

# Module 1: The ABCs and 123s of Prematurity



**Brenda Hussey-Gardner, PhD, MPH**  
*Associate Professor of Pediatrics*  
*University of Maryland School of Medicine*



In this presentation, we will discuss the ABCs and 123s of prematurity. This is the first in a series of five modules relevant to infants and toddlers born prematurely.

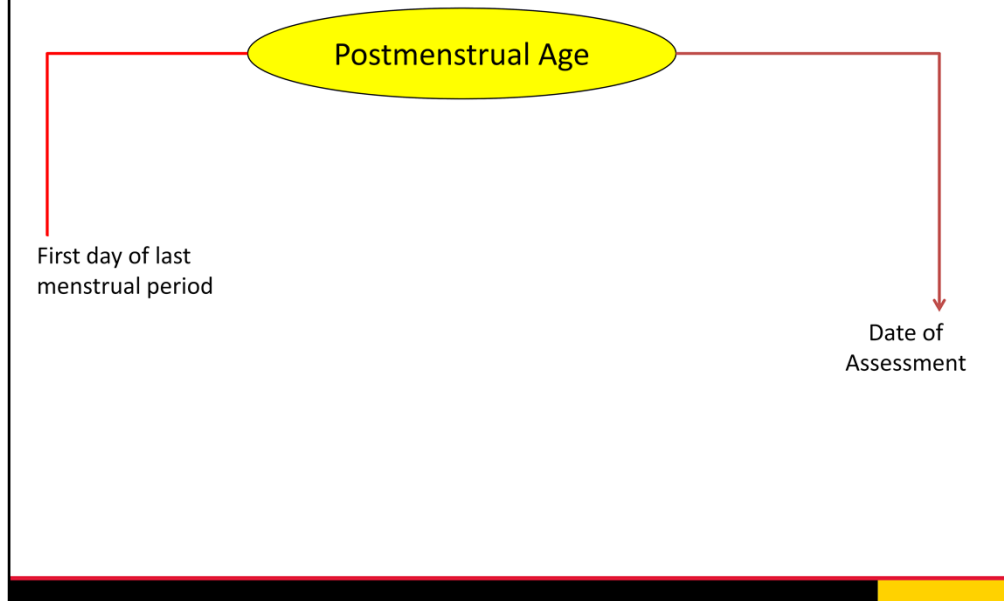
# Objectives

To become aware  
of prematurity  
rates for U.S. &  
Maryland

To become  
familiar with  
statistics related  
to infant mortality  
& morbidity for  
U.S. & Maryland

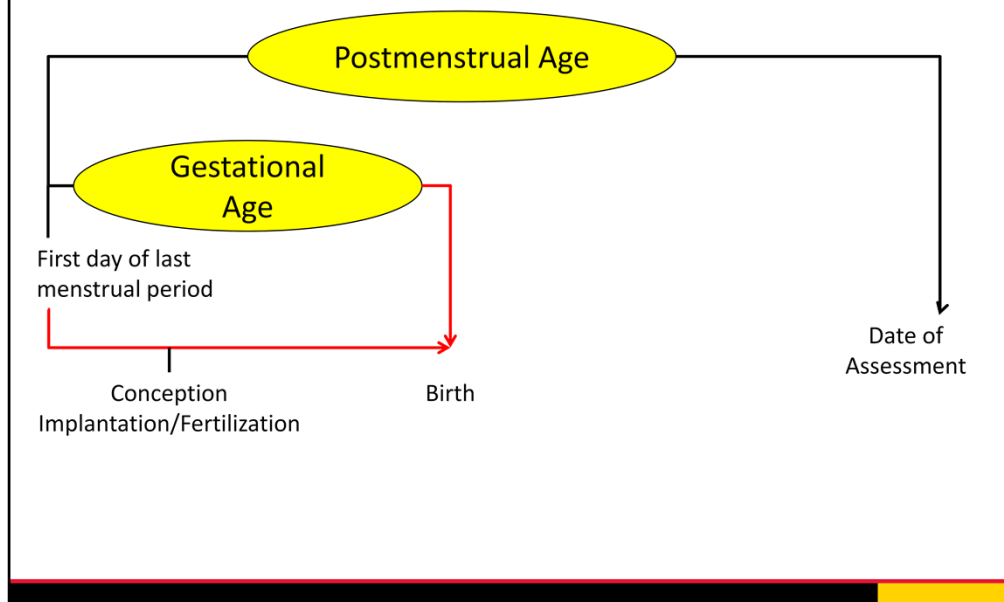
There are two objectives of this presentation. The first objective is to become aware of prematurity rates for the United States and Maryland. The second objective is to become familiar with statistics related to infant mortality & morbidity for the United States and Maryland. Along the way, you will learn some important definitions related to prematurity and birthweight.

## PERINATAL AGE TERMINOLOGY



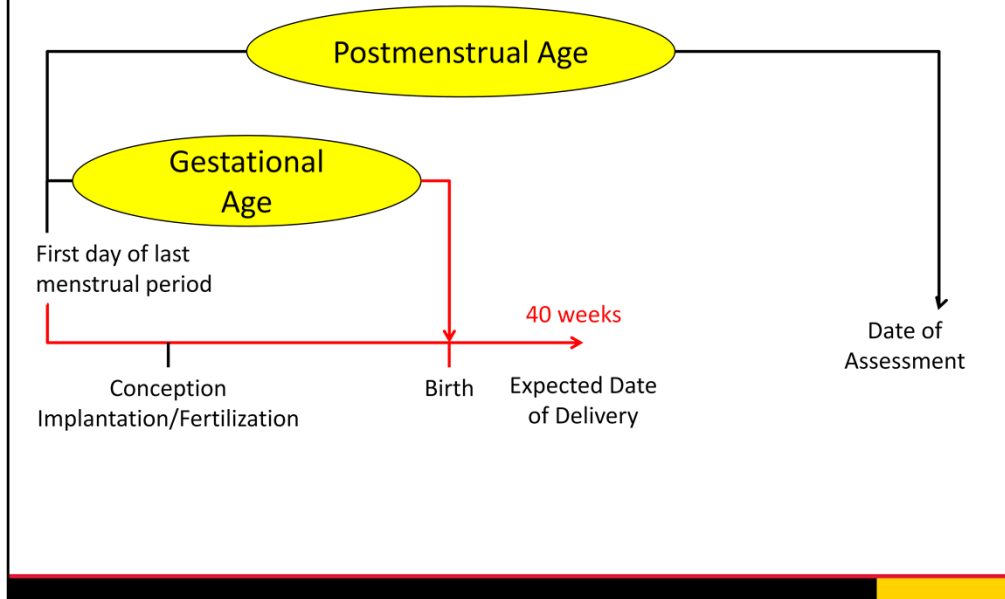
Let's begin by reviewing age terminology relevant to the perinatal period. First, there is the postmenstrual age. A child's postmenstrual age begins on the first day of mom's last menstrual cycle and continues until the date of assessment.

## PERINATAL AGE TERMINOLOGY



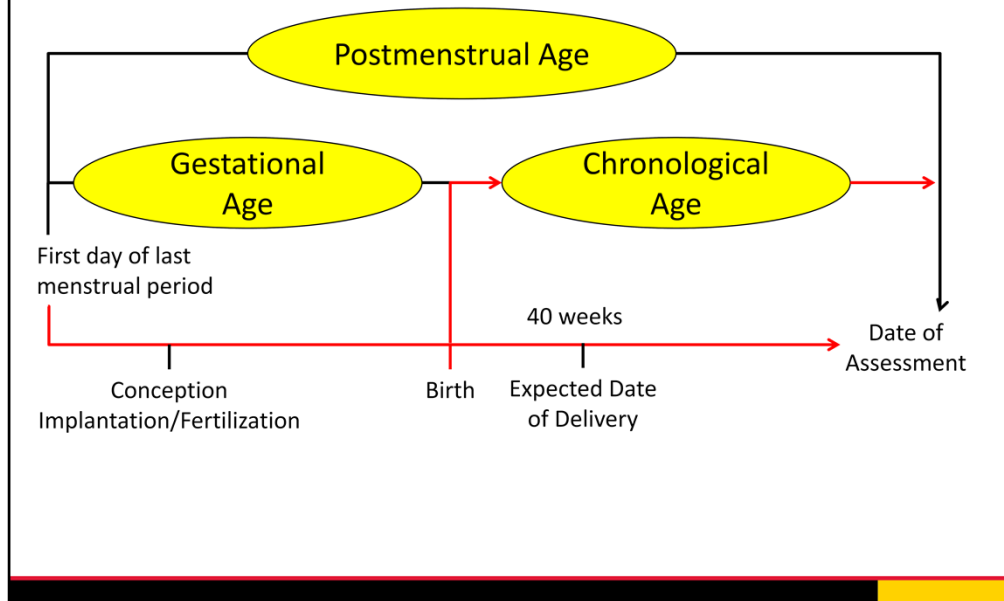
Next, there's a child's gestational age. This also begins on the first day of mom's last menstrual cycle and continues until the date of birth.

# PERINATAL AGE TERMINOLOGY



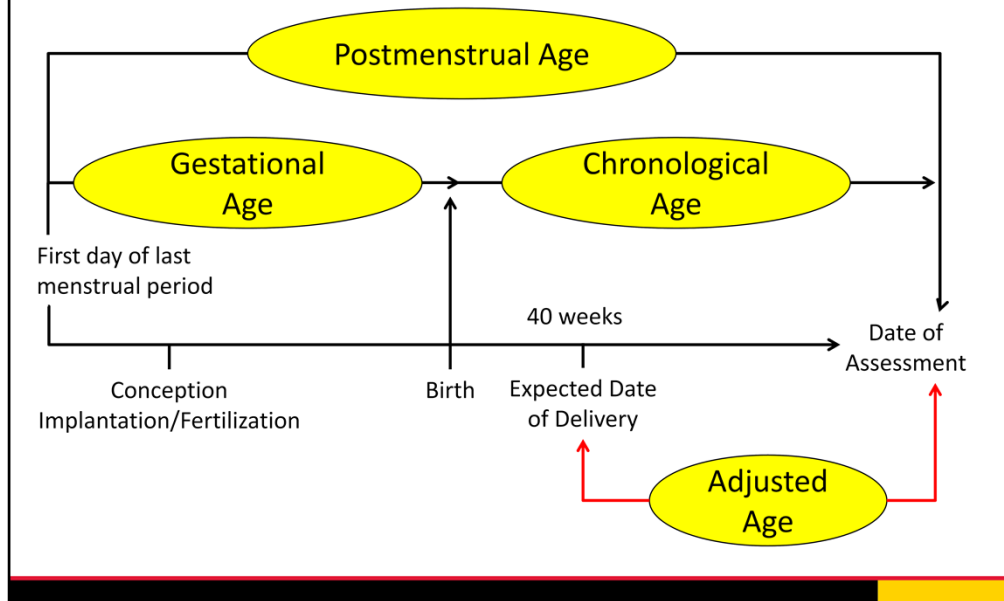
As such, infants born prematurely have a gestational age of less than 40 weeks at birth.

## PERINATAL AGE TERMINOLOGY

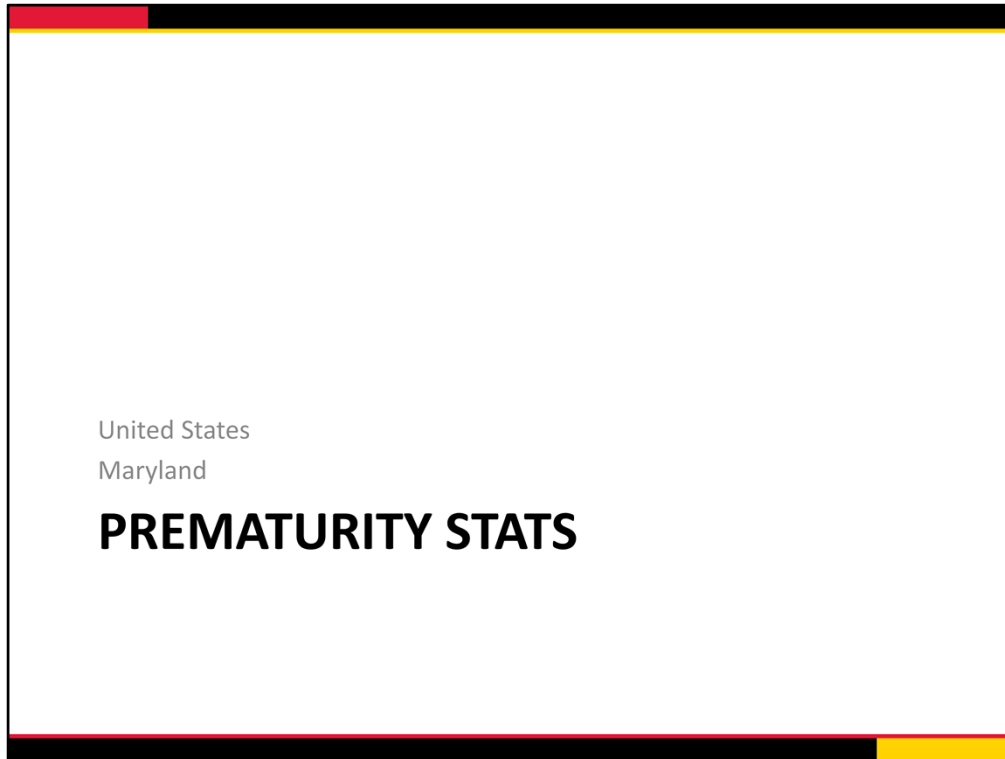


On the other hand, a child's chronological age begins on the date of birth and continues until the date of assessment. A child's chronological age represents how long the child has been alive.

## PERINATAL AGE TERMINOLOGY



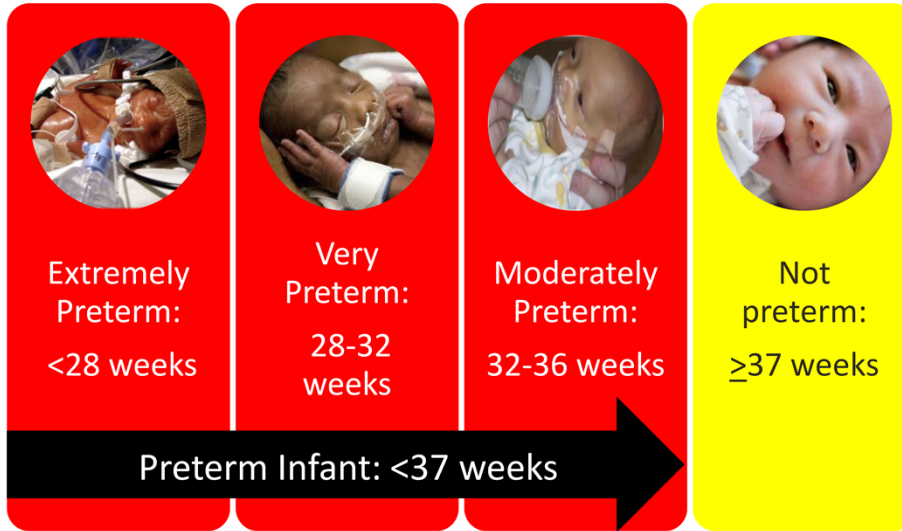
Finally, a child's adjusted age begins at the expected date of delivery, not the date of birth, and continues until the date of assessment. Adjusted age is also known as corrected age. We will discuss adjusted age, in depth, in Module 3: Understanding & Using Adjusted Age with Infants born Prematurely.



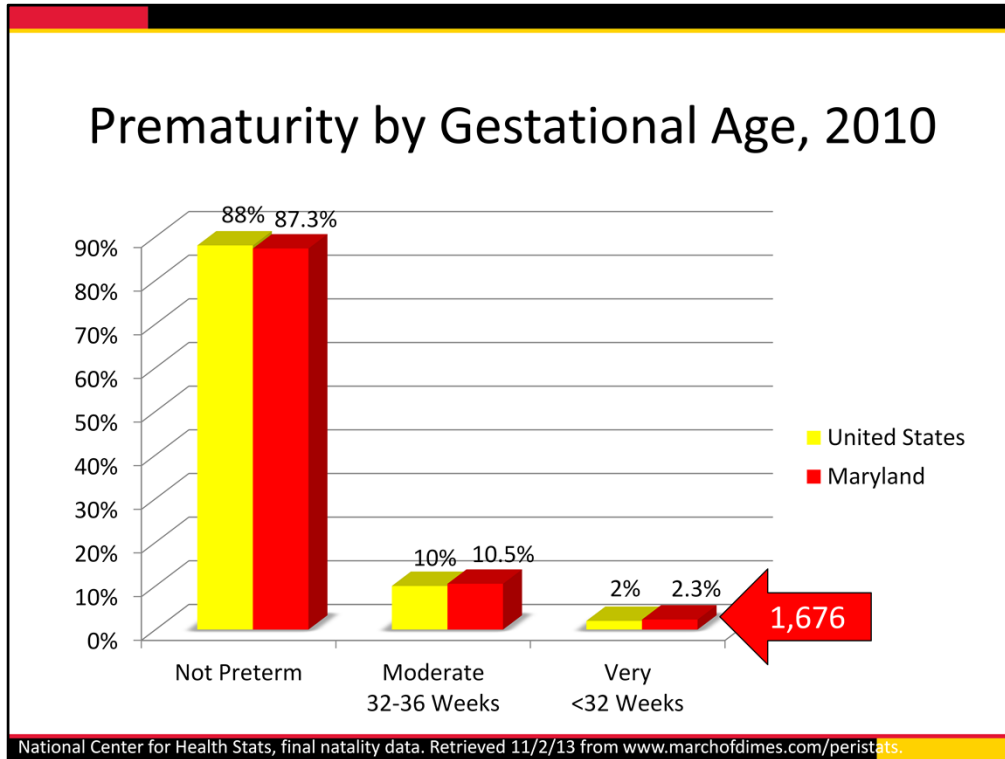
Now that we have some familiarity with the terms gestational age, chronological age and corrected or adjusted age, let's discuss statistics related to prematurity and birthweight.



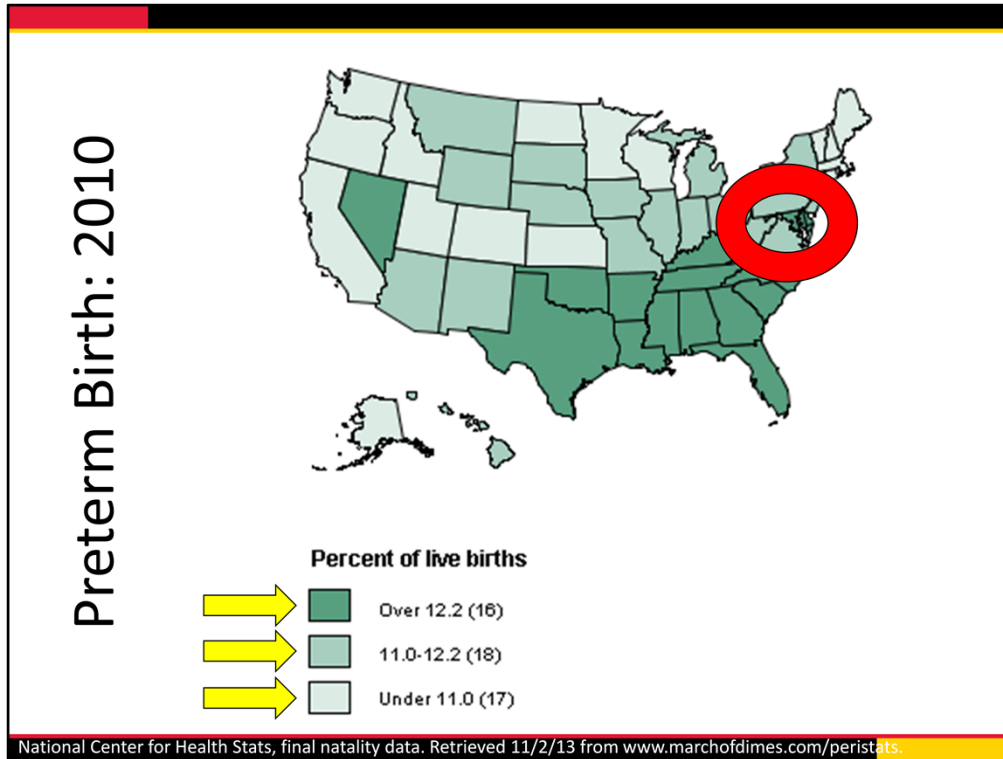
## Prematurity Classifications



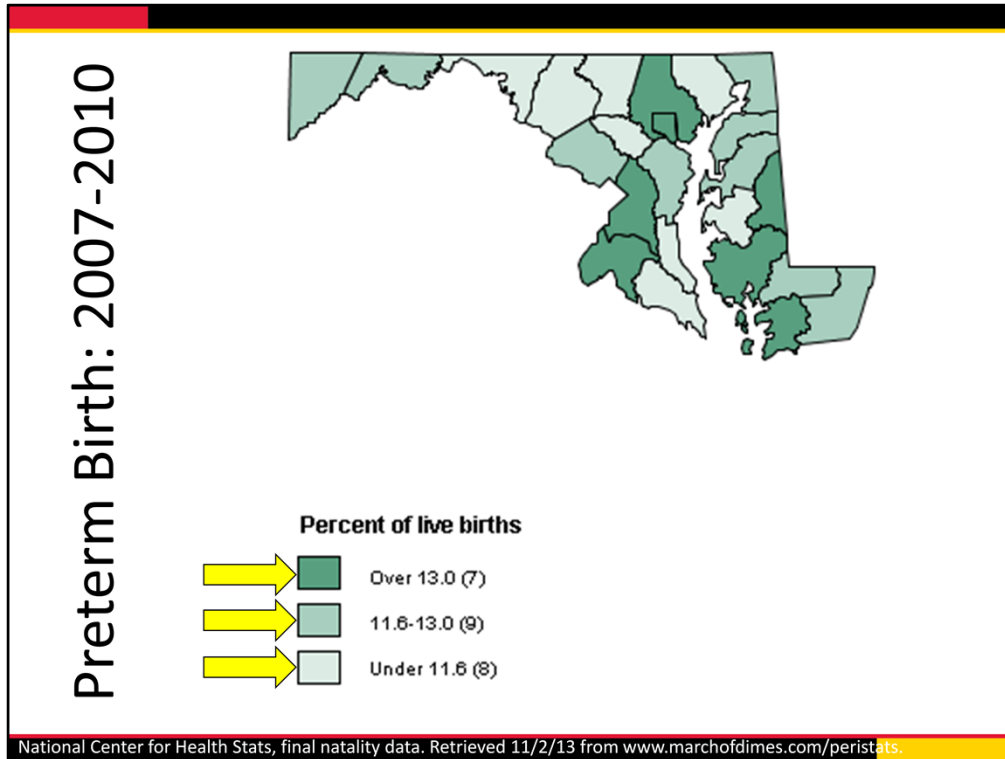
Before doing so, let's review the classifications of infants born prematurely. Babies born less than 28 weeks gestational age are known as *Extremely Preterm*. Currently the limit of viability is considered 22 weeks. The next classification of prematurity is *Very Preterm*, this includes infants born from 28 weeks to 32 weeks gestation or those babies born 2 to 3 months early. The final classification is *Moderately Preterm*, this includes infants born from 32 through 36 weeks gestation or 1 to 2 months early. Infants born at 37 weeks gestation or greater are not considered preterm. Given these classifications, all babies born at less than 37 weeks gestation are considered preterm infants.



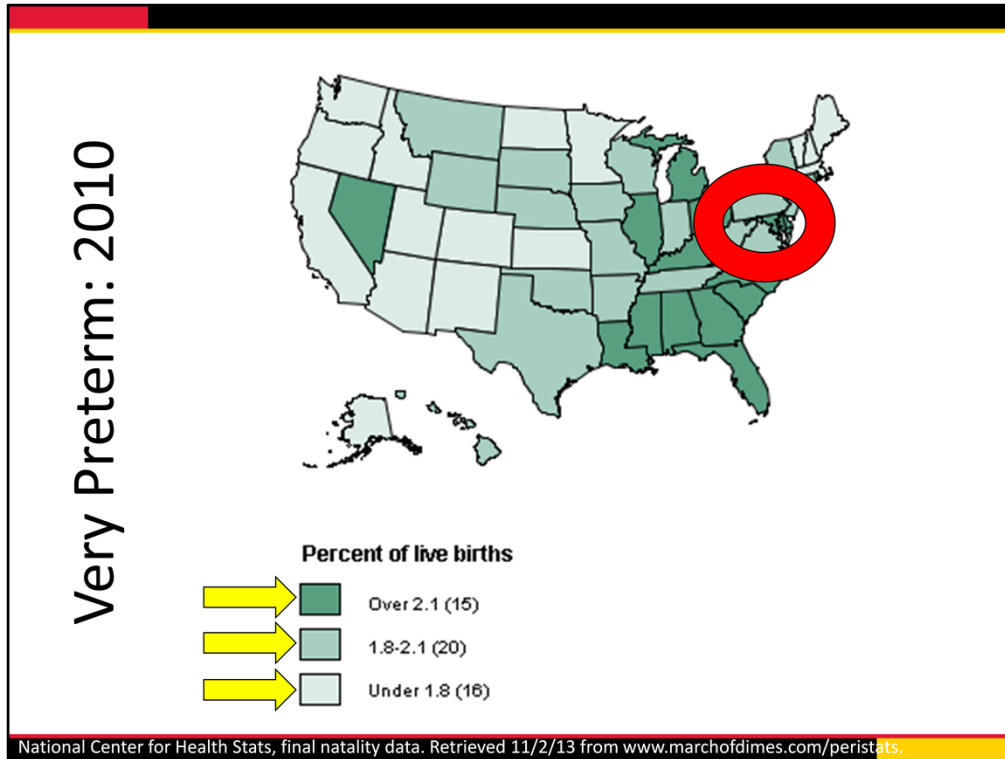
The most current data regarding the rate of prematurity is from 2010. In 2010, 88% of infants in the United States were born at full term, 10% were moderately preterm and 2% were very preterm. When compared to U.S. data, Maryland’s rate of prematurity was slightly higher. In 2010, 87.3% of babies in Maryland were born at full term with 10.5% of infants born moderately preterm and 2.3%, or 1,676 babies were very preterm. This number represents the population of infants born prematurely who most likely participated in the Maryland Infants and Toddlers program.



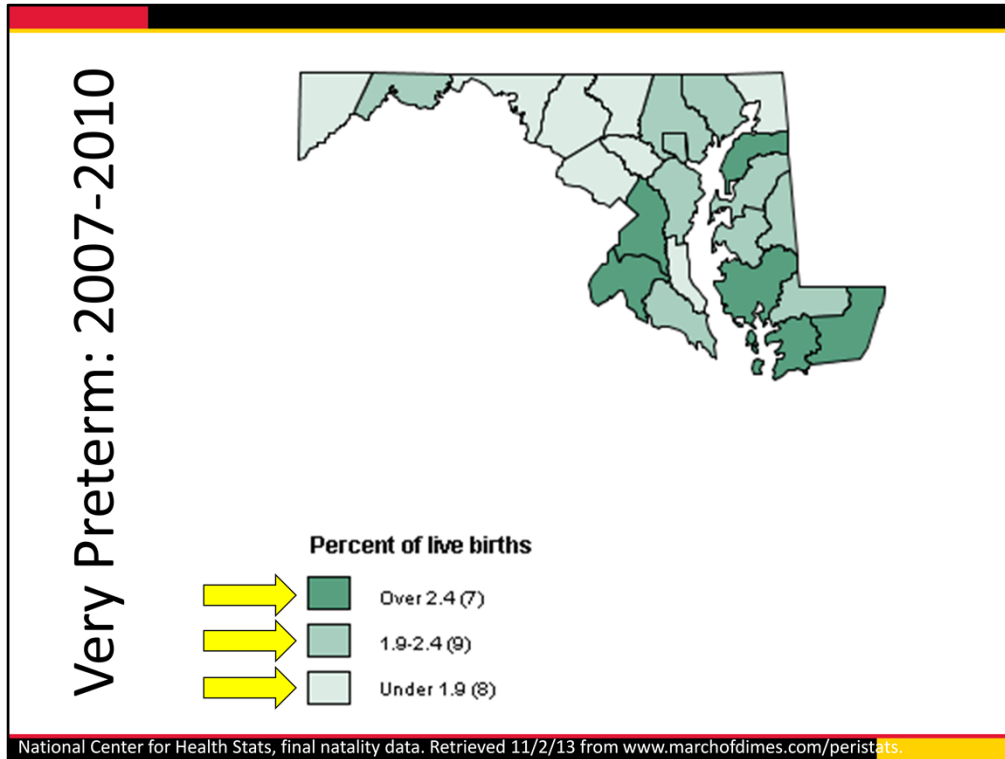
This map provides us with a visual image of how Maryland compares to other States in the United States. It depicts the percent of live births that were preterm births; in other words, babies born at less than 37 weeks gestation. Data is grouped into 3 categories. States with a prematurity rate of less than 11% are shaded light green, 17 states fell into this group. States with a prematurity rate ranging from 11 through 12.2% are shaded medium green, 18 states fell into this group. Finally, states with a prematurity rate greater than 12.2% are shaded dark green, 16 states fell into this group, including Maryland. Let's take a closer look at Maryland and see how the jurisdictions within Maryland compared.



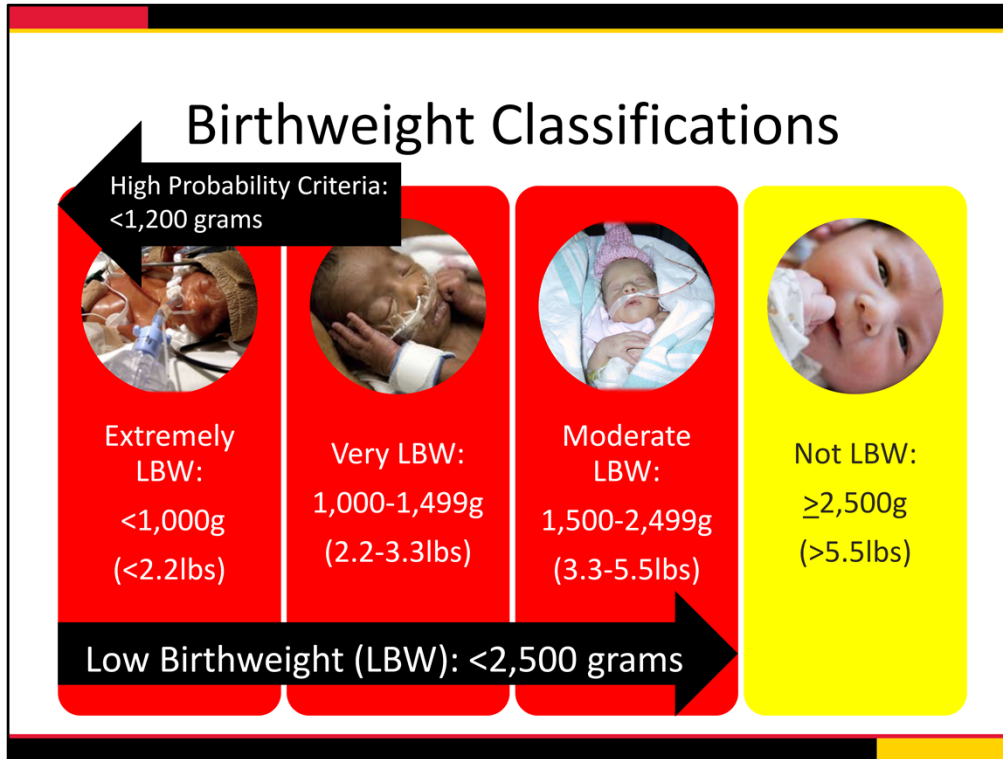
This map provides us with a visual image of how jurisdictions within Maryland compared to one another during the 2007 through 2010 timeframe. Like the previous map, it depicts the percent of live births that were preterm births. However, data depicted in this map is grouped differently. In this map, the 8 jurisdictions with a prematurity rate of less than 11.6% are shaded light green, the 9 jurisdictions with a prematurity rate ranging from 11.6 through 13% are shaded medium green, and the 7 jurisdictions with a prematurity rate greater than 13% are shaded dark green. Take a moment to determine the rate of prematurity for your jurisdiction.



As early intervention serves a proportion of infants born very prematurely, exploring this data is valuable. This map depicts the percent of babies born less than 32 weeks gestational age. The very preterm rate is divided into light green for the 16 states with a rate less than 1.8%, medium green for the 20 states with a rate ranging from 1.8 through 2.1%, and dark green for 15 states (including Maryland) with a very preterm rate greater than 2.1%. As we did with the preterm rate, let's look at the very preterm rate by Maryland jurisdiction.

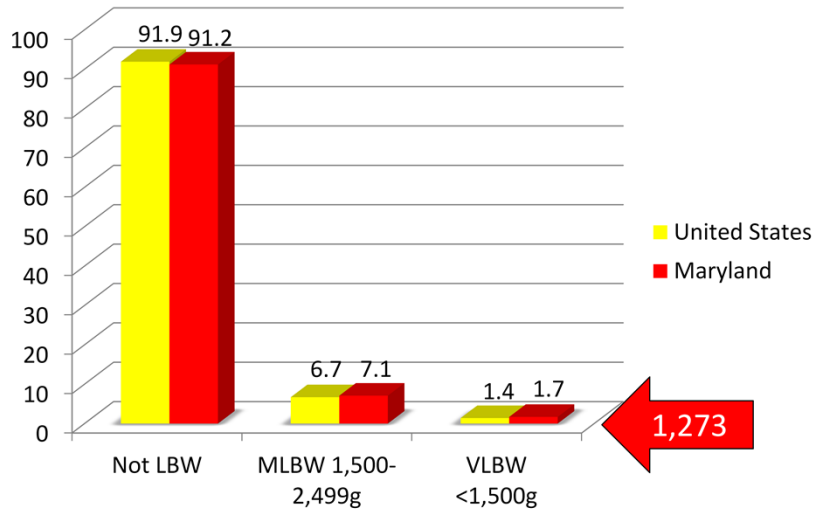


In Maryland, 8 jurisdictions had a very preterm rate of less than 1.9%, 9 jurisdictions had a rate of 1.9 through 2.4%, and 7 jurisdictions had a very preterm rate exceeding 2.4%. How does the very preterm rate in your jurisdiction compare to the preterm rate?



As the Maryland Infants & Toddlers Program defines high probability related to prematurity by birthweight, let's explore data related to birthweight classifications. Infants born weighing less than 1,000 grams or 2.2 pounds are classified as *Extremely Low Birthweight*. The next classification of birthweight is *Very Low Birthweight*, this includes infants born weighing 1,000 through 1,499 grams or 2.2 through 3.3 pounds. The final classification is *Moderate Low Birthweight*, this includes infants born weighing 1,500 through 2,499 grams or 3.3 through 5 ½ pounds. Infants with a birthweight of 2,500 grams or greater, in other words those born over 5 ½ pounds, are not considered low birthweight. Given these classifications, all babies born weighing less than 2,500 grams are considered low birthweight with all extremely low birthweight and some very low birthweight babies meeting Maryland's high probability birthweight criteria of less than 1,200 grams.

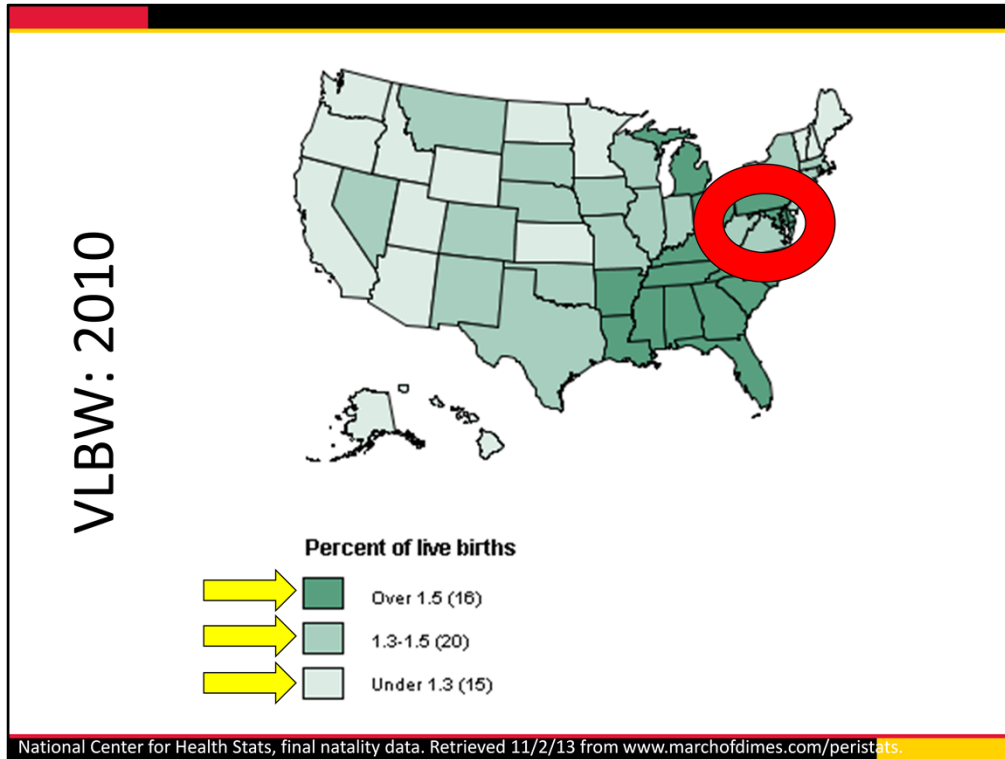
## Birthweight Breakdown, 2010



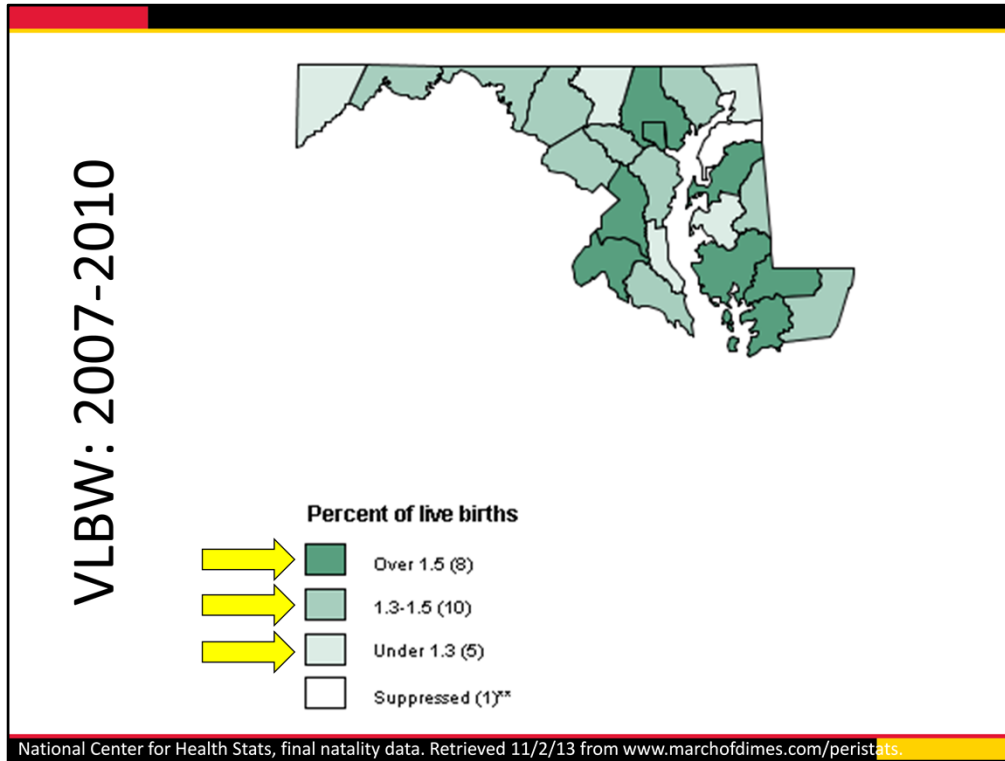
National Center for Health Stats, final natality data. Retrieved 11/2/13 from [www.marchofdimes.com/peristats](http://www.marchofdimes.com/peristats).

In 2010, 91.9% of infants in the United States were born weighing over 5 ½ pounds; 6.7% were moderately low birthweight and 1.4% were very low birthweight. In comparison, Maryland's low birthweight rates are slightly higher; with 91.2% born over 5 ½ pounds, 7.1% moderately low birthweight and 1.7%, or 1,273 babies were classified as very low birthweight.



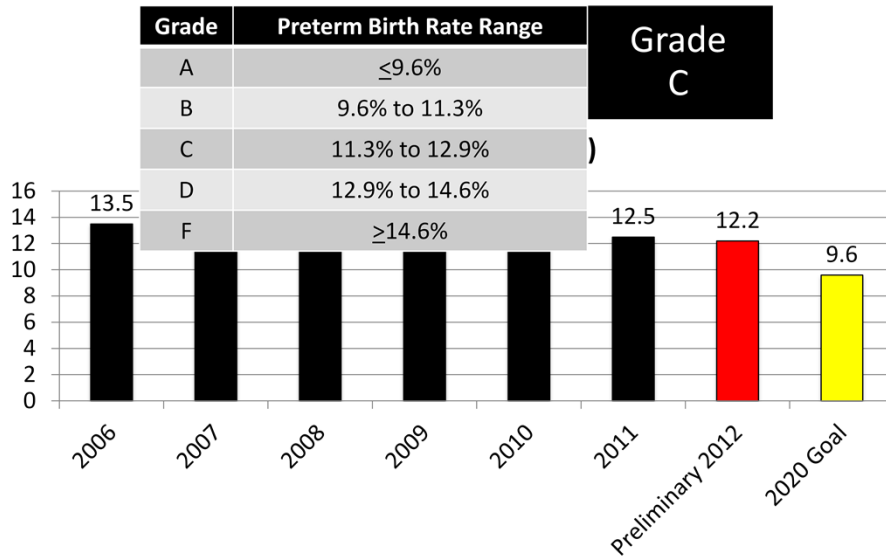


This map provides us with a visual image of how Maryland compares to other States with regards to the percent of live births that were less than 1,500 grams. Fifteen states had very low birthweight rate of less than 1.3%, 20 states had a rate of 1.3 through 1.5%, and 16 states had a rate of greater than 1.5%. Again, Maryland fell in the highest category. Let's take a closer look at Maryland and see how the jurisdictions within Maryland compared.



In Maryland, 5 jurisdictions had a very low birthweight rate of less than 1.3%, 10 jurisdictions had a rate of 1.3 through 1.5%, and 8 jurisdictions had a very low birthweight rate exceeding 1.5%. Data for 1 county was suppressed due to low or insufficient data.

# Maryland Report Card



Source: March of Dimes 2013 Premature Birth Report Card

Each year the March of Dimes creates a Premature Birth Report Card for each state. The 2020 goal is 9.6%. In 2012, Maryland's prematurity rate was 12.2%. This is a decrease from the rate of 13.5% seen in 2006. In fact, Maryland has experienced a steady decline in its prematurity rate over the past 6 years. Unfortunately, Maryland receives a grade of C for its prematurity rate. The March of Dimes grading system is as follows: states with a preterm birth rate less than or equal to 9.6% receive an A, those with a preterm birth rate of 9.6 to 11.3% receive a B, a rate of 11.3 to 12.9% earns a C, 12.9 to 14.6% a D, and states with a preterm birth rate of greater than or equal to 14.6% receive an F.

## Status of Contributing Factors in Maryland

Factor	Previous Rate	Latest Rate	Status	Recommendation
<b>Uninsured women</b>	17.0%	16.6%	★	MOD urges policymakers to expand insurance coverage & employers to create workplaces that support maternal & infant health.
<b>Late preterm birth</b>	8.6%	8.4%	★	MOD calls on hospitals & health professionals to eliminate early elective deliveries <39 weeks that are not medically necessary.
<b>Women who smoke</b>	18.7%	16.2%	★	MOD urges policymakers to pursue initiatives that prevent tobacco use & help women quit smoking.

March of Dimes 2013 Premature Birth Report Card

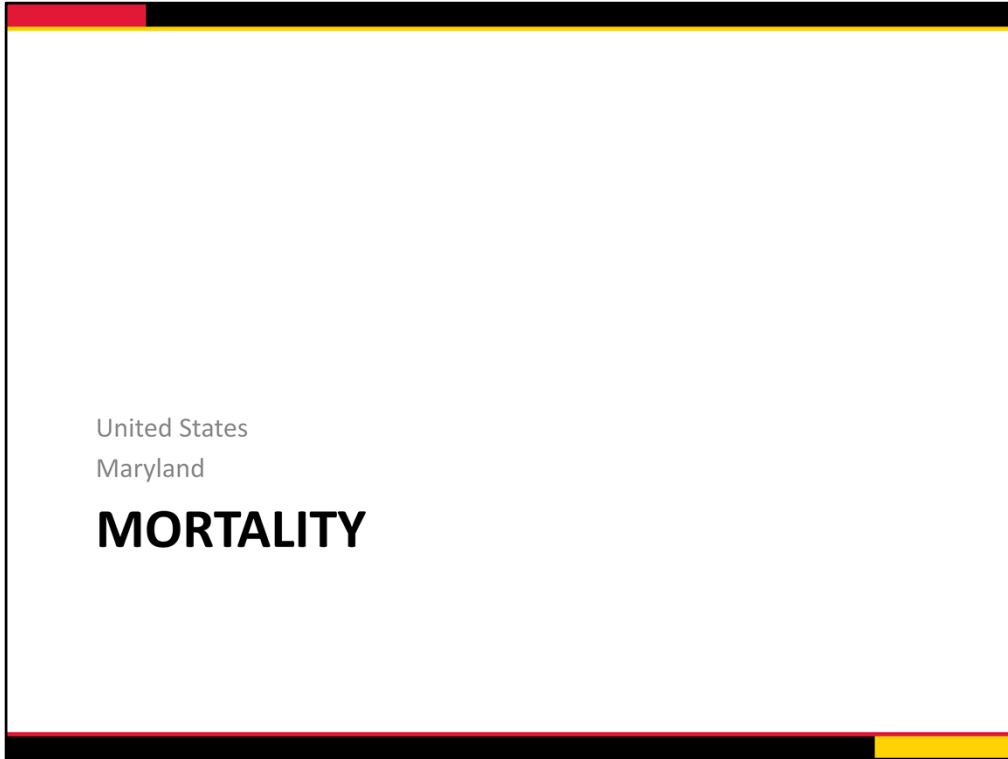
As part of its report card, the March of Dimes also evaluates the status of factors contributing to the prematurity rate in each state. In Maryland uninsured women, late preterm birth, and women who smoke are leading contributing factors. Fortunately, the status of each of the associated rates is improving with the greatest improvement seen in the factor *women who smoke*.

## Maryland Preterm Birth Rates by Race & Ethnicity

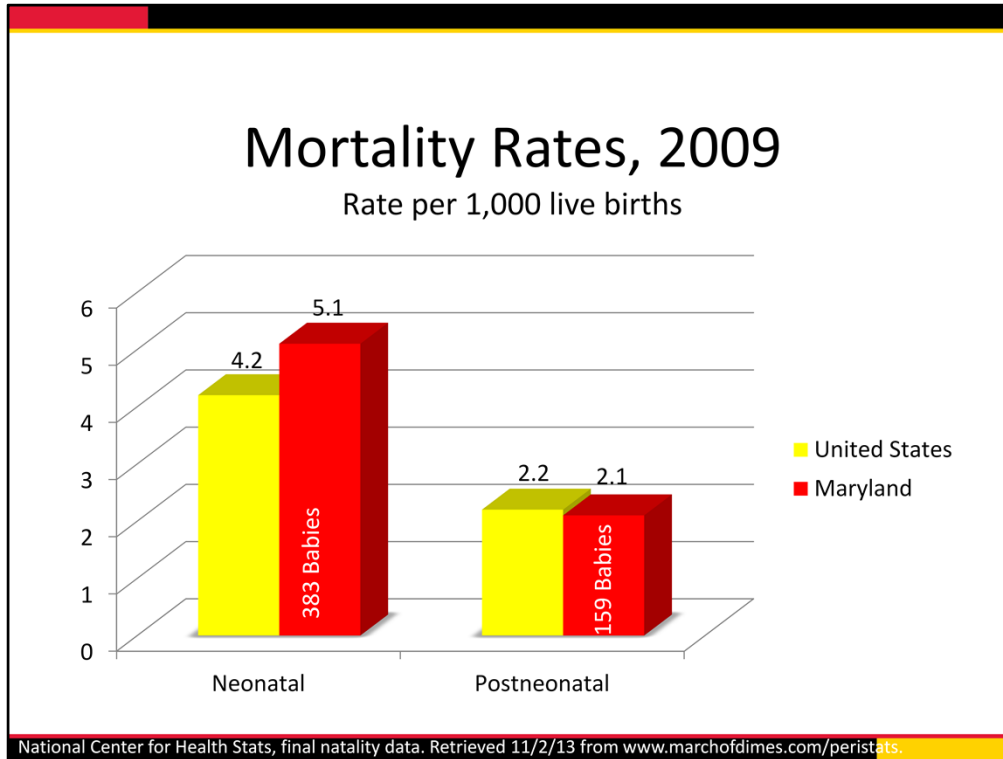
Rate	Recommendation
Asian 10.0%	MOD is concerned about inequities in health & health care that contribute to higher rates of preterm birth among different racial & ethnic groups. MOD urges state & federal governments to support funding & innovative practices that address the complex medical & social factors underlying racial & ethnic disparities in premature birth.
White 10.1%	
Hispanic 13.0%	
Black 16.3%	

March of Dimes 2013 Premature Birth Report Card

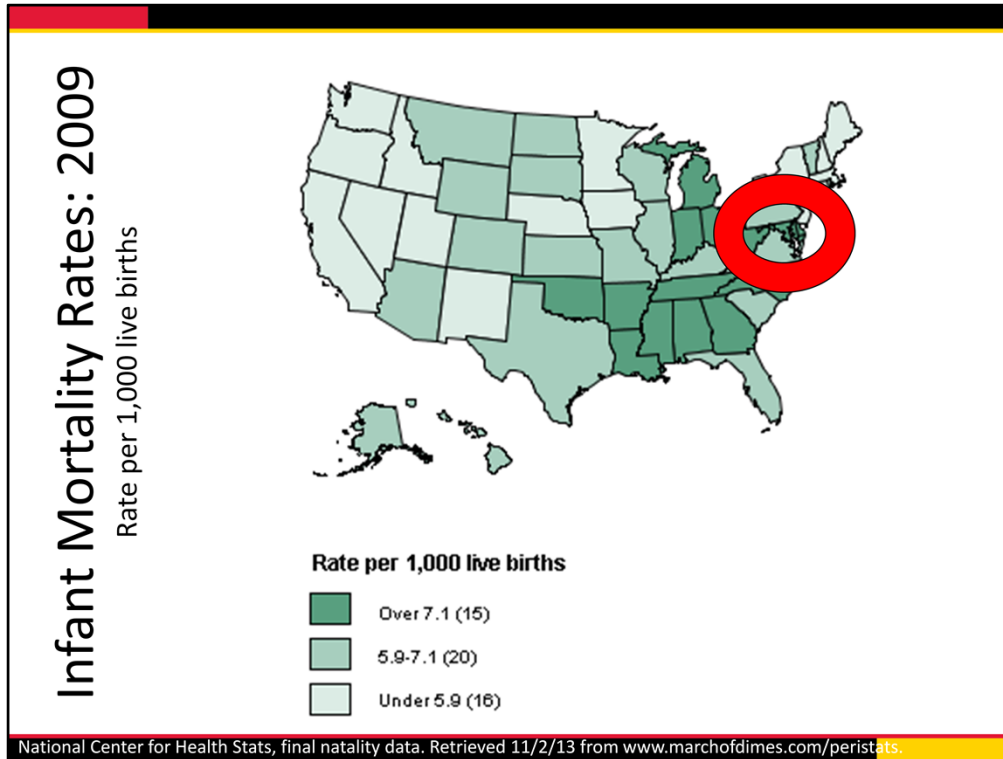
Finally, the March of Dimes report card includes information by race and ethnicity. In Maryland, the preterm birth rate is highest among Blacks and Hispanics, and lowest in Whites and Asians. The March of Dimes urges state and federal governments to support funding and innovative practices that address the complex medical and social factors underlying racial and ethnic disparities.



Unfortunately, infants born prematurely are at higher risk for infant mortality. Let's take a look at mortality rates in the U.S. and Maryland.

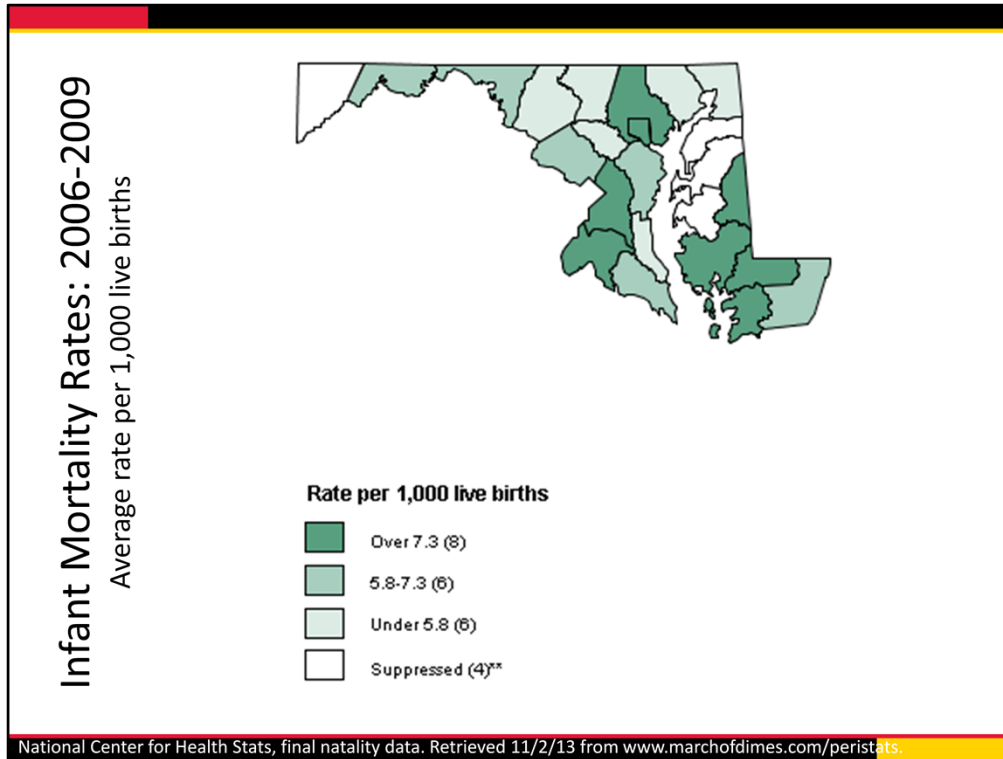


The most current data regarding infant mortality is from 2009. In 2009, the rate of neonatal mortality in the United States was 4.2 per 1,000 live births with neonatal mortality defined as a death occurring between birth and day 27 of life. In Maryland, the rate was 5.1 which is higher than the United States rate and represents the death of 383 babies prior to reaching their 28<sup>th</sup> day of life. The postneonatal mortality rate for the United States was 2.2 with postneonatal mortality referring to infant deaths occurring after day of life 27 but prior to the child's 1<sup>st</sup> birthday. In Maryland the rate was 2.1 which is lower than the United States and represents 159 infant deaths.

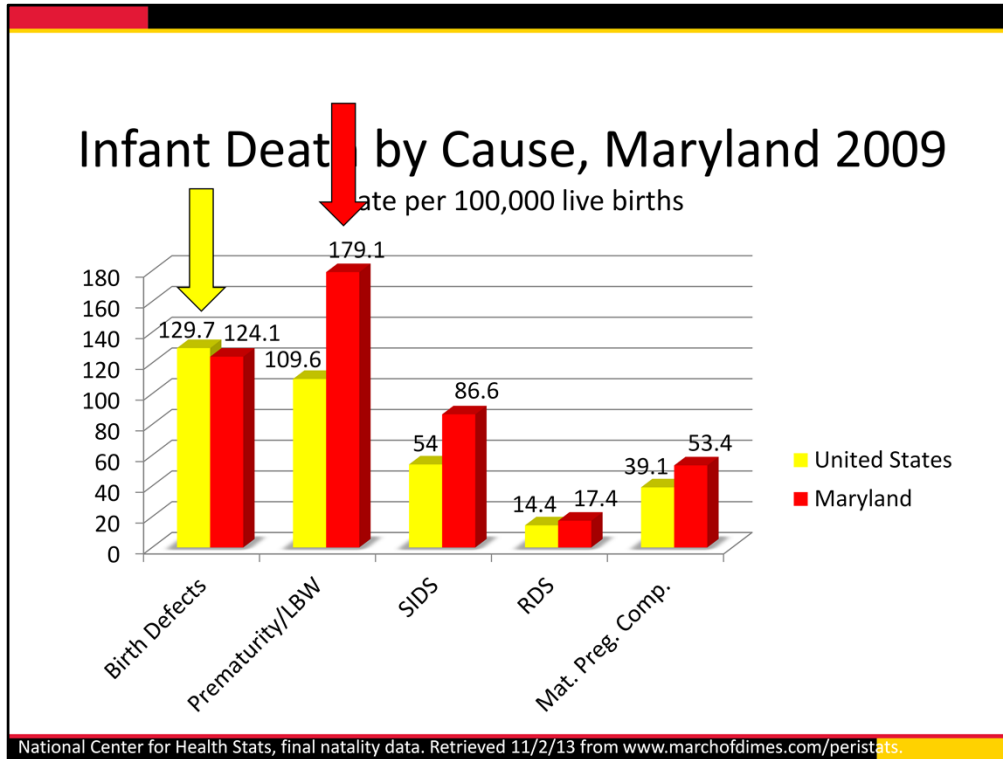


This map depicts how Maryland compares to other States with regards to infant mortality. 16 states had an infant mortality rate of less than 5.9, 20 states had a rate of 5.9 through 7.1 and 15 states had a rate of greater than 7.1. Unfortunately, Maryland once again fell in the highest category. Let's take a closer look at Maryland and see how the jurisdictions within Maryland compared.





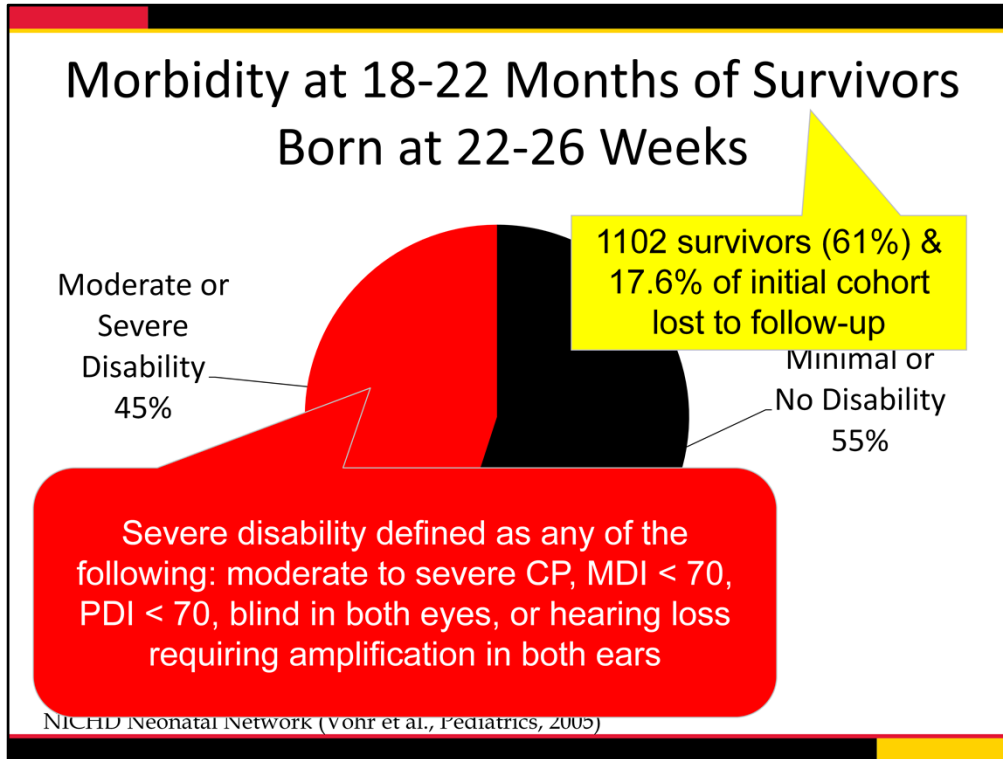
In Maryland, 6 jurisdictions had an infant mortality rate of less than 5.8, 6 jurisdictions had a rate of 5.8 through 7.3, and 8 jurisdictions had an infant mortality rate exceeding 7.3. Data for 4 counties were suppressed due to low or insufficient data.



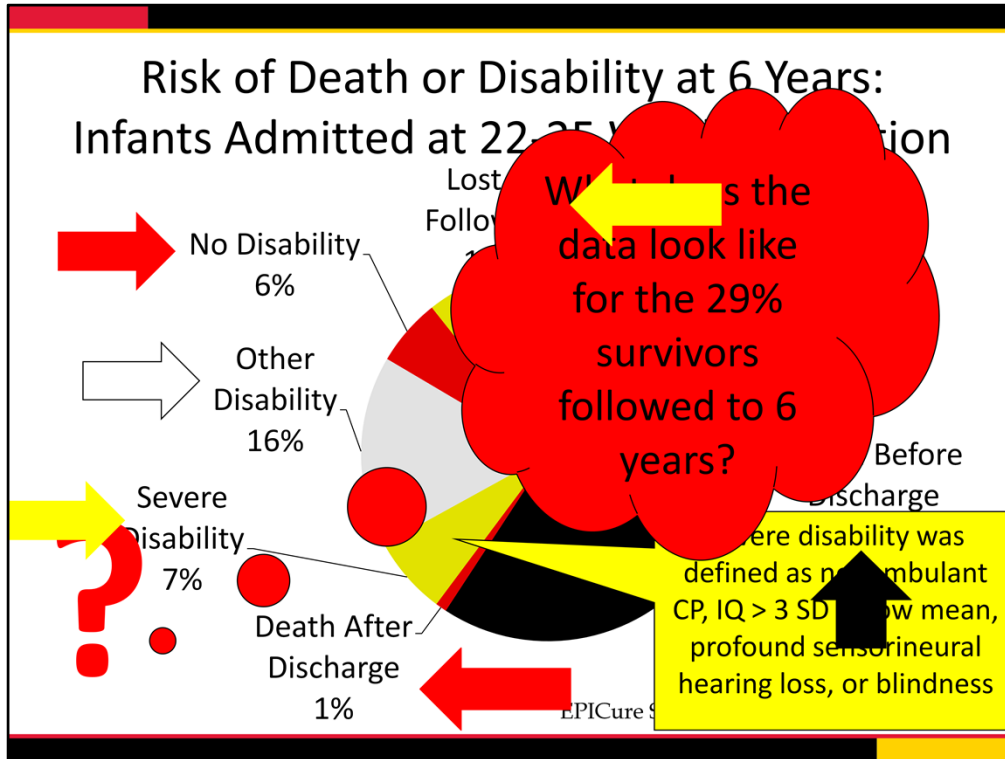
When comparing the cause of infant death throughout the United States to Maryland, we see that in 2009, birth defects was the leading cause of infant death in the United States while prematurity and low birthweight was the leading cause in Maryland.



In addition to being at risk for higher infant mortality, children born prematurely are also at higher risk for morbidity.

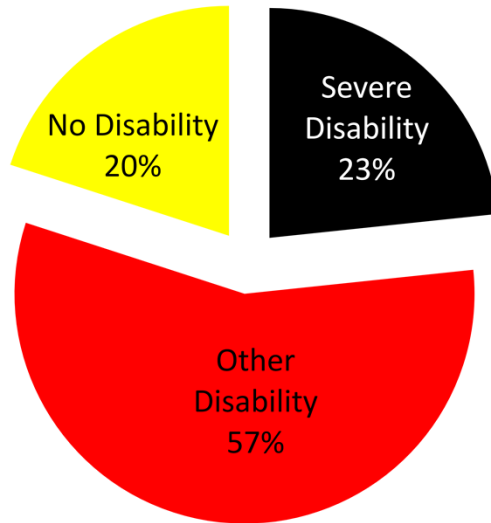


In this study, Vohr and her colleagues examined morbidity, at 18 to 22 months of age, in toddlers who were born at 22 to 26 weeks gestation. Noteworthy is the fact that this study includes 1,102 survivors or 61% of those born at this gestational age. Results of this study revealed that 55% of these toddlers displayed minimal or no disability and 45% had a moderate or severe disability. The authors of this study defined a severe disability as having moderate to severe cerebral palsy, a mental or physical developmental index of less than 70 where the mean was 100 and the standard deviation 15, blindness in both eyes or hearing loss requiring amplification in both ears. As authors of various studies define delay in different ways, it's important to determine how delay is defined in each study.



In this study, Marlow and colleagues examined the risk of death or disability at 6 years of age in 808 infants admitted to the NICU at 22 to 25 weeks gestation in the United Kingdom or Ireland. Fifty-nine percent of the babies died prior to discharge from the NICU and 1% died after discharge; an additional 11% were lost to follow-up. Six percent of the 6-year-olds had no disability, 7% had a severe disability. In this study, the authors defined a severe disability as nonambulant cerebral palsy, an IQ of greater than 3 standard deviations below the mean, a profound sensorineural hearing loss or blindness—and the remaining 16% had a mild or moderate disability. What does the data look like for the 29% of survivors followed to 6 years of age?

## Risk of Death or Disability at 6 Years: Infants Admitted at 22-25 Weeks Gestation



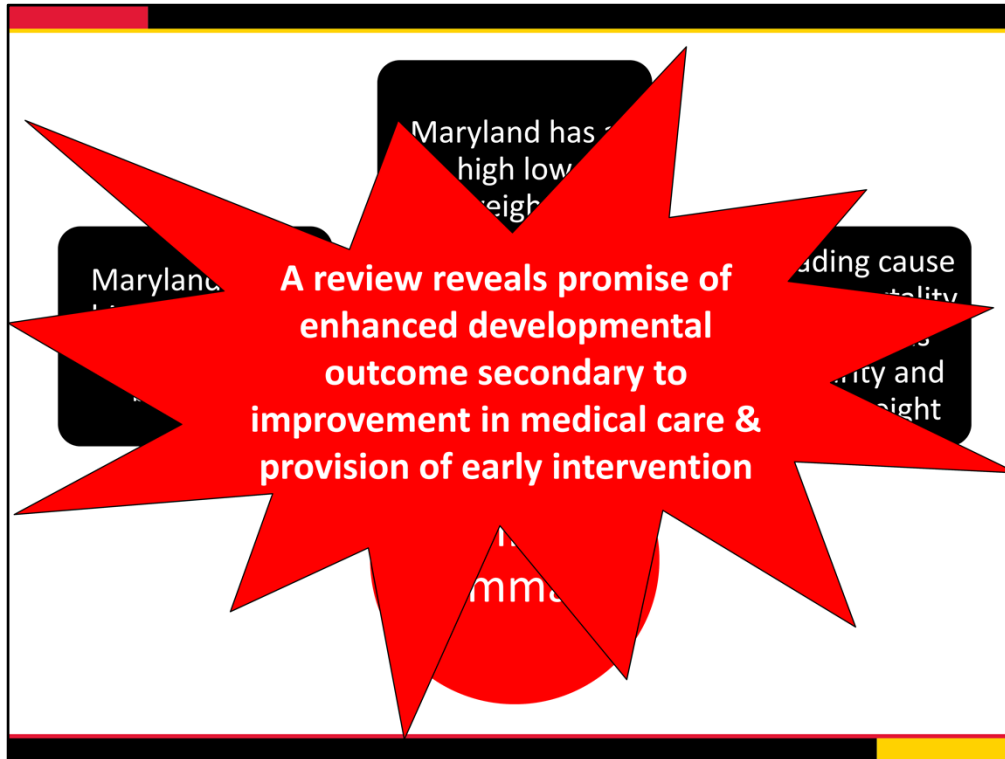
Twenty-three percent, or approximately 1/4 had a severe disability; 57% or a little over half, had a mild or moderate disability; and 20% had no disability.

## Promising Review of Outcome

**Ongoing surveillance to detect subsequent delay or impairment & to apply early intervention holds promise for further enhancement of functional outcome**

Baron & Rey-Casserly C. Extremely Preterm Birth Outcome: A Review of Four Decades of Cognitive Research. *Neuropsychol Rev* 2010;20:430-452.

In 2010, Baron and Rey-Casserly published a promising review of outcome results. They noted four key messages. First, premature birth incidence and survival rates are increasing due to medical advances in obstetric and neonatal intensive care. Second, infants born at the limits of viability (those 22-26 weeks) are at the highest risk of adverse neurocognitive functioning. Third, data from earlier generation cohorts, studies of babies born in substantially different eras, cannot be relied on to predict outcome today—because of the medical advances in neonatal intensive care and early intervention. Fourth, a systematic review, by birth cohort year, shows a changing developmental trajectory in which today's extremely preterm survivor is likely to have fewer severe medical complications, better neurological outcomes, and fewer adverse cognitive effects. As such, ongoing developmental surveillance to detect subsequent delay or impairment, and to apply early intervention, holds promise for further enhancement of functional outcome.



In summary, Maryland has a high preterm and very preterm birth rate. Maryland has a high low birtweight rate. The leading cause of infant mortality in Maryland is prematurity and low birtweight. A current review of the literature reveals the promise of enhanced developmental outcome secondary to improvement in medical care and the provision of early intervention services.



## In an Average Week in Maryland...

1,419 babies  
born

181 babies  
born preterm

125 babies  
born LBW

32 babies  
born very  
preterm

24 babies  
born VLBW

10 babies die  
before 1st  
birthday

In an average week in Maryland:

- 1,419 babies are born,
- 181 babies are born prematurely,
- 125 babies are born at low birthweight,
- 32 babies are born very preterm,
- 24 babies are born at very low birthweight, and
- 10 babies die before their first birthday.