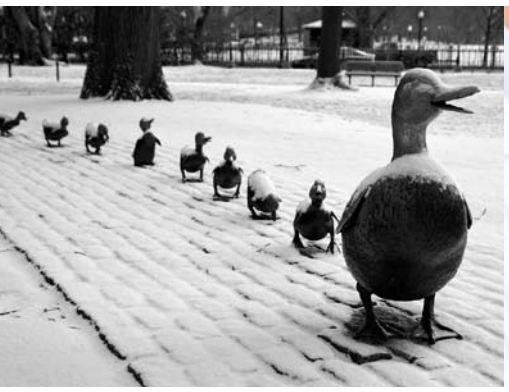


C H A P T E R 5

Natality and Early Childhood

This chapter presents information about the changing demographics of the Massachusetts birth population, maternal and infant health characteristics, and service utilization.

Data on births, fetal deaths, and infant deaths are obtained from records collected by the Registry of Vital Records and Statistics. These data, along with data from statewide maternal and child health programs and surveillance systems, provide information on the health and well-being of mothers, infants and children in the Commonwealth. They are essential for surveillance, research, and informing public health programs, policies, and interventions.

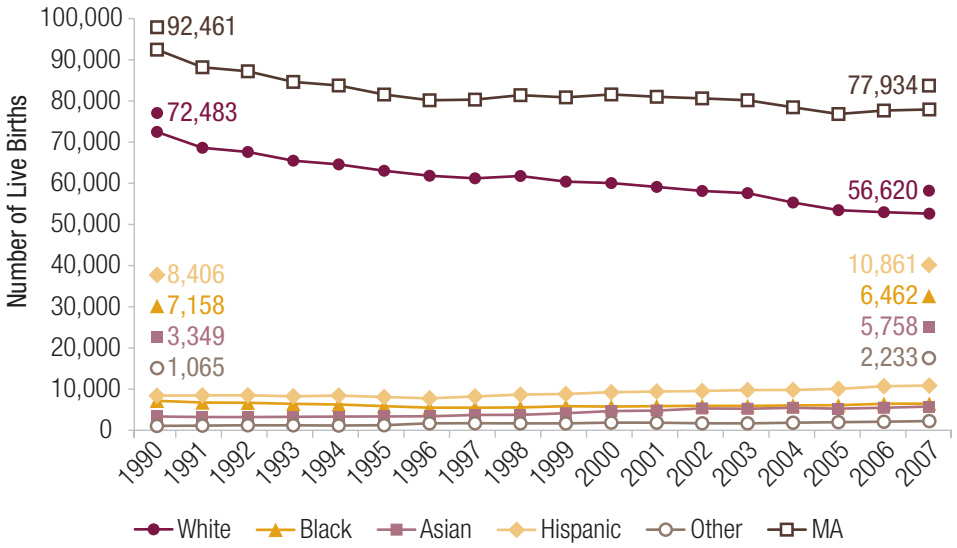
The health outcomes for women, infants and children in Massachusetts compare quite favorably with those of the United States. Massachusetts has infant mortality and teen birth rates that are among the lowest in the country. However, there are certain health indicators that have not seen improvement, and substantial disparities persist in many health outcomes.

Births

Since 1990, the total number of births in Massachusetts has decreased by 16%, and the demographics of the birth population have changed substantially.

In 1990, 22% of births were to non-White mothers. In 2007 this percentage had grown to 32%. The proportion of births to foreign-born mothers

Figure 5.1 **Trends in Births**



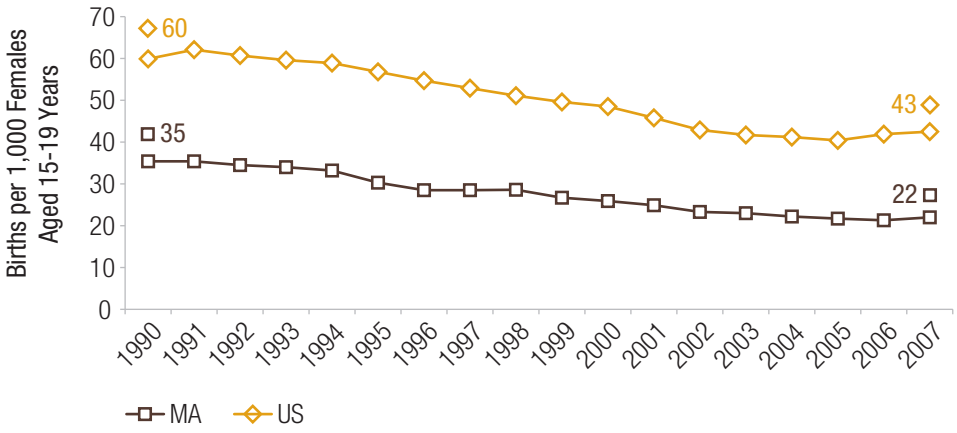
Source: MDPH Birth File, 1990-2007.

has also increased from 15% in 1990 to 27% in 2007. There has also been a marked change in the age of Massachusetts mothers in the past two decades. In 1990, 40% of mothers were over age 30. In 2007, 53% were over age 30.

Teen Births

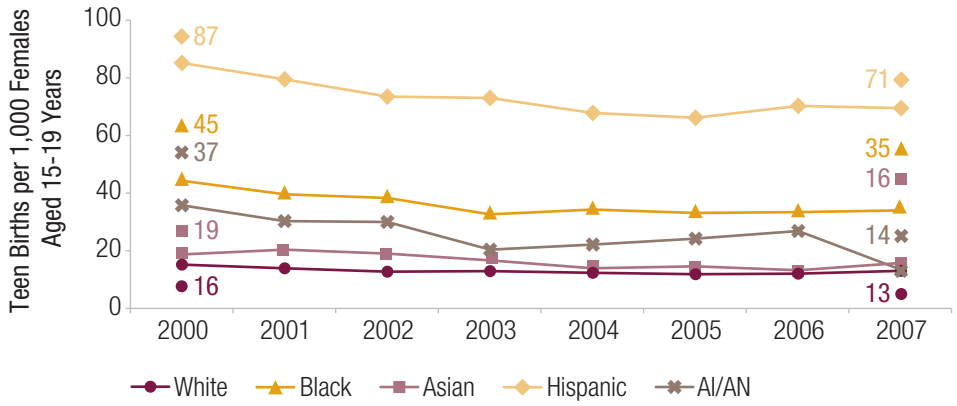
Teen birth is an important public health issue, associated with long-term negative outcomes for both mother and child.

Figure 5.2 **Trends in Rates of Births to Teens Aged 15-19 Years**



Source: MDPH Birth File, 1990-2007.

Figure 5.3 **Trends in Teen Birth Rates**



Source: MDPH Birth File, 2000-2007.

The birth rate among Massachusetts women aged 15-19 years has decreased by 38% since 1990 and has been consistently lower than the national teen birth rate. In 2007, the Massachusetts teen birth rate (22 births per 1,000 women ages 15-19 years) was almost half the U.S. teen birth rate (43).

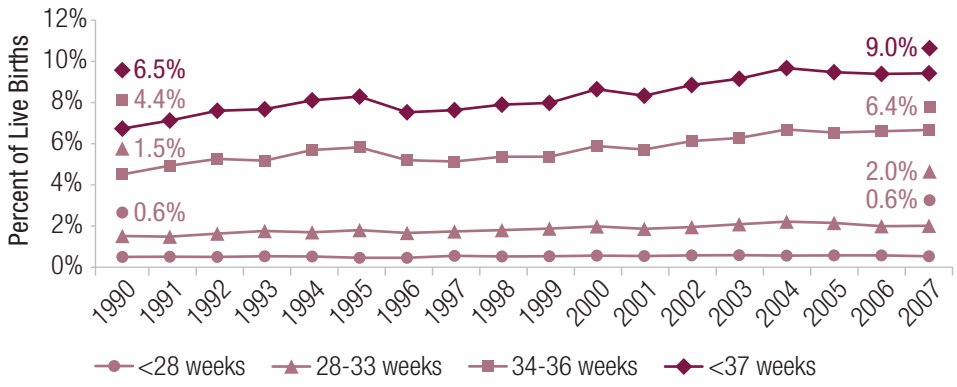
However, although the overall teen birth rate is declining, significant racial and ethnic disparities persist. In 2007, Hispanic and Black women had the highest teen birth rates, while Whites and Asians had significantly lower rates.

Hispanic and Black women had the highest teen birth rates.

Preterm and Low Birthweight Births

Preterm birth (less than 37 weeks gestational age) is a serious health problem and a leading cause of infant deaths. Infants who survive a preterm birth are at increased risk of lifetime health challenges, such as breathing

Figure 5.4 **Trends in Preterm Delivery Rates by Gestational Age**



Source: MDPH Birth File, 1990-2007.

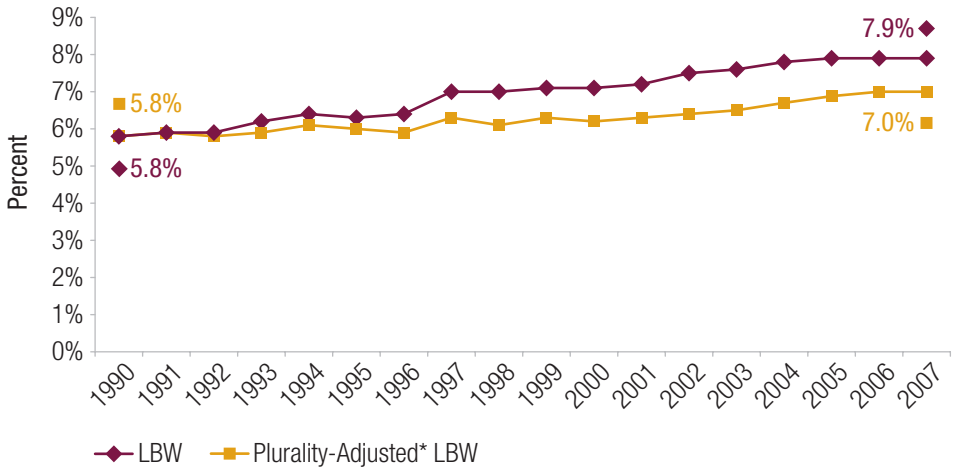
problems, mental retardation and other conditions. Even babies born just a few weeks too soon (34-36 weeks gestation, also known as late preterm birth) have higher rates of death and disability than full-term babies.[1]

The proportion of preterm births has increased 38% since 1990, although this proportion has been stable at 9% over the past three years. More than 70% of all preterm births in 2007 were late preterm births.

Low birthweight infants (LBW, weighing less than 2,500 grams or 5.5 pounds) are at increased risk of medical problems and death compared with infants of normal weight, and are at higher risk of delayed development and poor school achievement later in life.

LBW births have increased substantially since 1990, but have remained stable at 7.9% over the past three years. Much of the long-term increase in LBW is due to an increase in multiple births. Multiple births accounted for 13% of LBW births in 2007.

Figure 5.5 **Trends in Low Birthweight Births**



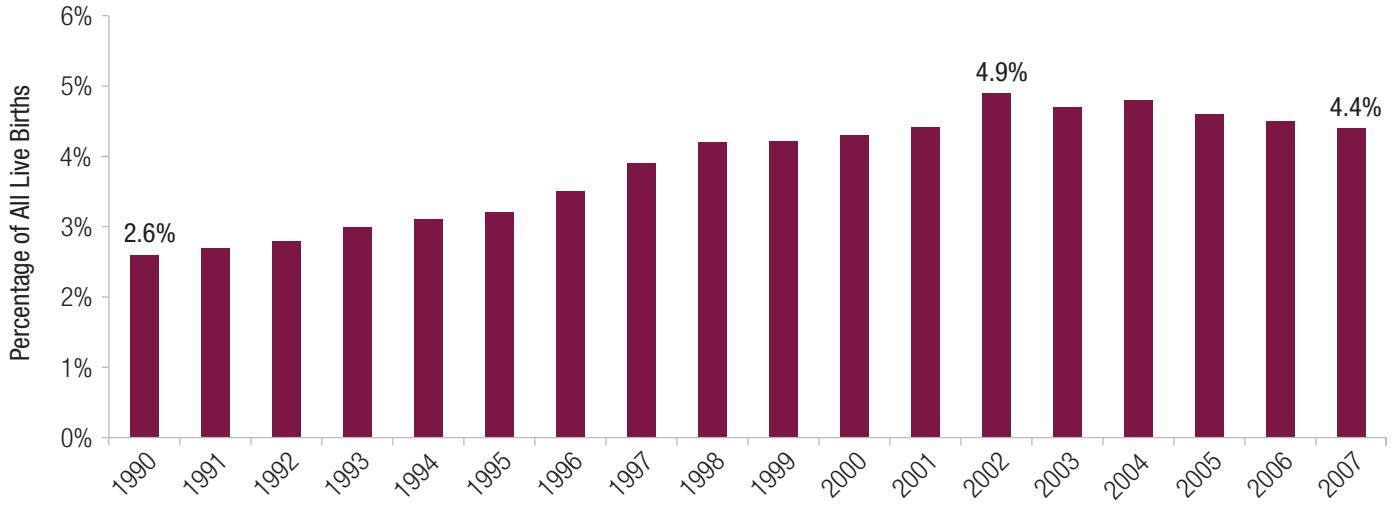
Source: MDPH Birth File, 1990-2007.
*The yellow chart line shows what LBW rates would have been had the percent of multiples not increased.

Multiple Births and Fertility Treatments

The percentage of births that were multiples increased steadily from 1990-2002, but has declined slightly in recent years. In 2007, 95.6% of Massachusetts births were singletons, 4.2% were twins, and 0.2% were triplets or higher order multiples.

Women who undergo treatment for infertility are more likely to deliver multiple births than women who conceive without such treatments.[2]

Figure 5.6 **Trends in Multiple Births**



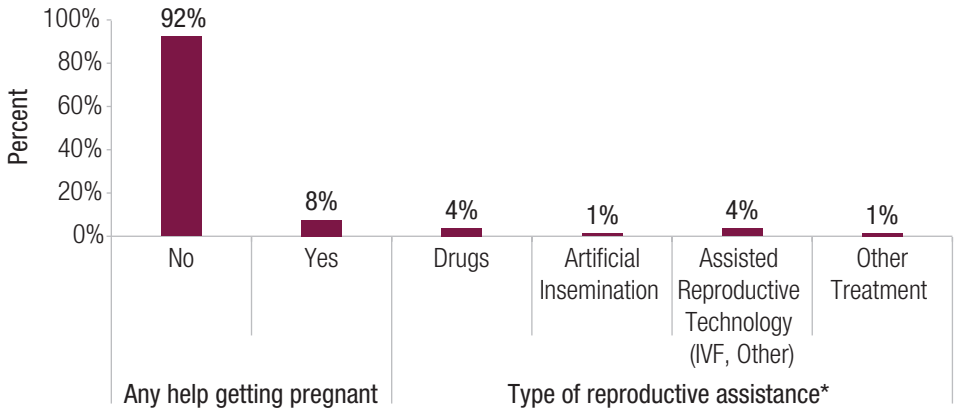
Source: MDPH Birth File, 1990-2007.

Fertility treatments include infertility drugs, artificial insemination, and assisted reproductive technologies (ART), in which both egg and sperm are manipulated outside the body.

Massachusetts is one of only 14 states with mandated private insurance coverage for fertility treatments. As a result, Massachusetts has the highest proportion of ART procedures per population in the US.[3]

Data from Massachusetts PRAMS (Pregnancy Risk Assessment Monitoring System) reveal that 8% of mothers giving birth in 2007 reported receiving some form of assistance from a health care provider in becoming pregnant. Fertility drugs and ART were each used in 4% of pregnancies.

Figure 5.7 **Types of Fertility Treatment**



Source: Massachusetts Pregnancy Risk Assessment Monitoring System (PRAMS), 2007.
*Some women received more than one type of treatment.

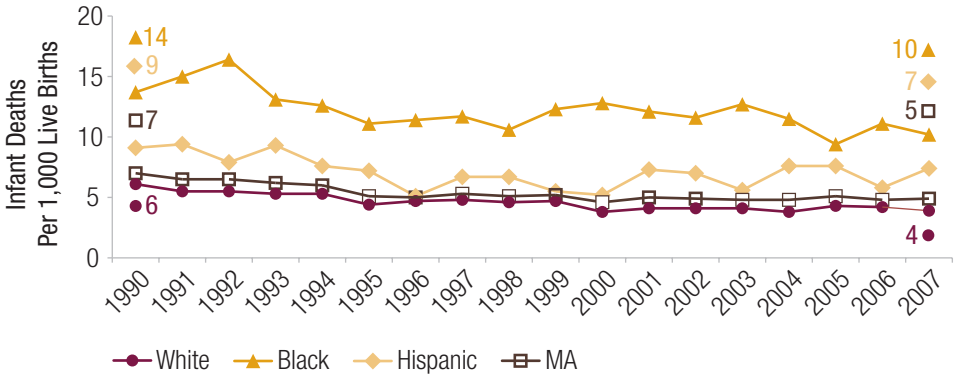
Infant and Fetal Mortality

Infant mortality refers to the death of an infant prior to one year of age from any cause. The infant mortality rate (IMR) is calculated as the number of infant deaths per 1,000 live births.

In Massachusetts, the overall IMR has decreased by 30% since 1990. However, significant racial and ethnic disparities persist.

In 2007, the IMR for Blacks was 2.6 times the White rate. The IMR for Hispanics was 1.9 times the White rate.

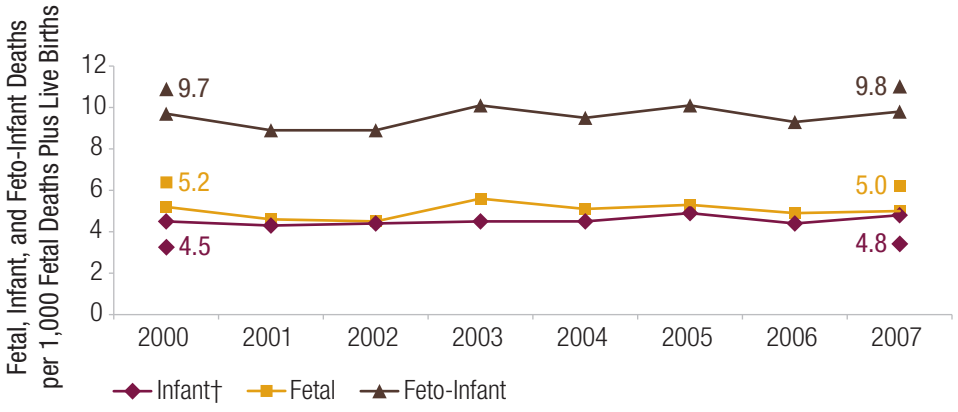
Figure 5.8 **Trends in Infant Mortality**



Source: MDPH Linked Birth-Death File, 1990-2007.

MDPH tracks data on fetal deaths that are 20 weeks gestational age or greater or 350 grams or greater. The fetal death rate has been slightly higher than the IMR and higher than the Healthy People 2010 fetal mortality rate goal of 4.1 each year since 2000.[4] The Massachusetts fetal

Figure 5.9 **Trends in Fetal, Infant and Feto-Infant Mortality**



Source: MDPH Linked Birth-Death File, 1990-2007.

death rate of 5.0 in 2007 was 20% lower than the US fetal mortality rate of 6.22 in 2005 (the most recent year for which national data are available).[5]

Prenatal Care

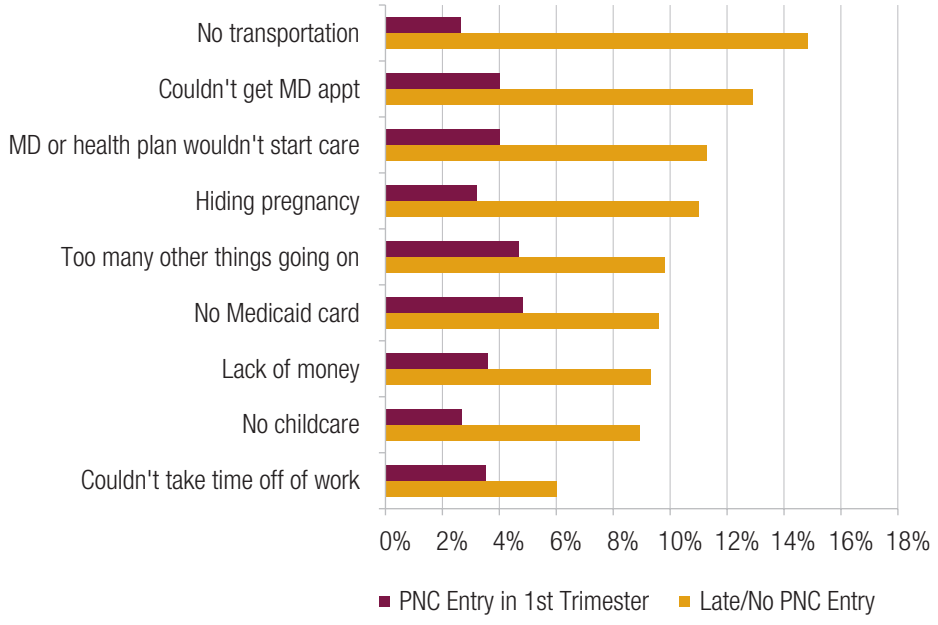
Entry to prenatal care (PNC) in the first trimester of pregnancy is recommended because of its potential to improve the health of mothers and infants.

The Adequacy of Prenatal Care Utilization (APNCU) Index[6] describes several aspects of PNC, including the timing of entry to care and the volume of care received.

According to data from the 2007 Massachusetts Pregnancy Risk Assessment Monitoring System (PRAMS), more than 85% of women began PNC during the first trimester of pregnancy, and more than 80% received PNC deemed "adequate" or "adequate plus" according to the APNCU.

According to PRAMS data, one out of 5 women giving birth in Massachusetts in 2007 reported experiencing at least one barrier to receiving PNC during her pregnancy. Women experiencing at least one barrier to receiving PNC were almost three times as likely to receive late or no PNC compared to women experiencing no barriers.

Figure 5.11 **Barriers to Obtaining Prenatal Care**



Source: MDPH Pregnancy Risk Assessment Monitoring System (PRAMS), 2007.

Figure 5.10a **Timing of Entry to Prenatal Care (PNC)**

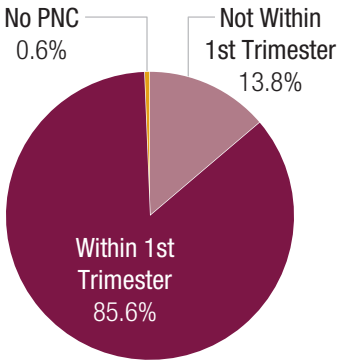
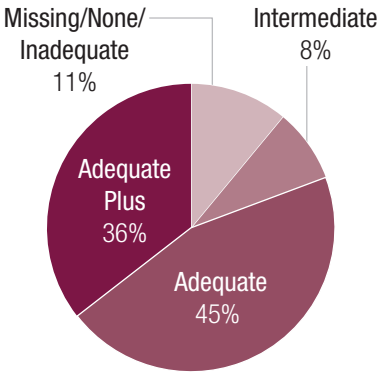


Figure 5.10b **Adequacy of Prenatal Care (PNC)**



Source: MDPH Pregnancy Risk Assessment Monitoring System (PRAMS), 2007.

The Healthy People 2010 target is that at least 90% of women receive PNC before the end of the first trimester of pregnancy.[4]

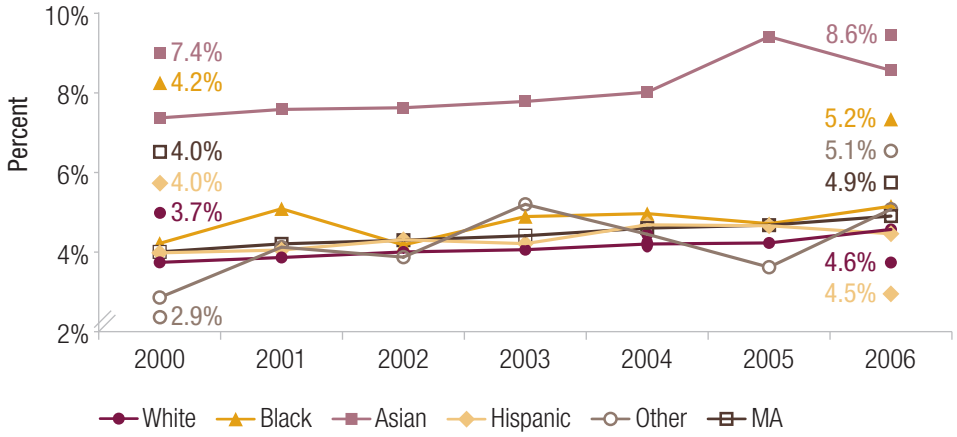
Gestational Diabetes Mellitus (GDM)

Gestational diabetes mellitus (GDM) is any degree of glucose intolerance with onset or first recognition during pregnancy.[7]

GDM can result in poor outcomes for the mother and baby during pregnancy, and can increase the risk that both mother and child develop type 2 diabetes later in life.

Known risk factors for GDM include advanced maternal age, obesity, and family history of diabetes.[8] The GDM prevalence in Massachusetts has increased nearly 23% in recent years, from 4.0% in 2000 to 4.9% in 2006, mirroring an increasing national trend.

Figure 5.12 **Trends in Gestational Diabetes Mellitus (GDM)**



Source: MDPH Pregnancy to Early Life Longitudinal (PELL) Data System.

Substantial differences in the prevalence of GDM exist across racial and ethnic subgroups both in Massachusetts and in the US.

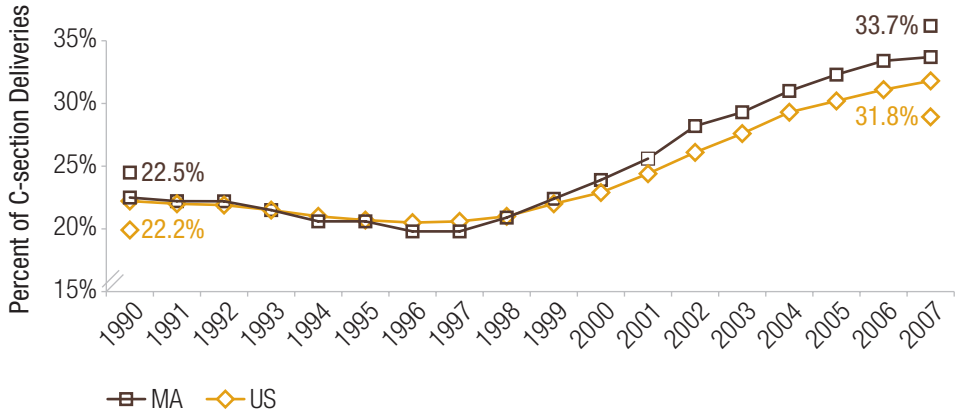
In 2006, Asian mothers had the highest prevalence of GDM (8.6%), followed by other, non-Hispanic (5.1%); Black (5.2%); White (4.6%); and Hispanic (4.5%) mothers.

Method of Delivery

The percentage of births delivered by cesarean section has increased rapidly both nationally and in Massachusetts. The proportion of Massachusetts births that were cesarean deliveries in 2007 (33.7%) was 8% higher than the national rate of 31%.

Health experts have debated the causes of increasing cesarean deliveries for years. These include the increasing age and medical risks of childbearing women, the rising number of multiple births, differing opinions about the advisability of a vaginal birth after a previous cesarean delivery, malpractice concerns among providers, and the choice of more women to voluntarily

Figure 5.13 **Trend in Cesarean Delivery Rate**



Source: MDPH Birth File, 1990-2007.

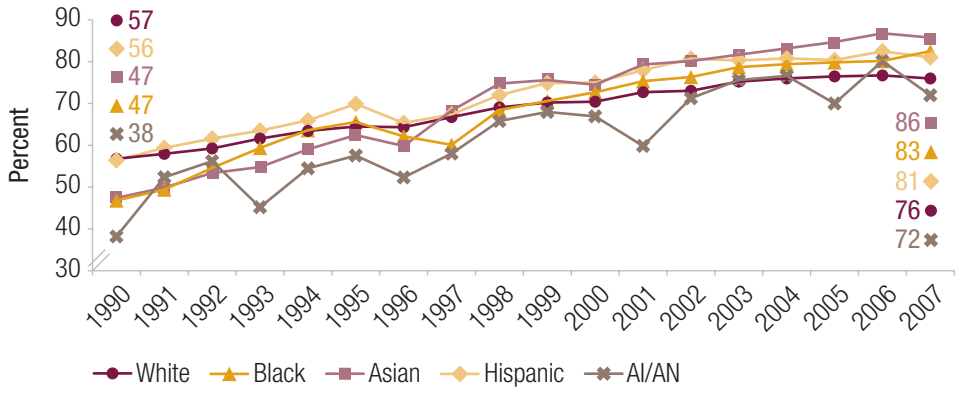
undergo cesarean deliveries. The rate of cesarean deliveries has increased even among women with no documented risks, including maternal medical conditions or complications of labor or delivery.

Breastfeeding

Breastfeeding has known health benefits for both mother and infant. Improved breastfeeding initiation and duration rates are critical public health outcomes.

The Healthy People 2010 goal for breastfeeding initiation is 75%.[4] Massachusetts currently surpasses that goal. However, racial and ethnic disparities in breastfeeding exist.

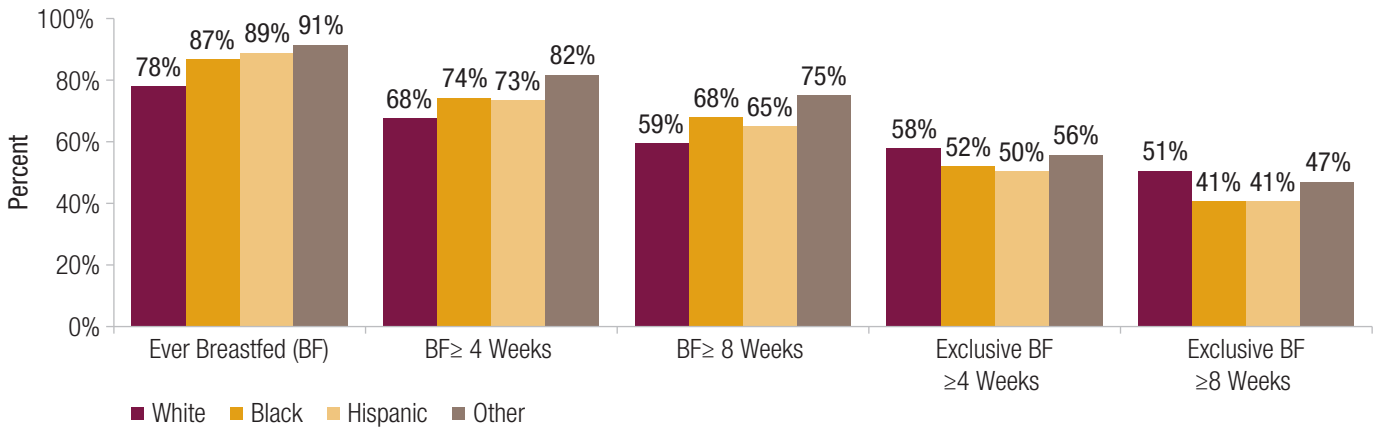
Figure 5.14 **Trends in Breastfeeding Initiation by Race and Ethnicity**



Source: MDPH Birth File, 1990-2007.

The prevalence of breastfeeding initiation, overall duration, and duration of exclusive breastfeeding as measured on the Massachusetts PRAMS survey varied by race and ethnicity.

Figure 5.15 **Breastfeeding Initiation, Duration and Exclusivity**



Source: MDPH Pregnancy Risk Assessment Monitoring System (PRAMS), 2007.

The highest rates of breastfeeding initiation and duration to 4 and 8 weeks were among other, non-Hispanic mothers, and the lowest among White mothers. However, White mothers were more likely than all other groups to *exclusively* breastfeed for at least 4 or 8 weeks.

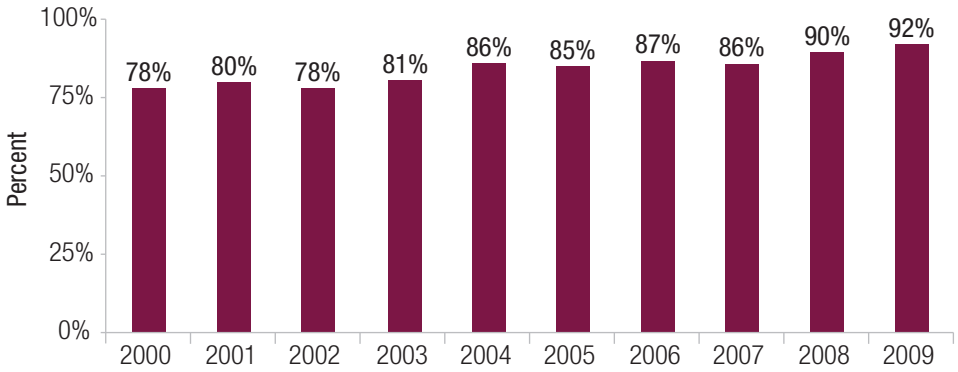
Women Infants and Children (WIC) Nutrition Program

The Women Infants and Children (WIC) Nutrition Program is a state- and federally-funded health and nutrition program serving low to moderate income women, infants and children under age five years who have, or are at risk of developing, nutrition-related health problems.

Since June 2009, applications to WIC have increased dramatically, with operations at capacity, as more low-to-moderate income families in Massachusetts felt the strain of the economic downturn and needed help in order to provide their families with nutritious food.

WIC currently serves 92% of individuals estimated as eligible by the Massachusetts WIC 2009 Needs Assessment.

Figure 5.16 **Eligible Women, Infants and Children served by WIC**



Source: MDPH Women Infants and Children (WIC) Nutrition Program, 2000-2009.

Figure 5.17 **WIC Participation During Pregnancy by Socio-Demographic Characteristics**

Characteristic	Subgroup	Weighted %
Maternal race/ethnicity	White	25.7
	Black	70.3
	Hispanic	79.3
	Other	39.3
Maternal age (years)	<20	87.5
	20-29	54.2
	30-39	19.4
	40+	17.5
Maternal education	< High school	84.5
	High school diploma	64.5
	Some college	45.6
	College graduate	9.5
Household poverty level	>100% FPL	21.6
	≤ 100% FPL	85.7
Maternal nativity	Non-US born	55.2
	US born	30.5
Marital status	Married	17.3
	Unmarried	78.4

Source: MDPH Pregnancy Risk Assessment Monitoring System (PRAMS), 2007.

WIC currently serves 92% of individuals estimated as eligible by the Massachusetts WIC 2009 Needs Assessment.

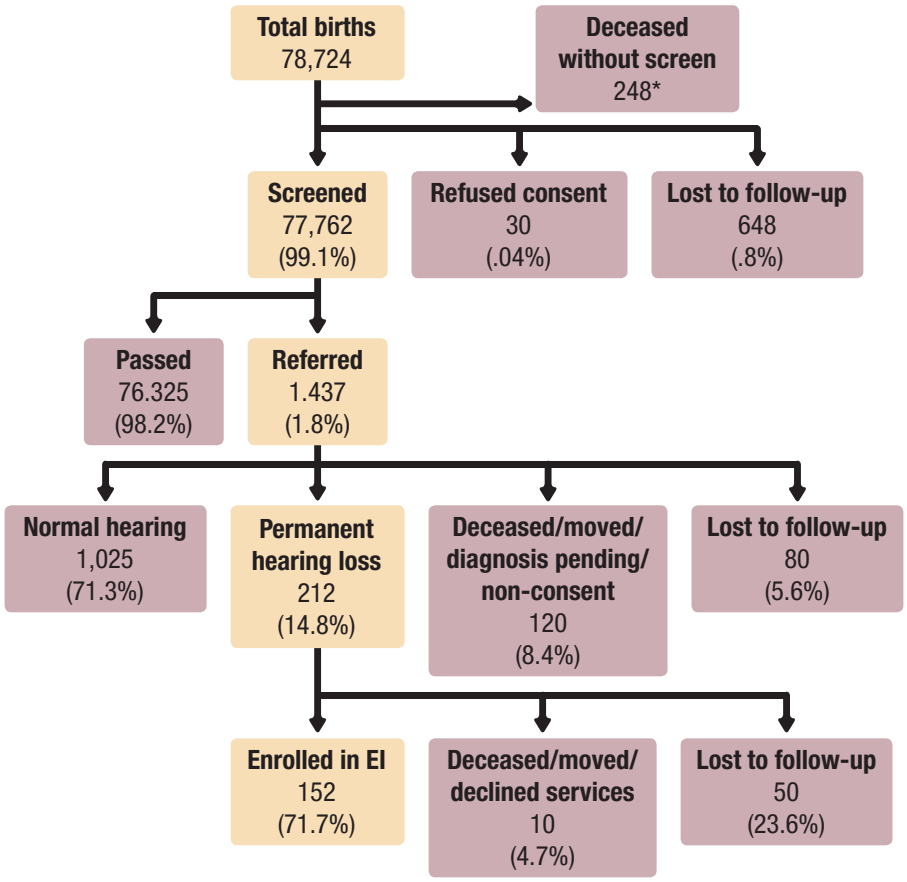
PRAMS data reveal that more than 38% of mothers with live births in 2007 participated in the WIC program during pregnancy. The highest rates of WIC participation were among women who were Hispanic (79.3%), under age 20 years (87.5%), had less than high school education (84.5%), living in poverty (85.7%), non-U.S. born (55.2%), and unmarried (78.4%).

Newborn Hearing and Blood Screening

When babies who are deaf or hard of hearing are identified early, intervention can have a dramatic, positive impact on speech, language, and overall development. Massachusetts law mandates hearing screening for all newborns, and the Universal Newborn Hearing Screening Program (UNHSP) ensures that families receive screening and follow-up services.

More than 99% of infants born in Massachusetts in 2007 were screened for hearing loss. Among those screened, 1.8% failed and were referred for a follow-up audiologic diagnostic evaluation. Among 1,437 children referred, 14.8% were diagnosed with permanent hearing loss.

Figure 5.18 **Screening, Diagnostic and Early Intervention Data**



*"Deceased without screen" category not included in further denominators

Source: Universal Newborn Hearing Screening Program (UNHSP), Massachusetts Department of Public Health, 2007.

Figure 5.19 **Disorders Detected by Newborn Screening, 2008**

Infants Screened	
Born in MA	77,345
Disorders Detected by Screening	
Biotinidase Deficiency	4
Toxoplasmosis	3
Congenital Adrenal Hyperplasia	5
Congenital Hypothyroidism	65
Galactosemia (Classical and Duarte)	19
Cystic Fibrosis	15
Hemoglobinopathies:	
Sickling	35
Non-Sickling	26
Amino Acid Disorders:	9
Fatty Acid Oxidation Disorders:	
Short-chain acyl-CoA dehydrogenase deficiency	7
Other Fatty Acid Oxidation Disorders	7
Urea Cycle and Organic Acid Disorders	10
Total	**205**

Source: New England Newborn Screening Program, 2008.

Approximately 72% of these children were enrolled in the Early Intervention Program (see EI section below).

The New England Newborn Screening Program is a comprehensive public health program that provides screening, clinical follow-up, and research to prevent or minimize the effects of disorders that can lead to death, mental retardation, and life-compromising conditions in newborns.

In 2008, a disorder was detected in 0.3% of the 77,345 infants screened (Figure 5.19).

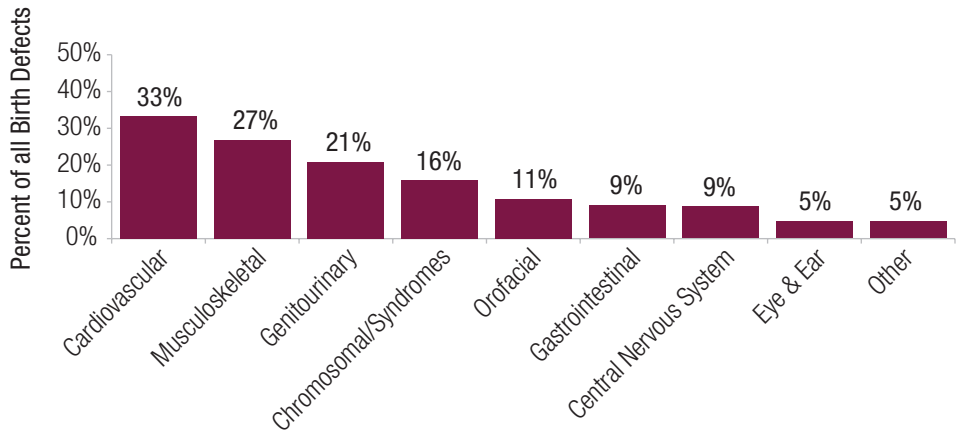
Birth Defects

Birth defects contribute substantially to premature births and are the leading cause of infant death nationally. Among the 155,284 live births to Massachusetts residents in 2004-2005, 2,536 had one or more structural birth defects. In addition, 54 stillbirths were identified with a birth defect.

Overall, 1.7% of births in the state (166.8 per 10,000 live births) were identified as having one or more birth defects.

Cardiovascular birth defects are the most commonly occurring birth defects and contribute more to infant deaths than any other category. Of the ten most common birth defects in 2004-2005, three (atrial septal defects, ventricular septal defects, and valvular pulmonary stenosis) were cardiovascular in nature. Common non-cardiovascular defects included Down syndrome, polydactyly/syndactyly, hypospadias, clubfoot, and orofacial clefts.

Figure 5.20 **Common Birth Defects**

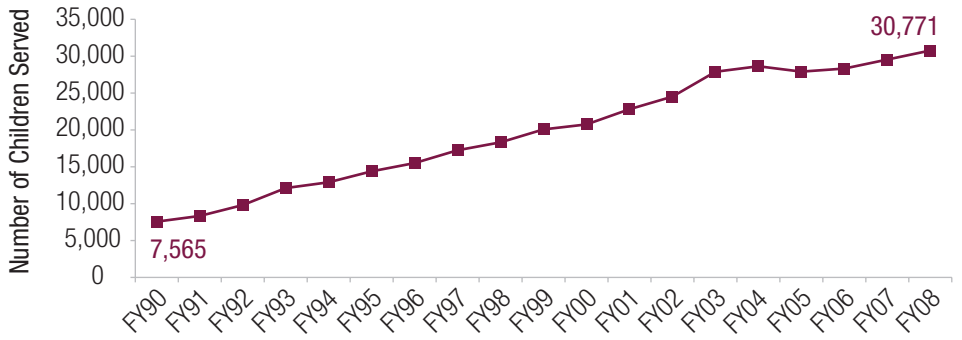


Source: MDPH Birth Defects Monitoring Program, 2004-2005.

Early Intervention Program

Early Intervention (EI) provides family-centered services that facilitate the progress of children with certain developmental delays (e.g., significant speech delays), established conditions (e.g., Down syndrome), or for

Figure 5.21 **Children Served in the Early Intervention Program**



Source: MDPH Early Intervention Program.

In SFY90, the Early Intervention program served 7,565 children. In SFY08, this number had increased by more than 300% to 30,771.

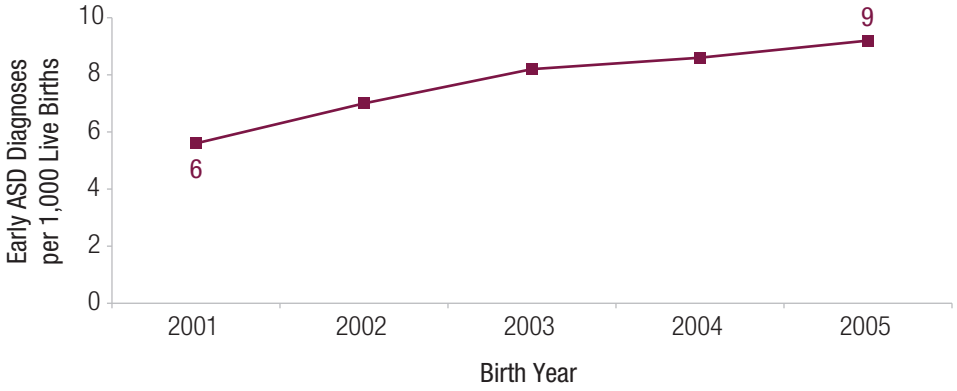
whom typical development is at risk due to certain birth or environmental circumstances (e.g., living in a home where substance abuse is present). Eligible children receive services from birth to age three years to acquire the skills they need to participate more easily in their everyday activities and with their peers. Services are provided to the child and family in "natural settings," which can include individual treatment in family homes and child care settings, or group sessions in natural settings throughout the community such as community play groups or libraries.

Autism Spectrum Disorders

Autism spectrum disorders (ASD) are complex developmental disabilities characterized by impairments in a person's ability to communicate and interact with others. Early identification of ASDs and early intervention can improve developmental outcomes.

Early treatment for ASD is available through state-coordinated EI services, mandated under part C of the Individuals with Disabilities Education Act (IDEA '97). The MA EI Specialty Services Program was created in 1998 to address the unique service needs of children with ASD.

Figure 5.22 **Trends in Autism Spectrum Disorders**



Source: Massachusetts Pregnancy to Early Life Longitudinal (PELL) Data System.

ASD diagnoses among children aged 36 months or less in the EI Program have increased from approximately one in 179 among the 2001 birth cohort to one in 109 among the 2005 birth cohort.

The most recent CDC estimate of the prevalence of ASDs from a multi-state study is one in 150 children aged 8 years, with a median age at first documented diagnosis ranging from 49-66 months.

In 2007, the American Academy of Pediatrics recommended routine screening of all children at age 18 and 24 months for ASD.[9]

Our finding of one in 109 children diagnosed with an ASD before age 36 months demonstrates the success of the EI program at promoting the early identification of ASD children for referral to appropriate services.

Policy Perspective: Reproductive and Infant Health

Milton Kotelchuck, PhD, MPH
Chair Emeritus and Professor, Community Health Sciences,
Boston University School of Public Health

The reproductive and infant health status in Massachusetts overall is very positive, especially compared to U.S. national rates. Massachusetts has benefited from many years of effective sustained public and private initiatives. However, there is still much room to improve our reproductive health. Too many of our children start life in less than optimal health. The reproductive health trends for Massachusetts and the nation are not moving in a positive direction. Infant Mortality rates have ceased improving since 2000. Low birthweight and prematurity rates have steadily worsened for the past decade, increasing the need for more special health and educational services.

Seven MA trends are particularly noteworthy:
1) Massachusetts births, like those in the rest of the United States, are growing more diverse, both in terms of racial/cultural ancestry and maternal age distribution. These trends will require substantial adaptations by our current clinical and public health programs.

2) Disparities in reproductive outcomes remain glaring. Ameliorative efforts have increasingly turned to addressing the health of women over their life course especially before pregnancy rather than the services they receive while pregnant. This approach is captured by the phrase: "You can't cure a life time of ills during nine months of a pregnancy". Moreover, disparities in reproductive health reflect the larger world of racial and economic inequities. Efforts to address the economic needs of families with newborn children – through paid parental leave or European-modeled programs of family support – are notably absent in Massachusetts and in the U.S.

3) The rapidly rising rates of gestational diabetes likely reflect the current obesity and diabetes epidemics in Massachusetts and in the U.S. Gestational diabetes puts both the infant and mother at substantially higher risk for subsequent morbidity. Programmatic and clinical efforts to address gestational diabetes and obesity pre- and post-delivery are under-developed in Massachusetts.

4) High levels of clinical technology are associated with births in Massachusetts. More than one third of births are delivered by C-Section, one of the highest rates in the US. This rate is still rising.

The number of births associated with assisted reproductive technologies (ART) is also one of the highest in the U.S., as is our multiple birth rate. Debates continue over the proper balance of natural versus technology-assisted birthing in MA.

5) Too many births (42%) in Massachusetts are unplanned, and more than 30% are not desired at the time of conception or at all (PRAMS, 2007). While Massachusetts has a relatively positive record on teen pregnancies, Hispanic populations have extremely high teen pregnancy rates, and almost all teen pregnancies are unplanned. Family planning and sexuality education must continue to be part of a comprehensive Massachusetts reproductive health policy.

6) The Massachusetts stillbirth rates are now higher than the state's neonatal and infant mortality rates. Massachusetts pays too little attention to stillbirths and earlier miscarriages. These are all tragic losses for parents.

7) Massachusetts provides extensive reproductive and early childhood services. While these assure our state's relatively positive reproductive health record, negative birth trends will increase pressure in upcoming years to further expand Early Intervention services, already utilized by nearly 15% of Massachusetts children aged zero to three. The rising Autism rates are particularly alarming.

Massachusetts can not rest on past laurels. Our enviable reproductive and infant health record is not immune to negative trends seen across the nation. Each new pregnancy challenges us to assure that every woman, family, and developing child has the opportunity for optimal reproductive and infant health now.

FIGURE NOTES

Figure 5.9: Infant mortality rate in this graph includes fetal deaths in the denominator unlike the conventional IMR. The feto-infant mortality rate includes late fetal deaths (after 20 weeks) and deaths of infants less than one year of age. In this graph, feto-infant, feto, and infant mortality rates include all deaths (including those with unknown birthweight). The fetal mortality rate and infant mortality rate may not equal the feto-infant mortality rate due to rounding.

Figure 5.12: The Pregnancy to Early Life Longitudinal (PELL) Data System contains birth certificates (BC) linked with delivery-related hospital discharge records. GDM information is ascertained from both data sources. The annual prevalences of GDM presented here are higher than those presented in other publications that use BC data alone.

Figure 5.16: The percent of eligibles served is for all women, infants and children. The percents are calculated by taking the active statewide caseload and dividing by the estimated eligibles from the MA Needs Assessment Data for that fiscal year.

Figure 5.17: To examine differences in health by household income level, each respondent's household Federal Poverty Level (FPL) was approximated using self-reported income (as a range) and the number of dependent household members, and comparing these to the 2007 Department of Health and Human Services Federal Poverty guidelines (DHHS, 2007). Because exact dollar amounts were not reported by respondents, the mid-point of each income range was used to approximate household income. Thus, the estimated household poverty level should be viewed as approximate, and may misclassify some households.

Figure 5.20: Birth defects data are from the Massachusetts Birth Defects Monitoring Program. Denominator data are from the Massachusetts Registry of Vital Records and Statistics birth certificate file. For detailed information on inclusion and exclusion criteria, please visit the Massachusetts Center for Birth Defects Prevention and Research website at (www.mass.gov/dph/birthdefects).

ENDNOTES

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