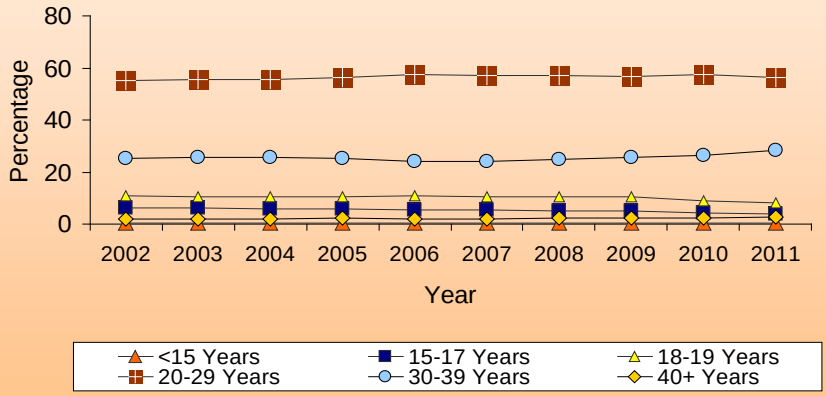




APPENDIX 4:
TREND CHARTS FOR 2011 PNSS

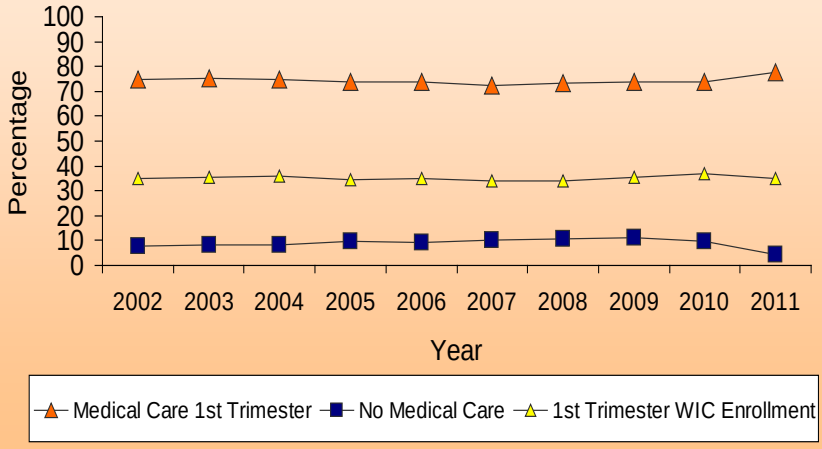


Trends in age distribution in MA PNSS



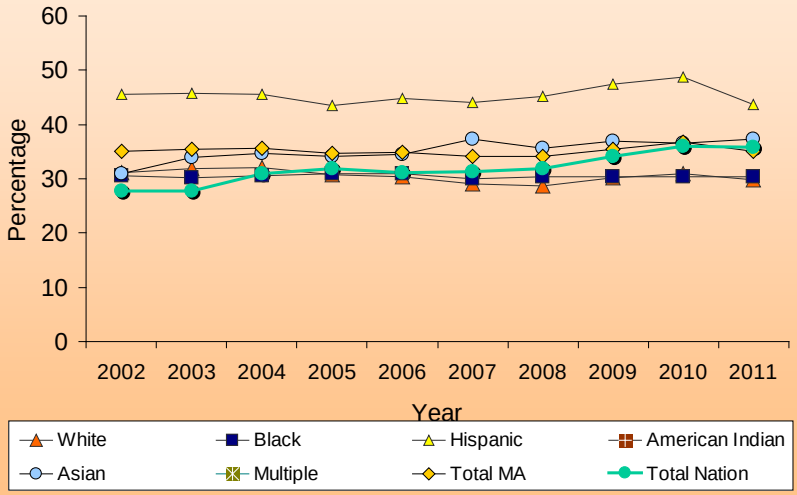
2011 MA PNSS Table 15C

Trends in WIC Enrollment and Medical Care in MA PNSS



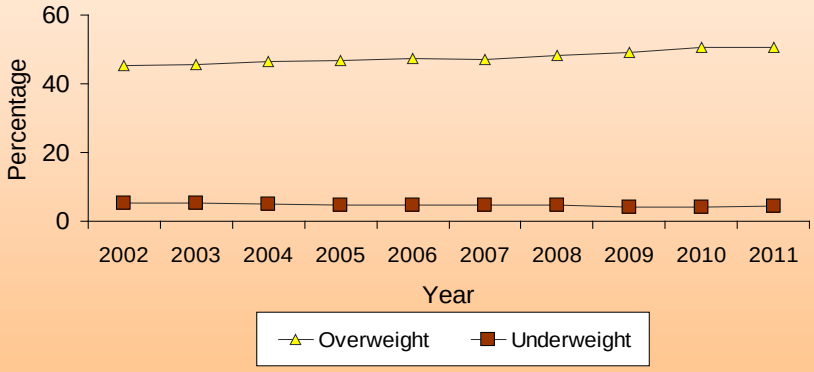
2011 MA PNSS Table 17C

Trends in First Trimester WIC Enrollment
by Race and Ethnicity in MA PNSS



2011 MA PNSS Table 21C

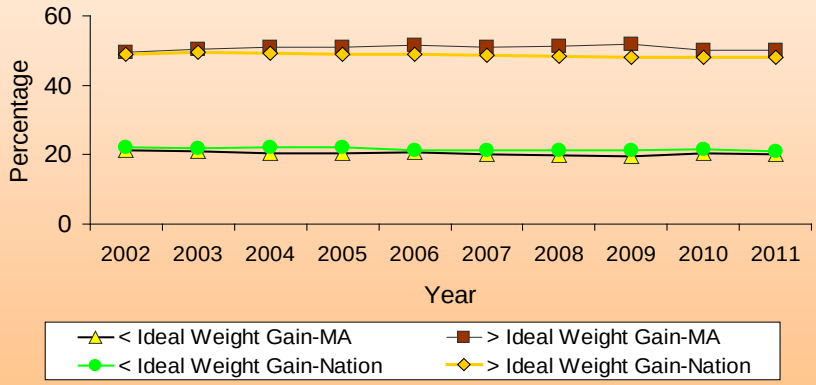
Trends in Prevalence of Prepregnancy Overweight and Underweight* in MA PNSS



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

2011 MA PNSS Table 16C

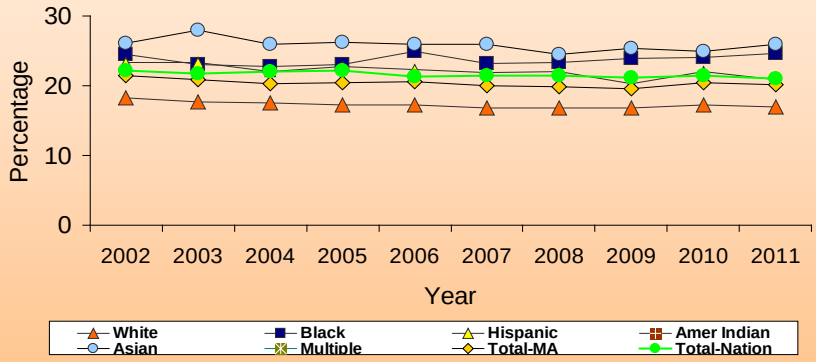
Trends in prevalence of less than ideal and greater than ideal weight gain*



** 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.*

2011 MA PNSS Table 16C

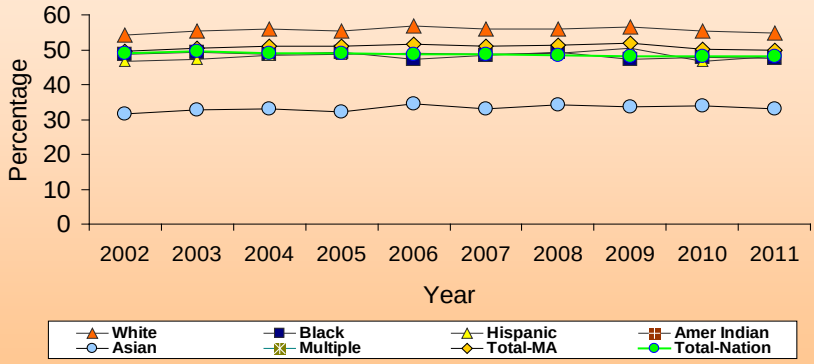
Trends in the prevalence of less than ideal maternal weight gain*
in MA PNSS by race and ethnicity



** 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.*

2011 MA PNSS Table 20C

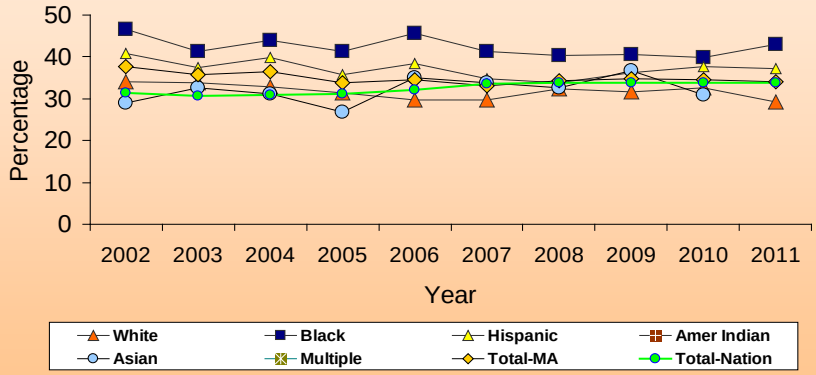
Trends in the Prevalence of Greater than Ideal Maternal Weight Gain* in MA PNSS by race and ethnicity



* *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.*

2011 MA PNSS Table 20C

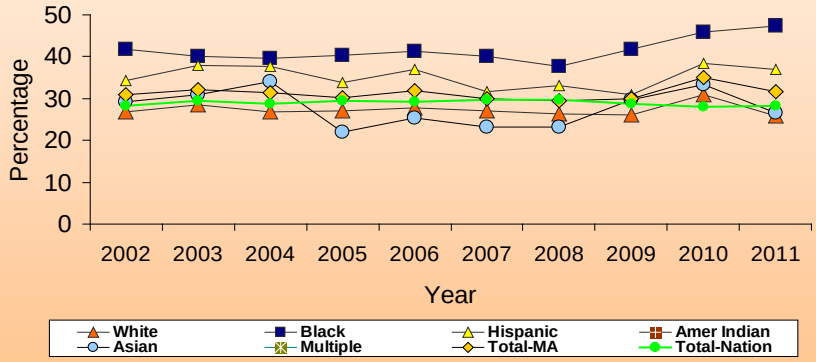
Trends in Prevalence of Third Trimester Anemia* by Race and Ethnicity



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

2011 MA PNSS Table 20C

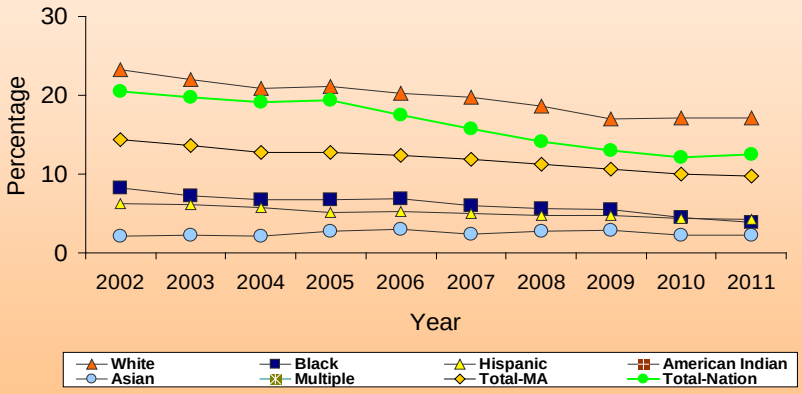
Trends in the Prevalence of Postpartum Anemia*
by Race and Ethnicity



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

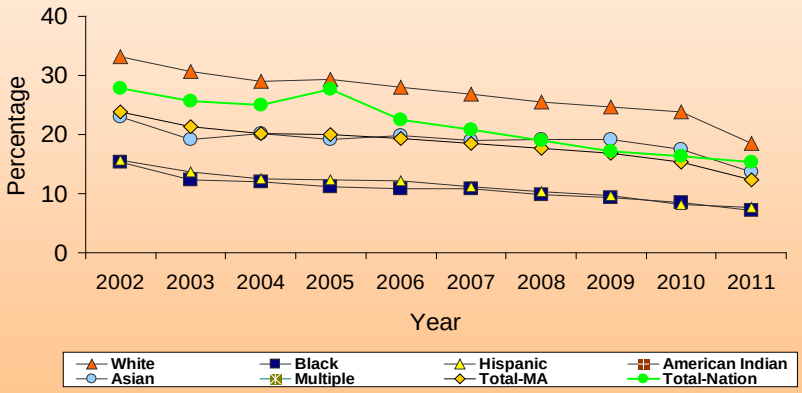
2011 MA PNSS Table 20C

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



2011 MA PNSS Table 22C

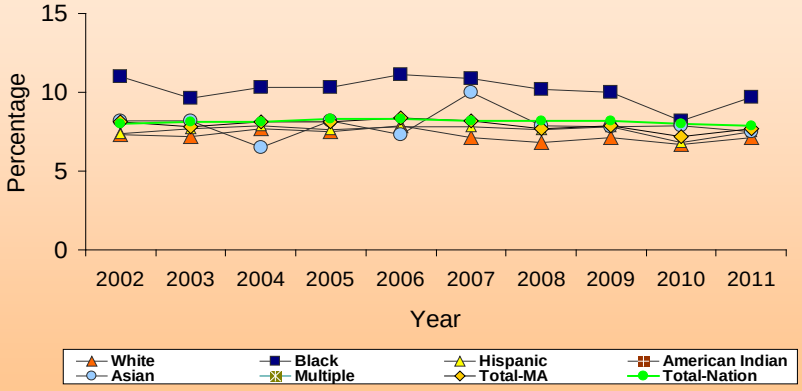
Trends in the Prevalence of Smoking in the Household*
by Race and Ethnicity



* *During the prenatal period.*

2011 MA PNSS Table 22C

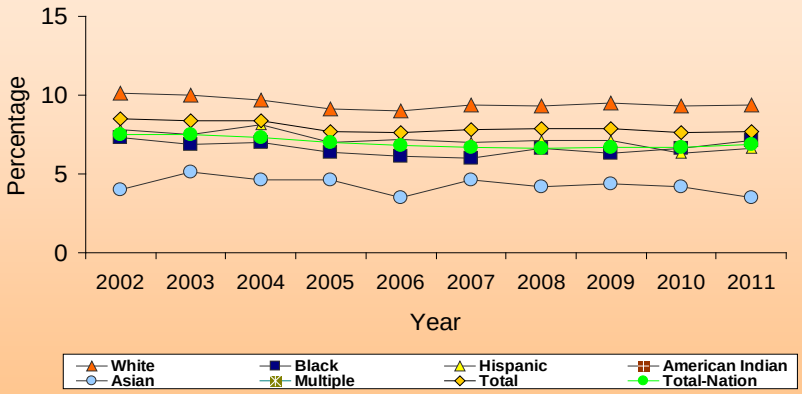
Trends in the Prevalence of Low Birth Weight*
by Race and Ethnicity in MA PNSS



* *< 2500 g.*

2011 MA PNSS Table 23C

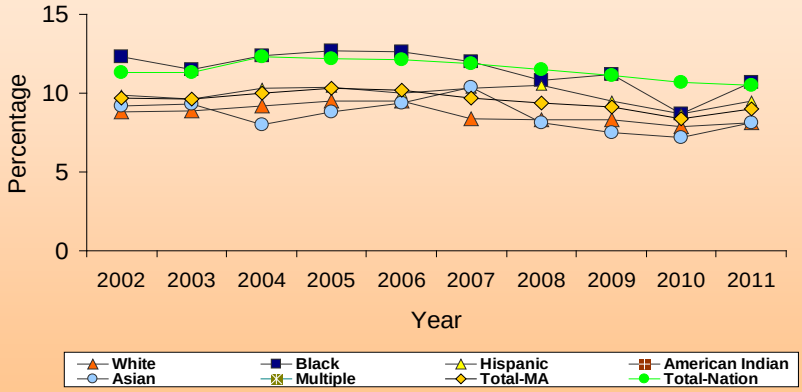
Trends in the prevalence of High Birth Weight*
by Race and Ethnicity



* *> 4000 g.*

2011 MA PNSS Table 23C

Trends in the prevalence of preterm delivery*
by race and ethnicity



* *< 37 weeks gestation.*

2011 MA PNSS Table 23C

MASSACHUSETTS

2011

Pregnancy Nutrition
Surveillance System