

**Summary of 2011 DHMH  
Infant Mortality Report and An  
Analysis Design Template**

# Hypertension During Pregnancy

Prevalence:

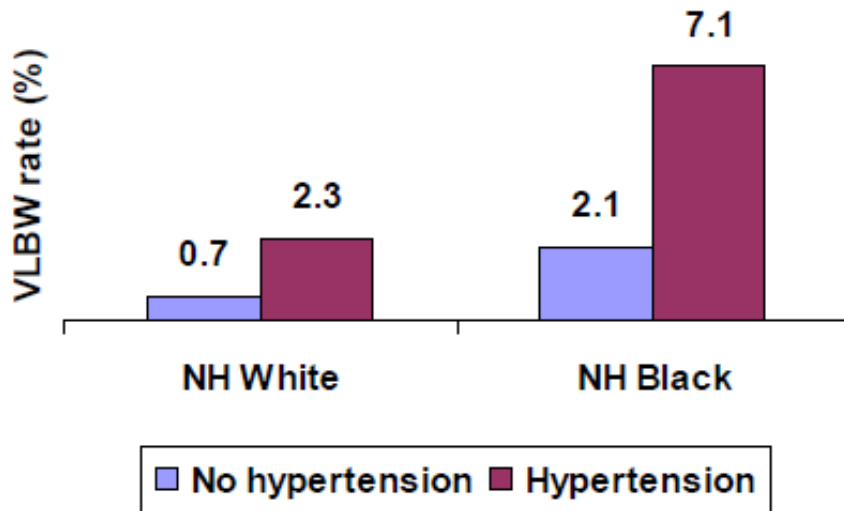
NH White ('05-'08) = 11.7%

('09) = 8.6%

NH Black ('05-'08) = 12.8 %

('09) = 16.2%

**Infant VLBW (<1500 grams) Rate and Hypertension During Pregnancy by Race/Ethnicity, Maryland 2005-2009**



A major contributing factor to preterm birth is preeclampsia/eclampsia and related hypertensive complications of pregnancy which frequently require very early delivery.

The very low birth weight (VLBW) rate for infants of NH Black women with prenatal hypertension was over three times the rate for NH Black mothers without hypertension (7.1% vs. 2.1%) and over three times the rate for NH White mothers with hypertension (7.1% vs. 2.3%). The very preterm birth (VPTB; <32 weeks gestation) rate among NH Black mothers with hypertension was 6.9% compared with

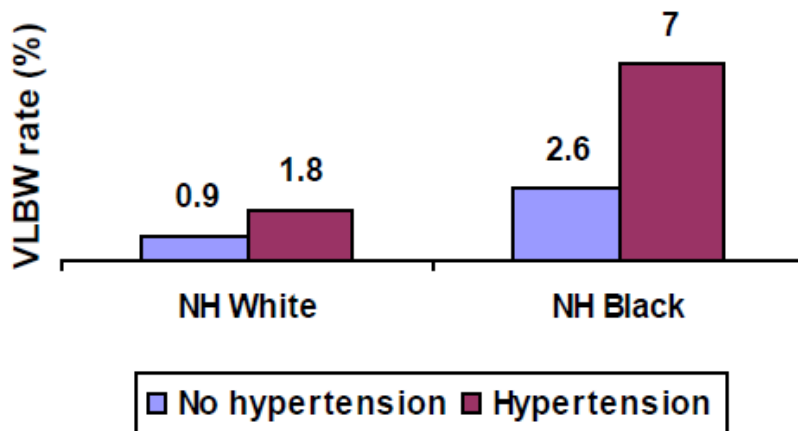
# Hypertension Before Pregnancy

## Hypertension before Pregnancy

PRAMS Survey: “During the 3 months before you got pregnant with your new baby, did you have hypertension?”

Prevalence:                      NH White ('05-'08) = 2.4%                      ('09) = 3.1%  
   NH Black ('05-'08) = 3.9%                      ('09) = 5.7 %

**Infant VLBW (<1500 grams) Rate and Hypertension Before Pregnancy by Race/Ethnicity, Maryland 2005-2009**



The VLBW rate among NH Black women who reported they had hypertension before pregnancy was 2.7 times the rate for NH Black women who did not report hypertension (7.0% vs. 2.6%) and nearly four times the rate of NH White women with hypertension before pregnancy (7.0% vs. 1.8%). Approximately 3% of mothers (~2,250 mothers) reported they were hypertensive before pregnancy, including 3% of NH White mothers and 6% of NH Black mothers. Compared to 2005-2008 rates, the prevalence of chronic hypertension increased 29% in 2009 among NH White and 72% among NH Black women.

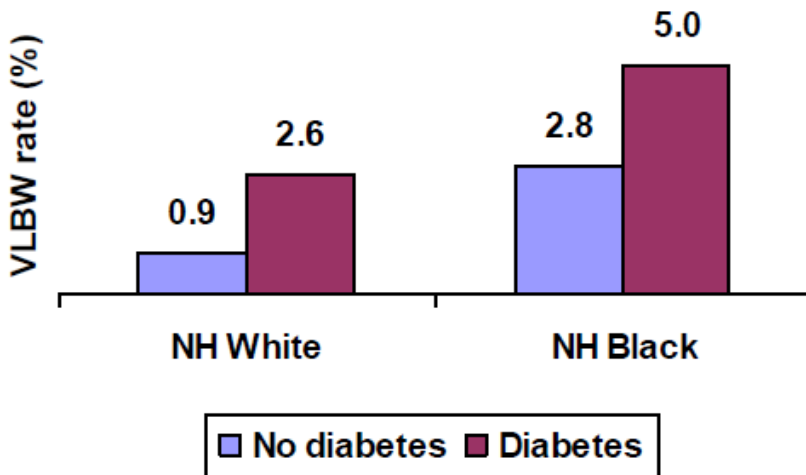
# Diabetes Before Pregnancy

## Diabetes before Pregnancy

PRAMS Survey: “Did you have high blood sugar (diabetes) that started before this pregnancy?”/ “Before you got pregnant with your new baby, were you told by a doctor, nurse or health care provider that you have Type 1 or Type 2 diabetes?”

Prevalence:                      NH White ('05-'08) = 0.8%                      ('09) = 1.9%  
   NH Black ('05-'08) = 1.7%                      ('09) = 1.8%

**Infant VLBW (<1500 gms) Rate and Diabetes Before Pregnancy by Race/Ethnicity, Maryland 2005-2009**



The VLBW rate among NH White and NH Black mothers who reported they had diabetes before pregnancy was nearly twice the rate for mothers who did not report diabetes. Nearly 2% of NH White and Black mothers (~1,500 mothers) reported they had diabetes before pregnancy. Compared to 2005-2008 rates, the prevalence of diabetes nearly doubled in 2009 among NH White mothers and increased 6% among NH Black mothers.

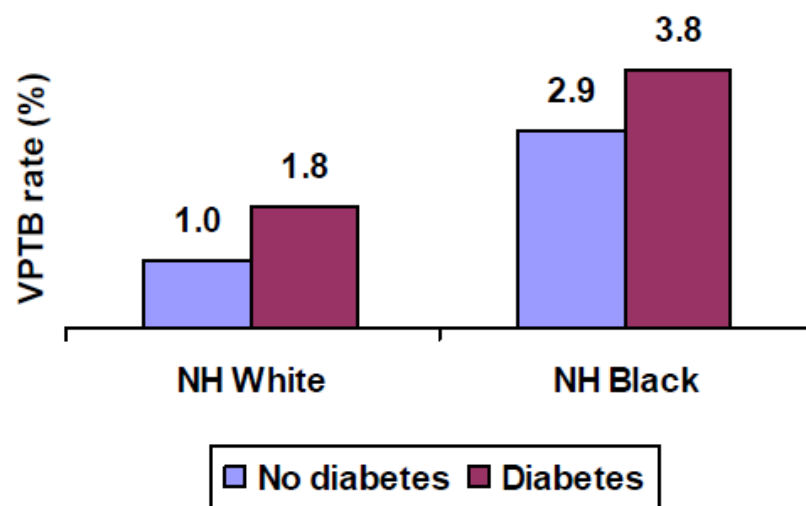
# Diabetes During Pregnancy

## Diabetes during Pregnancy (Gestational Diabetes)

PRAMS Survey: “During your most recent pregnancy, were you told by a doctor, nurse or health care provider that you had gestational diabetes (diabetes that started during this pregnancy)?”

Prevalence:                      NH White ('05-'08) = 6.7%                      ('09) = 9.0%  
   NH Black ('05-'08) = 9.8%                      ('09) = 8.0%

Infant VPTB (<32 weeks) Rate and Diabetes during Pregnancy by Race/Ethnicity, Maryland 2005-2009



The VPTB rate among NH White and NH Black mothers who reported gestational diabetes was 2.9 and 1.8 times the rate respectively for White and Black mothers who did not report gestational diabetes. Ten percent of Maryland mothers (~7,500 mothers) reported they had gestational diabetes. [Note: 18% of Asian mothers reported they had gestational diabetes – more than any other racial/ethnic group.]

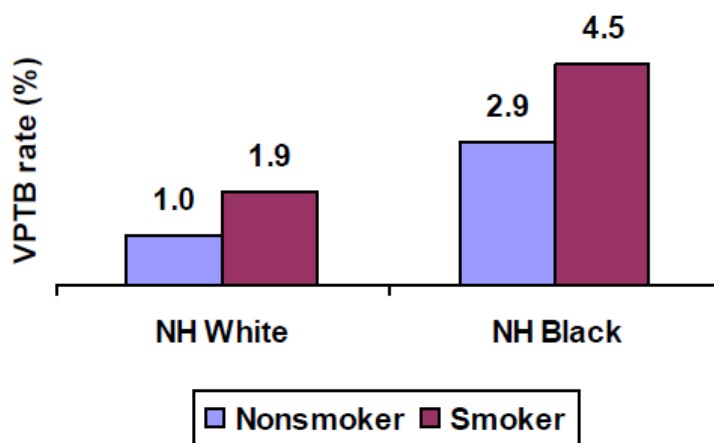
## Maternal Tobacco Use

### Tobacco Use before and during Pregnancy

PRAMS Survey: “In the 3 months before you got pregnant, how many cigarettes did you smoke in an average day?” “In the last 3 months of your pregnancy, how many cigarettes did you smoke in an average day?”

Prevalence (before):	NH White ('05-'08) = 25%	('09) = 22%
	NH Black ('05-'08) = 13%	('09) = 17%
Prevalence (during):	NH White ('05-'08) = 14%	('09) = 13%
	NH Black ('05-'08) = 8%	('09) = 8%

**Infant VPTB (<32 weeks) Rate and Tobacco Use During Pregnancy by Race/Ethnicity, Maryland 2005-2009**



The respective VPTB rate among NH White and NH Black mothers who reported tobacco use during pregnancy was 1.9 and 1.6 times the rate for NH White and Black mothers who did not smoke. Nine percent of Maryland mothers (~6,750 mothers) reported they smoked during pregnancy.

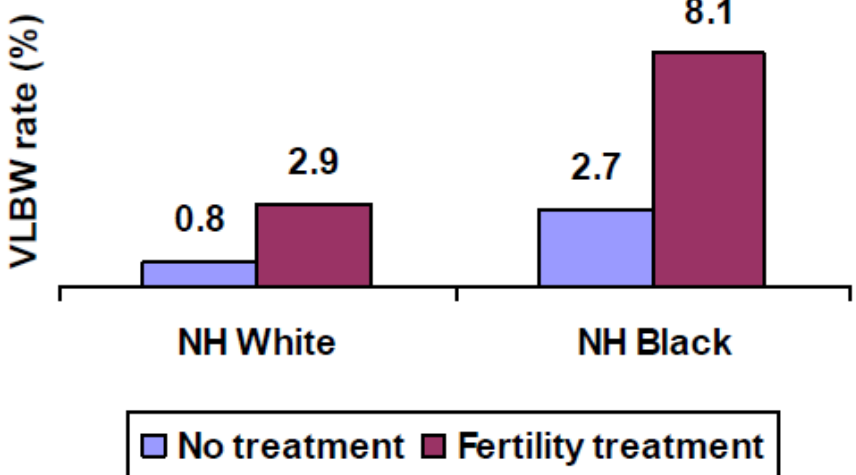
Mothers who reported that they smoked during the 3 months just before pregnancy most likely smoked during early pregnancy until the time of pregnancy confirmation. The VPTB rates are similar to rates of mothers who smoked during pregnancy.

# Fertility Treatments

PRAMS Survey: “Did you take any fertility drugs or receive any medical procedures from a doctor, nurse, or other health care worker to help you get pregnancy with your baby?”

Prevalence: NH White ('05-'08) = 6.8% ('09) = 8.7%  
NH Black ('05-'08) = 2.3% ('09) = 2.6%

Infant VLBW (<1500 gms) Rate and Fertility Treatments by Race/Ethnicity, Maryland 2005-2009



Fertility treatments, including fertility drugs and assisted reproductive technology procedures, generally increase the risk of multiple gestations. Multiple gestation is related to about a 3-fold increase in VLBW infants for NH White and Black mothers compared to women not using fertility treatments. NH Black women using fertility treatments are 2.8 times more likely to deliver a VLBW infant than NH White women using fertility treatments. [Note: 10% of Asian mothers reported the use fertility treatments, more than any other racial/ethnic group.]

## ***Post Partum Factors***

### **Infant Sleep Position, Co-Sleeping, Maternal Tobacco Use**

PRAMS Survey: “In which position do you most often lay your baby down to sleep?”

Prevalence (not on back):      NH White ('05-'08) = 21%                      ('09) = 17%  
   NH Black ('05-'08) = 45%                      ('09) = 41%

PRAMS Survey: “How often does your new baby sleep in the same bed with you or anyone else?” ('09 data only)

Prevalence (always/often- yes):                      NH White ('09) = 14%  
   NH Black ('09) = 30%

PRAMS Survey: “How many cigarettes do you smoke on an average day now?”

Prevalence (smokes):                      NH White ('05-'08) = 19%                      ('09) = 18%  
   NH Black ('05-'08) = 12%                      ('09) = 14%

# Prevalence of Late Onset of Prenatal Care

Onset of pre-natal care data are obtained from birth certificates, and prenatal care onset is reported as first trimester, second trimester, third trimester, no care, or not stated. The table and chart below show the distribution this timing of the onset of prenatal care by race/ethnicity.

**Distribution of Births by Onset of Prenatal Care,  
Race and Hispanic Origin**  
*Maryland Vital Statistics, 2004-2008 birth cohorts combined*

	<b>All Race/Ethnicity</b>	<b>NH White</b>	<b>NH Black</b>	<b>Hispanic</b>
First	80.2%	88.4%	73.5%	63.2%
Second	14.1%	8.6%	18.1%	26.4%
Third	2.9%	1.6%	4.0%	5.3%
No care	1.3%	0.6%	2.2%	2.3%
Not stated	1.5%	0.8%	2.1%	2.8%

## Observed Risks Associated with Late Onset of Prenatal Care

The infant mortality outcomes associated with these times of onset of prenatal care, by race/ethnicity groups, are given the table below:

	<b>All</b>	<b>NH White</b>	<b>NH Black</b>	<b>Hispanic</b>
First	6.9	4.6	12.2	4.6
Second	6.9	6.9	8.9	3.7
Third	5.7	6.4	7.1	2.0
No care	35.9	31.6	43.1	22.9
Not stated	33.0	30.4	40.8	20.9

Some of these outcome results are counter-intuitive: why should second trimester onset of care appear better than first trimester onset for Non-Hispanic Blacks and Hispanics and why should third trimester care onset appear superior to second trimester onset? These patterns are most likely due to selection biases and confounding inherent in public health surveillance data and which are not easily removed.

Infant mortality rates vary by maternal age. Generally, women aged 20 to 34 have lower risk for infant mortality, while women younger than this age range generally have higher risk for infant mortality, and women older may have higher risk depending on race/ethnicity.

## Prevalence of Young or Old Maternal Age

Maternal age data are obtained from birth certificates, and reported by age groups as shown in the table and chart below, which shows the distribution of maternal age by race/ethnicity.

	<b>All Race/Ethnicity</b>	<b>NH White</b>	<b>NH Black</b>	<b>Hispanic</b>
<16 years	0.5%	0.2%	1.0%	0.7%
16-17 years	2.4%	1.4%	3.9%	3.2%
18-19 years	5.8%	4.1%	8.8%	6.7%
20-24 years	20.7%	17.1%	25.9%	27.1%
25-34 years	51.9%	55.2%	45.0%	50.0%
35-39 years	15.0%	17.7%	12.0%	9.7%
40+ years	3.8%	4.3%	3.3%	2.6%

## Observed Risks Associated with Maternal Age

Infant mortality rates by maternal age group, race and Hispanic origin are given in the table below:

	<b>All Race/Ethnicity</b>	<b>NH White</b>	<b>NH Black</b>	<b>Hispanic</b>
<16 years	14.0	14.0	12.7	17.9
16-17 years	10.2	7.2	10.7	13.1
18-19 years	9.2	6.8	11.6	6.3
20-24 years	8.6	6.9	12.4	3.5
25-34 years	6.7	4.4	12.1	4.7
35-39 years	7.8	5.1	15.4	6.5
40+ years	9.7	6.0	16.6	9.0

For Non-Hispanic Whites, dramatically higher risk is seen in the youngest age group, while there is less additional risk in the older ages. For Non-Hispanic Blacks, the lowest risk is paradoxically seen for ages 16-17, and the highest risks at ages 35 and older. For Hispanics, there is a strikingly higher risk in the two youngest age groups, as well increased risk in the two oldest age groups.

## ***Prior Pre-term Birth***

### **Prevalence of Prior Pre-term Birth**

Prior pre-term birth data come from birth certificates, and the table below shows its distribution by race/ethnicity.

**Distribution of Births by Prior Pre-term Delivery,  
Race and Hispanic Origin**  
*Maryland Vital Statistics, 2004-2008 birth cohorts combined*

	<b>All Race/Ethnicity</b>	<b>NH White</b>	<b>NH Black</b>	<b>Hispanic</b>
No	99.0	98.9	98.9	99.5
Yes	1.0	1.1	1.1	0.5

Mothers with a history of a previous pre-term birth represent only about 1% of Maryland live births. Because the risk factor is so rare, interventions in this risk group, while advisable, will have a small impact on overall Maryland infant mortality.

## Observed Risks Associated with Prior Pre-term Birth

The infant mortality outcomes associated with presence or absence of a history of prior preterm birth, by race/ethnicity groups, is given the table below:

### Infant Mortality Rates by Prior Pre-term Birth Stratified by Race and Hispanic Ethnicity

*Maryland Vital Statistics, 2004-2008 birth cohorts combined*

	<b>All Race/Ethnicity</b>	<b>NH White</b>	<b>NH Black</b>	<b>Hispanic</b>
No	7.5	5.1	12.3	5.1
Yes	23.3	11.8	40.1	16.5

History of prior pre-term birth is associated with a two- to three-fold higher infant mortality rate compared to no such history. This represents an identifiable high risk group that is appropriate for targeting with effective inter-conception and during pregnancy interventions.

## ***Level of Care in Hospital of Birth, if Very Low Birth Weight***

### **Prevalence of Non-Level III Birth among Very Low Birth Weight Babies**

Data on the percentage of VLBW infants delivered in non-level III hospitals come from birth certificates. The table below shows the distribution of these births by race/ethnicity.

<b>Very Low Birth Weight Babies Only: Distribution of Births by Level of Care in Birth Hospital, Race and Hispanic Origin</b>				
<i>Maryland Vital Statistics, 2004-2008 birth cohorts combined</i>				
	<b>All Race/Ethnicity</b>	<b>NH White</b>	<b>NH Black</b>	<b>Hispanic</b>
Level III	91.0%	89.4%	91.6%	91.5%
Not Level III	9.0%	10.5%	8.4%	8.5%

Nine percent of all VLBW infants are born in non-level III hospitals. This figure is slightly higher for NH White infants than for NH Black or Hispanic infants.

## Observed Risks Associated with Non-Level III Birth among Very Low Birth Weight Babies

The infant mortality rates associated with non-level III birth of VLBW babies by race/ethnicity groups are given in the table below:

**Very Low Birth Weight Babies Only:  
Infant Mortality Rates by Level of Care in Birth Hospital  
Stratified by Race and Hispanic Ethnicity**  
*Maryland Vital Statistics, 2004-2008 birth cohorts combined*

	<b>All Race/Ethnicity</b>	<b>NH White</b>	<b>NH Black</b>	<b>Hispanic</b>
Level III	249.7	225.4	266.3	224.8
Not Level III	387.4	330.2	450.5	272.7

The infant mortality rates for all VLBW infants are strikingly high. In this high risk pool, the NH Black to NH White rate ratio is rather small: 1.18 for births at a level III hospital. Birth at a non-level III hospital adds 20% to 70% to the risk of infant death depending on race/ethnic group: infant mortality rates are particularly high among Non-Hispanic Black infants.

Overall, the infant mortality rate is twice as high for infants delivered at 37-38 weeks gestation compared with infants delivered at 39-41 weeks. Both neonatal and postneonatal mortality rates are higher among the early term births. This relationship exists for NH White, NH Black and Hispanic infants.

<b>Infant, Neonatal and Postneonatal Mortality Rates by Gestational Age, Race and Hispanic Origin, Maryland, 2004-2008 Birth Cohorts.</b>			
Race, Hispanic origin and gestational age (wks.)	Mortality rate per 1000 live births		
	Infant	Neonatal	Postneonatal
Total			
37-38	3.0	1.3	1.7
39-41	1.5	0.5	1.0
White non-Hispanic			
37-38	2.8	1.3	1.5
39-41	1.4	0.5	0.9
Black non-Hispanic			
37-38	3.7	1.4	2.4
39-41	1.9	0.6	1.4
Hispanic			
37-38	2.0	1.1	0.9
39-41	1.2	0.4	0.7

The Workgroup recommends the following opportunities (with caveats) for intervention

**1) Chronic Conditions Before and During Pregnancy**

- *Hypertensive disorders during pregnancy and chronic hypertension before pregnancy*
- Other medical conditions such as *gestational diabetes and pre-pregnancy diabetes, heart disease, obesity, and asthma* as well as *tobacco use, binge drinking, intimate partner violence and depression*

**2) Fertility Treatment**

**3) Infant Sleep Position, Co-sleeping, Postpartum Maternal Tobacco Use**

**4) Timing and Effectiveness of Prenatal Care**

**5) Maternal age**

**6) Prior Pre-term**

**7) Birth Hospital Level of Care, if Very Low Birth Weight (VLBW)**

**8) Early Term Deliveries (37-38 weeks gestation)**

# Factorial Design Approach Illustrated

Hypertension during pregnancy and its relationship to Very Low Birth Weight (data from 2011 report, or **hypothetical** [red or other color])

Prevalence of HTN during pregnancy:

	Rural	Non-Rural	Total
Black	<b>16%</b>	<b>12%</b>	<b>12.8% ('05-'08) 16.2% ('09)</b>
White	<b>10%</b>	<b>10%</b>	<b>8.6% ('05-'08) to 11.7% ('09)</b>
Total	<b>13%</b>	<b>11%</b>	<b>11.5%</b>

**This hypothetical pattern of rural and non-rural prevalence within race groups could contribute to an overall rural disadvantage, which is confined to a Black rural disadvantage.**

# Explore Local Effect Differences

- Even if hypertension has the same adverse effect in both Blacks and Whites, the prevalence difference will create a rural Black disadvantage.
- If hypertension has a greater adverse effect on Blacks, then the Black disadvantage will be even larger than the prevalence disadvantage would suggest.
- So we also chart the association metrics (risk ratio and risk difference):

**Relative prevalence (prevalence ratio) for VLBW outcome by HTN status in pregnancy (HTN/Not):**

	Rural	Non-Rural			Total
Black	<b>3.4</b> <b>3.8</b> <b>3.8</b>	<b>3.4</b>	<b>3.0</b>	<b>3.0</b>	<b>3.4 (7.1% if HTN/2.1% if not)</b>
White	<b>3.3</b> <b>3.3</b> <b>3.6</b>	<b>3.3</b>	<b>3.3</b>	<b>3.0</b>	<b>3.3 (2.3% if HTN/0.7% if not)</b>
Total					

The red, purple and blue represent three sets of cell values that would be consistent with the marginal values (items under total). **Red represents similar relative risk for all four cells, purple represents RR excess for rural in Blacks only, and blue represents RR excess for rural in both races.**

**Prevalence difference for VLBW outcome by HTN status in pregnancy (HTN - Not):**

	Rural	Non-Rural	Total
Black			<b>5.0 percentage points</b> <b>(7.1% if HTN - 2.1% if not)</b>
White			<b>1.6 percentage points</b> <b>(2.3% if HTN - 0.7% if not)</b>
Total			