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The Relationship of Maternal Age, Trimester of Entry into Prenatal Care, Maternal Postpartum Depression, and Race with Birth weight of Infants Born in Cincinnati, Ohio

Kelli Kohake

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The Relationship of Maternal Age, Trimester of Entry into Prenatal Care, Maternal Postpartum Depression, and Race with Birthweight of Infants Born in Cincinnati, Ohio

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Abstract

Healthcare, resources, and technology in the United States (U.S.) has improved, yet the U.S. ranks 29th in the world for the highest infant mortality rates – behind other less developed countries. Within the U.S., Ohio (and Hamilton County in particular) has high rates of infant mortality. Low birthweight and preterm births are a major cause of infant mortality. Data analysis was done consisting of descriptive statistics and Analysis of Variance of the prenatal patients served at the Cincinnati Health Department health centers who delivered in 2009, with dependent variables of birthweight and postpartum depression. Independent variables included maternal age, the trimester of entry into prenatal care, postpartum depression, and race. A p-value of < .05 was considered statistically significant. Relative to infant birthweight, maternal age was not statistically significant as a continuous variable (p = 0.2508), or when divided into age groups (p = 0.3819). The trimester of entry was not statistically significant relative to infant birthweight (p = 0.5294), but was statistically significant when the depression scale score was used as a dependent variable (p = 0.0388). The Edinburgh Postnatal Depression Scale score was also statistically significant relative to birthweight as a continuous variable (p = 0.0492, and when broken into scoring categories (p = 0.0273). Race was statistically significant relative to birthweight (p = 0.0059). In summary, maternal age and trimester of entry into prenatal care were not statistically significant relative to infant birthweight. However, the EPDS score and maternal race was statistically significant relative to infant birthweight. Further, the trimester of entry was statistically significant relative to the EPDS score. More studies are needed to further explore depression during the antenatal period relative to infant birthweight and to add credence to the supposition of the relationship between depression and LBW, and depression and trimester of entry.
Introduction

Healthcare in the United States has improved over time, including maternal and infant health. According to the U. S. Department of Health and Human Services (DHHS), the proportion of mothers getting early prenatal care is at a record high. In 2000, 83.2 percent began prenatal care in the first trimester, the continuation of a trend since 1989 (U.S. DHHS, 2002). The rate of cigarette smoking by pregnant women continues to fall. Birth rates among teenagers in all ethnic groups declined throughout the 1990s. But infant mortality has continued to be a problem in the United States that has evaded the technological advances and medical sophistication of this country. Further, infant mortality has plagued the southwest area of Ohio – specifically Hamilton County – with some of the highest rates for infant mortality in the nation.

Infant mortality rate (IMR) is defined as the rate at which babies less than one year of age die (Centers for Disease Control and Prevention (CDC), 2008). Overall, the nation’s infant mortality rate has fallen from 20 deaths per 1,000 live births in 1970 to 6.9 deaths in 2000 (DHHS), a decline of 74% in the last four decades. Infant mortality is widely viewed as the single best indicator of the overall health of a community or a nation (Friis & Sellers, 2004). It is used as a measure of the quality of food, housing, water source, health care, and education (Health Resources and Services Administration [HRSA] - Maternal and Child Health Bureau, 2006) available to the people of a community. The World Health Organization (WHO) reports that communities with high infant mortality rates tend to have high child and adult mortality rates, lower life expectancy, and higher rates of preventable illness overall. Despite all of our technological advances and resources, the IMR of the United States is worse than 28 other developed countries (ODH Task Force, 2009).

Many factors can influence infant mortality rates. Medical and socioeconomic status risk factors may contribute to poor birth outcomes. A number of medical risks are gathered on the
birth certificate, including anemia, pregnancy-associated hypertension, diabetes, and age. In 2002, the Ohio Department of Health Vital Statistics section reported that 36.6% of women who had a live birth also were identified as having medical risk factors. Behavioral risks factors have also been identified as affecting birth outcomes, such as unintended pregnancy, cigarette smoking, alcohol and illicit drug use, late or no prenatal care, and physical exertion at work (James, 1993).

Racial disparities exist for IMR between black (African-American) and white (Caucasian) infants. According to a report from the HRSA - Maternal and Child Health Bureau (2006), disparities often reflect underlying differences in access to care, use of preventive health behaviors, nutritional status, health care decision making, psychosocial stresses, and environment (such as housing quality). All of these factors are also known to be predictors to prematurity, low birthweight, and perinatal depression (Rich-Edwards et al., 2006). Black infants are more than two times (14.2%) more likely to be born weighing less than 2500 grams than white infants (6.3%), and more than three times more likely than white infants to be born weighing less than 1500 grams (3.1% vs. 12%) (Rauh, Andrews, & Garfinkel, 2001).

In consideration of risk factors listed, further deliberation will be given to the possible relationships or correlations within the prenatal population served at the Cincinnati Health Department’s five community health centers. Analysis of data will show if there is any relationship of the infant’s birthweight compared to maternal age, trimester of the mother’s entry into prenatal care, and postpartum depression.
Background

Cincinnati, Ohio is in the United States’ midwest region. It is in Hamilton County which is located in the southwest region of the state. Cincinnati has a population of approximately 331,285, with a council-manager run government. The racial makeup of the city is 53% white, 42.9% black, and 4.1% other. Approximately 1.3% of the population also identify themselves as being Hispanic. It is estimated that 18% of the population is below the poverty level (U.S. Census Bureau & ePodunk, 2007).

The Cincinnati Health Department (CHD) has five primary care community health centers located around the city. These community health centers are partially funded by city dollars, and leveraged by other sources. They provide comprehensive services to the citizens of Cincinnati, offering adult and pediatric medicine, obstetric and gynecologic services, lab and pharmacy services, Women, Infant, and Children (WIC) food supplemental services, and dental services at four of the five sites. Together, the five sites serve largely vulnerable and indigent populations, with 80.9% below the federal poverty level. The five health centers are: Braxton F. Cann Memorial Medical Center located on the east side of the city; Elm Street Health Center is located downtown; Millvale at Hopple Street Health Center is located in Cumminssville; Northside Health Center is located in the north-central part of the city; and Price Hill Health Center is located in the lower west side of Cincinnati. The Elm Street Health Center is a Federally Qualified Health Center (FQHC), and the remaining four sites have FQHC Look-Alike status (Appendix A).

Hamilton County continues to have one of the highest infant mortality rates in the country (Table 1), averaging 10.7 infant deaths per 1,000 live births over the past nine years (2000-2008).
Table 1 – IMR County, State, Nation 2000-2008

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamilton County, Ohio&lt;sup&gt;b&lt;/sup&gt;</td>
<td>9.9</td>
<td>10.5</td>
<td>9.8</td>
<td>9.6</td>
<td>11.0</td>
<td>13.9</td>
<td>9.7</td>
<td>10.9</td>
<td>11.1</td>
</tr>
<tr>
<td>Ohio&lt;sup&gt;c&lt;/sup&gt;</td>
<td>7.7</td>
<td>7.6</td>
<td>7.9</td>
<td>7.8</td>
<td>7.7</td>
<td>8.3</td>
<td>7.8</td>
<td>7.7</td>
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<td>U.S.&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.9</td>
<td>6.8</td>
<td>7.0</td>
<td>6.8</td>
<td>6.8</td>
<td>6.8</td>
<td>7.0</td>
<td>6.8</td>
<td>*</td>
</tr>
</tbody>
</table>

<sup>a</sup>Infant Mortality is defined as infant deaths per 1,000 births.
<sup>b</sup>Data obtained from Ohio Department of Health Information Warehouse
<sup>c</sup>Data obtained from the National Center for Health Statistics

*Data not available at this time

The top three causes of infant death in Hamilton County are attributed to prematurity/low birthweight, congenital malformations (birth defects), and sudden infant death syndrome (SIDS) (Table 2).

Table 2 - Top Three Causes of Infant Death

<table>
<thead>
<tr>
<th></th>
<th>Hamilton County 2007</th>
<th>U.S. 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disorders related to short gestation and low birthweight, not elsewhere classified</td>
<td>24.0%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Congenital malformations, deformations, and chromosomal abnormalities</td>
<td>17.1%</td>
<td>19.6%</td>
</tr>
<tr>
<td>Sudden infant death syndrome</td>
<td>10.1%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

<sup>a</sup>Data obtained from ODH Information Warehouse
<sup>b</sup>Data obtained from CDC Wonder.

Prematurity is defined as any birth at less than 37 weeks of gestational age. Further, births that are less than 32 weeks are considered very preterm, and births between 34-36 6/7 weeks are referred to as late preterm. Babies born at 37 weeks gestation or earlier have considerably more health problems than those born at 38, 39, or 40 weeks (Donovan, Iams, & Rose, 2008).

Low birthweight (LBW) is defined as an infant weighting less than 2500 grams at birth; an infant is termed very low birthweight (VBLW) if weighing less than 1500 grams at birth.
Low birthweight is considered one of the greatest factors affecting neonatal mortality, and is a determinant of postneonatal mortality (CDC, 1995). Low birthweight infants are almost 40 times more likely to die during their first year of life than those born weighing above 2500 grams (CDC, 1995).

Congenital malformations, also known as birth defects, is an abnormality that is present at birth that results from a genetic, inherited, or unexplained cause (Donovan et al., 2008). Examples of birth defects include heart defects, metabolic disorders, neural tube defects (e.g., spina bifida) and genetic conditions (e.g., Down Syndrome).

Sudden infant death syndrome (SIDS) is defined as the sudden unexplained death of an otherwise healthy infant during the first year of life (National Institute of Child Health and Human Development, 2010). Further, if a child’s death remains unexplained after a formal investigation into the circumstances of the death, the death is then attributed to SIDS (Donovan et al., 2008). In the U.S., SIDS is the leading cause of death after the first month of life.

In Hamilton County, the proportional disparity between infant mortality for black women is great; they are 3.43 times more likely to have an infant die than white women. Race was limited to blacks and whites, which comprised 97.0% of the women giving birth in Hamilton County in 2002, (ODH 1999-2002; CDC, Wonder,Table 3). However, a discussion about the Hispanic population will be introduced later when describing disparities in vulnerable populations, and possible protective factors resulting in favorable birth outcomes.
Table 3 - Infant Mortality Rates per 1,000 births in Hamilton County in 2002 by Race

<table>
<thead>
<tr>
<th>IMR</th>
<th>% of pop. by race giving birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blacks</td>
<td>17.58</td>
</tr>
<tr>
<td></td>
<td>5.14</td>
</tr>
<tr>
<td>Whites</td>
<td>31.73</td>
</tr>
<tr>
<td></td>
<td>65.25</td>
</tr>
</tbody>
</table>

Additional data shows that in Hamilton County the average annual black infant mortality rate was 21% higher than the national black IMR (17.6 vs. 13.9) (CDC, 2002).

A snapshot of Hamilton County in 2002 indicated that women aged 15-19 had the highest rate of infant mortality (12.64% of those giving birth experienced an infant loss) compared to those aged 20-34 (9.7% of those giving birth with an infant loss) (ODH 1999-2002; CDC, Wonder). Data was not available for those aged less than 15 or older than 45.
Literature Review

Birthweight and Maternal Age

Young women, those less than 20 years old, have the highest prevalence of several risk factors for a poor pregnancy outcome such as a low birthweight baby, fetal death, stillbirth, birth complications, or infant loss. The risk factors include tobacco use, experiencing abuse and high levels of stress, anemia, underweight, and postpartum symptoms of depression (CDC, 2004). In Ohio, very young mothers (those less than 15 years of age) and older mothers (those 45+ years old) had the highest prevalence of infants born with a low birthweight in 2006 (approximately 17% and 20% respectively) (ODH, 2009). Recent reports suggest that older maternal age is associated with increased risk of LBW among singletons in black women (Rauh et al., 2001). Geronimus (1996) termed this deterioration in reproductive health status in black women as “weathering” (Geronimus, 1996). Geronimus (1996) proposes that black women experience deteriorating health over the childbearing years as a consequence of living in poverty.

In another study, the effects of maternal age on LBW varied by race and poverty, with the most extreme effects (incidence of low birth rates) among poor black women (Rauh et al., 2001). Older maternal age is associated with reduced birthweight among infants born to black women, and the age effect is worsened by individual poverty (poverty was defined as those receiving Medicaid during the perinatal period) (Rauh et al., 2001). Younger maternal age and lower educational levels were associated with higher postneonatal deaths for black and white women, but not for Hispanics (Kitsantas & Gaffney, 2010). Despite low educational levels, younger age, and little or late prenatal care, Hispanic women have the lowest risk for postneonatal mortality (Kitsantas & Gaffney, 2010). One theory for this is that the immigrant mothers tend to be married, have strong family support systems, have a strong sense of “self,” culture, and tradition
— along with their common language, healthier diets, and fewer high risk behaviors, like drug and alcohol use and smoking compared to non-immigrants (Kitsantas & Gaffney, 2010).

**Birthweight and Trimester of Entry into Prenatal Care**

There are many reports that say that early prenatal care is key to a positive birth outcome (Beck et al., 2002; HRSA - Maternal and Child Health Bureau, 2006; March of Dimes, 2008). Early prenatal care is defined as obstetric care received within the first trimester of the pregnancy. Early prenatal care provides the opportunity to address preventive behaviors such as folic acid use, periodontal care, breastfeeding, and interconceptional care (HRSA - Maternal and Child Health Bureau, 2006). It also allows for other risky behaviors to be addressed, like maternal smoking, alcohol and drug use. Additionally, biological and social risk factors can be addressed, such as perinatal depression, stress, bacterial vaginosis, domestic violence, and screening and management of other medical risks like diabetes, hypertension, or seizures (HRSA - Maternal and Child Health Bureau, 2006; ODH Task Force, 2009).

The Healthy People 2010 goal for early prenatal care is 90 percent (U.S. DHHS—Public Health Service, 2007). In 2004, 75.2% of U.S. women received adequate or adequate-plus care (as defined and measured by the Kotelchuck Index) (March of Dimes, 2008). In 2004, women who received late or no prenatal care were twice as likely to have a low birthweight infant (9.9% vs. 5.9%) (March of Dimes, 2008). Generally, women who are younger, black, less educated, and receiving Medicaid were more likely to report late or no prenatal care (Beck et al., 2002.). American Indian/Alaskan Native and Hispanic women were also associated with late or no prenatal care, while White and Asian/Pacific Islander women have the highest percentage of receiving early prenatal care (HRSA - Maternal and Child Health Bureau, 2006).
Given that Hispanic women are more likely to receive little or late prenatal care and yet have more infants with less prematurity and low birthweight, and experience less infant mortality, it would seem that early prenatal care is not the panacea to avert low birthweight, premature births, and infant mortality. In fact, there are reports and studies – some suggesting, some stating – that increased access to prenatal care does not result in reduced risk of preterm birth (Donovan et al., 2008; Misra & Guyer, 1998).

Misra & Guyer (1998) go on to state that the idea of increasing prenatal care utilization as a way of decreasing low birthweight and preterm delivery has been oversold by the public health and clinical community. It seems that those most at risk of a poor pregnancy outcome are not the ones seeking prenatal care to begin with (Hueston, Gilbert, Davis, & Sturgill, 2003). Those who delay prenatal care may be at higher risk for “social chaos,” with unstable relationships, poverty, alcohol and/or drug use. Hence, it is not clear whether the medical care received from early prenatal care results in improved birth outcomes, or if those seeking early prenatal care are a more stable population of women with fewer risk factors and behaviors (Hueston et al., 2003). Hueston et al. (2003) adjusted for race and other differences in the women, and those who began prenatal care in their second or third trimester had lower risks of low birthweight than those who began in the first trimester. Hueston et al. (2003) concluded by suggesting that the timing of prenatal care is not a predictor of low birthweight risk.

It may be that social factors, in combination with the medical factors, have the strongest influences on the outcome of a women’s pregnancy, including their environment, resources, stress, poverty, being of a minority race, and living with social inequities (Misra & Guyer, 1998). It is thought that these interconnections between the social, cultural, and economic circumstances of women, lending to the consideration of the psychosocial significance of “race” and “ethnic
minority status” as the true determinants of birth outcomes (James, 1993). James (1993) suggests that while our attention has been on risk factors of poor pregnancy outcomes such as marital status, smoking, alcohol and drug use, and late versus early prenatal care, we should have been attending to the women’s “structural” factors of their economic and cultural condition. No one suggested that women should not have early prenatal care, but that the frequency and content of the care is of issue. Targeting the high-risk individuals for increased early prenatal care may address some of the behavioral and medical risk factors discussed.

The IMR for women giving birth in Hamilton County in 2002 was calculated and compared with the trimester the women entered into prenatal care (Table 4). The trimester-specific IMR showed a relationship between late or no prenatal care and infant mortality. This is especially noteworthy considering that 90% of women having a live birth in 2002 began prenatal care in their first trimester.

| Table 4 - Hamilton County, 2002 by Trimester of Entry into Prenatal Care |
|---------------------------------|----------------|-----------------|-----------------|-----------------|
| **Trimester of Entry**          | IMR per 1,000 births | Trimester-Specific IMR | Percentage of women entering prenatal care per trimester | Percentage of births per trimester of entry into prenatal care |
| First                           | 7.1             | 8.0              | 90.0            | 88.4            |
| Second                          | 1.2             | 17.4             | 7.0             | 6.9             |
| Third + Unknown                 | 0.60            | 23.5             | 3.6             | 2.6             |
| None                            | 0.60            | 55.8             | 1.1             | 1.1             |

Data was obtained from the Ohio Department of Health – Vital Statistics, 2002. Numbers may not exactly add to totals due to rounding.

**Birthweight and Evidence of Postpartum Depression**

The first month after giving birth is the most vulnerable time for the development of mental illness, including postpartum depression (PPD) (Beck, 2002). Postpartum depression can
have deleterious effects on the family, straining the mother, leading to feelings that the infant is overly fussy, and a lack of emotional bonding. Prevalence rates of PPD vary, ranging from 7 – 26% (Watt, Sword, Krueger, & Sheehan, 2002). Most studies report PPD rates of 12-15% nationally, but prevalence may be higher among poor and minority women (Barclay, 2010; CDC, 2004; Leigh & Milgrom, 2008). Women who suffer from PPD tend to be single – or in a strained relationship, have an unplanned or unwanted pregnancy, in a lower socioeconomic status, and lack physical and emotional support from family or friends (Beck, 2002; Watt et al., 2002). The greatest predictor of PPD is previous depression or depression during pregnancy (Beck, 2002; Leigh & Milgrom, 2008; Rich-Edwards et al., 2006). Little has been done to address the emotional needs of women during the perinatal period. Postpartum depression often goes unrecognized and can rob the mother of enjoying and actively participating in motherhood. It is described as a “thief that steals motherhood” (Beck, 2002).

Antenatal Depression and Stress

Depression during pregnancy is known as antenatal or perinatal depression. It is estimated that 10 percent of women in the United States experience depressive symptoms during their pregnancy, with the highest prevalence among those with low socioeconomic status (HRSA - Maternal and Child Health Bureau, 2006). Younger maternal age has been associated with both antenatal and postpartum depression (Rich-Edwards et al., 2006). Factors associated with antenatal depression include maternal anxiety, life stress, a previous history of depression, lack of social support, unintended or unwanted pregnancy, Medicaid insurance, domestic violence, low income, low education, smoking, single status or poor relationship quality (Barclay & Vega, 2010). Additional factors associated with antenatal depression are a history of miscarriage and pregnancy termination, history of childhood sexual abuse, and low self-esteem.
Antenatal depression can affect the women’s ability to care for herself, including inadequate nutrition, poor prenatal clinic attendance, and the ability to avoid dangerous behavior – such as the decision to abuse drugs or alcohol (HRSA - Maternal and Child Health Bureau, 2006; Leigh & Milgrom, 2008). Left untreated, antenatal depression has been associated with poor pregnancy outcomes like spontaneous abortion, preterm delivery and subsequent need for neonatal care, small head circumference, maternal hypertension and preeclampsia (HRSA - Maternal and Child Health Bureau, 2006).

Stress during pregnancy has been shown to be an important factor for PPD and for increased rates of prematurity and low birthweight, with 1.16 and 1.08 higher odds for delivering a premature or low birthweight, respectively (HRSA - Maternal and Child Health Bureau, 2006). Data from the Pregnancy Risk Assessment Monitoring System (PRAMS) can be used to estimate the prevalence of self-reported PPD, linking different types of stress to PPD. In 2000, seven states (Alaska, Louisiana, Maine, New York, North Carolina, Utah, and Washington) participated in the reporting. The data collected represented the responses of 453,186 women who gave birth to a live infant in those states. Overall, 7.1% reported severe depression after delivery and more than half reported low to moderate depression. Women with low education, those with low poverty, and those who delivered LBW babies were most likely to report severe depression. Further, women who experienced physical abuse during pregnancy and women who reported emotional, partner-related, financial, or traumatic stress were more likely than other women to report being severely depressed (CDC, 2009). Black women experiencing psychosocial stressors in an urban setting has shown considerable increases in the occurrence of low birthweight (HRSA - Maternal and Child Health Bureau, 2006).
Studies have also shown that stress, particularly, during pregnancy increases the likelihood of smoking, substance abuse, poor weight gain during pregnancy which further increases the risk of prematurity and low birthweight. Additionally, it is thought that stress, and the subsequent psychological distress, may cause the secretion of placental corticotrophin, releasing hormone that can lead to a greater susceptibility to infections during pregnancy (HRSA - Maternal and Child Health Bureau, 2006). For all of these reasons, prenatal care is deemed important to screen and assess for the many risks listed above, and offer resources and interventions.
Purpose Statement

The purpose of this study is to describe relationships between infant birthweight and maternal age, trimester of entry into prenatal care, evidence of maternal postpartum depression, and maternal race. The cohort for the study is women who delivered from January 1, 2009 to December 31, 2009 who received prenatal care from one of the five Cincinnati Health Department community health centers. The study was conducted to answer the following questions: 1) What relationship exists between an infant’s birthweight and the age of the mother? 2) What relationship exists between an infant’s birthweight and the trimester the mother entered into prenatal care? 3) What relationship exists between an infant’s birthweight and evidence of postpartum depression in their mothers? 4) What relationship exists between an infant’s birthweight and the race of their mother?
Definitions

Listed below are additional terms/definitions as described in a report by the Health Resources and Services Administration (Health Resources and Services Administration - Maternal and Child Health Bureau, 2006):

• First Trimester – Time period extending from the first day of the last menstrual period through 12 weeks of gestation.

• Folic Acid – A nutrient found in some green, leafy vegetables, nuts, beans, citrus fruits, fortified breakfast cereals, and some vitamin supplements. Folic acid can help reduce the risk of birth defects of the brain and spinal cord (also called neural tube defects).

• Gestation Period – The period during when the embryo develops.

• Health Education – Health education includes instructional activities and other strategies to increase knowledge/awareness of an individual/group/community and to change individual health behavior.

• Healthy People 2010 – A comprehensive, nationwide health promotion and disease prevention agenda launched by the U.S. Department of Health and Human Services in January 2000. Healthy People 2010 contains 467 objectives designed to serve as a road map for improving the health of all people in the United States during the first decade of the 21st century.

• Interconceptional Care – Relating to the care recommended to women between pregnancies or up to 24 months postpartum. Interconceptional care generally consists of interventions to ensure that medical conditions, poor personal behaviors, and negative environmental conditions are treated and eliminated before conception, thus decreasing the likelihood of poor birth outcomes.
• Maternal Perinatal Depression – Refers to maternal depression occurring during the period shortly before or after birth.

• Neonatal Period – The first four weeks after birth.

• Perinatal – Pertaining to or occurring in the period shortly before and after birth, variously defined as beginning with completion of the 20th to 28th week of gestation and ending 7 to 28 days after birth.

• Postneonatal Period – The period from 4 weeks to 52 weeks after birth.
Methods

A cross-sectional study was conducted of women who received prenatal care at the Cincinnati Health Department (CHD) primary care health centers. The study included data from women who delivered a baby between January 1 – December 31, 2009 and were CHD patients (457 deliveries). Individual medical records were also reviewed to determine the trimester in which the mother entered prenatal care, and to obtain the EPDS scores.

Descriptive analysis of delivery statistics were tabulated for the five CHD health centers. The five health centers are: Braxton F. Cann Memorial Medical Center; Elm Street Health Center; Millvale at Hopple Street Health Center; Northside Health Center; and Price Hill Health Center. The prenatal population at each site differs due to the neighborhoods that they serve.

Postpartum depression data was based on the Edinburgh Postnatal Depression Scale (EPDS) scores. The Edinburgh Postnatal Depression Scale was developed as a screening tool for perinatal depression. Scores of ten and above indicate possible depression, and scores of 13 and higher indicate probable depression (Leigh & Milgrom, 2008).

Data analysis consisted of descriptive statistics, and Analysis of Variance (ANOVA). Dependent variables for the ANOVAs were birthweight and postpartum depression (EPDS scores). Independent variables included maternal age, the trimester of entry into prenatal care, postpartum depression, and race. The first ANOVA included birthweight as the outcome, and race, trimester of entry into prenatal care, and EPDS score as the independent variables. Because EPDS scores were not available for a large proportion of the mothers, a second ANOVA was completed that was the same as the first ANOVA, but without EPDS. This allowed for a much larger n for analysis of other independent variables besides EPDS. The last ANOVA that was completed was with EPDS as the outcome. Independent variables for the third ANOVA
included race, maternal age and trimester of entry into prenatal care. The first and second ANOVAs were then re-run to see the categorical p-values for EPDS (<10 and 10 or greater) and maternal age (<20, 20-34, and 35 or greater). A p-value of < .05 was considered statistically significant.
Results

Table 5 contains a descriptive summary of the characteristics of birth mothers associated with Health Centers of the Cincinnati Health Department for 2009.

<table>
<thead>
<tr>
<th>Race of mother (n = 452)</th>
<th>Cann Medical Center</th>
<th>Elm Street Health Center</th>
<th>Millvale Health Center</th>
<th>Northside Health Center</th>
<th>Price Hill Health Center</th>
<th>Total All Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>39</td>
<td>89</td>
<td>38</td>
<td>52</td>
<td>25</td>
<td>243</td>
</tr>
<tr>
<td>White</td>
<td>8</td>
<td>69</td>
<td>5</td>
<td>15</td>
<td>22.1%</td>
<td>206</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1.5%</td>
<td>3</td>
</tr>
<tr>
<td>Hispanic (Also counted as Black, White, or Other)</td>
<td>1</td>
<td>2.1%</td>
<td>0</td>
<td>0</td>
<td>3.6%</td>
<td>126</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trimester of Entry into Prenatal Care (n = 450 [2 unknown])</th>
<th>Cann Medical Center</th>
<th>Elm Street Health Center</th>
<th>Millvale Health Center</th>
<th>Northside Health Center</th>
<th>Price Hill Health Center</th>
<th>Total All Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Trimester</td>
<td>33</td>
<td>70.2%</td>
<td>83</td>
<td>50.6%</td>
<td>19</td>
<td>44.2%</td>
</tr>
<tr>
<td>2nd Trimester</td>
<td>12</td>
<td>25.5%</td>
<td>62</td>
<td>37.8%</td>
<td>22</td>
<td>51.2%</td>
</tr>
<tr>
<td>3rd Trimester</td>
<td>2</td>
<td>4.3%</td>
<td>14</td>
<td>8.5%</td>
<td>2</td>
<td>4.7%</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maternal Age at time of Delivery (n = 452)</th>
<th>Cann Medical Center</th>
<th>Elm Street Health Center</th>
<th>Millvale Health Center</th>
<th>Northside Health Center</th>
<th>Price Hill Health Center</th>
<th>Total All Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; Age 15</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.6%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ages 15-19</td>
<td>10</td>
<td>21.3%</td>
<td>33</td>
<td>20.0%</td>
<td>10</td>
<td>23.3%</td>
</tr>
<tr>
<td>Ages 20-24</td>
<td>21</td>
<td>44.7%</td>
<td>49</td>
<td>29.7%</td>
<td>10</td>
<td>23.3%</td>
</tr>
<tr>
<td>Ages 25-44</td>
<td>16</td>
<td>34.0%</td>
<td>77</td>
<td>46.7%</td>
<td>23</td>
<td>53.5%</td>
</tr>
<tr>
<td>Ages &gt; 45</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Edinburgh Postnatal Depression Scale Score (n = 241 [211 refused or not done])</th>
<th>Cann Medical Center</th>
<th>Elm Street Health Center</th>
<th>Millvale Health Center</th>
<th>Northside Health Center</th>
<th>Price Hill Health Center</th>
<th>Total All Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score of 10-12</td>
<td>2</td>
<td>12.5%</td>
<td>7</td>
<td>6.1%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Score of &gt; 13</td>
<td>6</td>
<td>37.5%</td>
<td>14</td>
<td>12.3%</td>
<td>3</td>
<td>15.8%</td>
</tr>
<tr>
<td>Completed screens</td>
<td>16</td>
<td>34.0%</td>
<td>114</td>
<td>71.3%</td>
<td>19</td>
<td>44.2%</td>
</tr>
<tr>
<td>Not done or refused</td>
<td>31</td>
<td>66.7%</td>
<td>46</td>
<td>24.3%</td>
<td>26</td>
<td>58.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Birthweight (n = 454 [3 unknown])</th>
<th>Cann Medical Center</th>
<th>Elm Street Health Center</th>
<th>Millvale Health Center</th>
<th>Northside Health Center</th>
<th>Price Hill Health Center</th>
<th>Total All Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥2500 grams</td>
<td>39</td>
<td>83.0%</td>
<td>137</td>
<td>83.0%</td>
<td>39</td>
<td>90.7%</td>
</tr>
<tr>
<td>1500-2499 grams</td>
<td>5</td>
<td>10.6%</td>
<td>18</td>
<td>10.9%</td>
<td>3</td>
<td>7.0%</td>
</tr>
<tr>
<td>&lt; 1500 grams</td>
<td>3</td>
<td>6.4%</td>
<td>10</td>
<td>6.1%</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>All low birthweight</td>
<td>8</td>
<td>17.0%</td>
<td>28</td>
<td>17.0%</td>
<td>4</td>
<td>9.3%</td>
</tr>
<tr>
<td>Stillborn</td>
<td>1</td>
<td>2.1%</td>
<td>3</td>
<td>1.8%</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preterm Deliveries (n=456 [1 unknown])</th>
<th>Cann Medical Center</th>
<th>Elm Street Health Center</th>
<th>Millvale Health Center</th>
<th>Northside Health Center</th>
<th>Price Hill Health Center</th>
<th>Total All Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 37 weeks</td>
<td>7</td>
<td>14.9%</td>
<td>24</td>
<td>14.5%</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>&lt; 32 weeks</td>
<td>3</td>
<td>6.4%</td>
<td>9</td>
<td>5.5%</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>All preterms</td>
<td>10</td>
<td>21.3%</td>
<td>33</td>
<td>20.0%</td>
<td>6</td>
<td>14.0%</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
An alpha = .05 was used for the test criteria. Birthweight was analyzed as a continuous variable.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>n</th>
<th>Least Squares Mean</th>
<th>Standard Error of the Mean</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birthweight</td>
<td>Maternal Age Continuous</td>
<td>240</td>
<td>3088.1\textsuperscript{a}</td>
<td>602.3\textsuperscript{b}</td>
<td>0.1148</td>
</tr>
<tr>
<td></td>
<td>Trimester of Entry</td>
<td>240</td>
<td></td>
<td></td>
<td>0.8054</td>
</tr>
<tr>
<td></td>
<td>1\textsuperscript{st} Trimester</td>
<td></td>
<td>2281.3</td>
<td>239.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2\textsuperscript{nd} Trimester</td>
<td></td>
<td>2317.3</td>
<td>243.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3\textsuperscript{rd} Trimester</td>
<td></td>
<td>2367.0</td>
<td>271.7</td>
<td></td>
</tr>
<tr>
<td>EPDS Continuous</td>
<td>240</td>
<td>3088.1\textsuperscript{a}</td>
<td>602.3\textsuperscript{b}</td>
<td>0.0492</td>
<td></td>
</tr>
<tr>
<td>EPDS Categorical</td>
<td>241</td>
<td></td>
<td></td>
<td></td>
<td>0.0273</td>
</tr>
<tr>
<td>&lt; 10</td>
<td>2494.1</td>
<td>267.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 or &gt;</td>
<td>2286.5</td>
<td>282.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>240</td>
<td></td>
<td></td>
<td></td>
<td>0.0142</td>
</tr>
<tr>
<td>White</td>
<td>2598.6</td>
<td>157.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>2257.7</td>
<td>161.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a} – Arithmetic mean for entire population with EPDS scores
\textsuperscript{b} – Standard Deviation for entire population with EPDS scores
Maternal age and the trimester of entry into prenatal care were not statistically significant relative to infant birthweight for the more limited sample size of those with an EPDS cohort in this study. EPDS was statistically significant relative to birthweight (p < .05). Birthweight for infants born to mothers with EPDS scores less than 10 was higher than for those with EPDS scores of 10 and greater. Race was also statistically significant when associated with birthweight in this smaller sample. Infants born to white mothers had a significantly higher birthweight than those of black mothers.

Table 7 ANOVA 2. For variables associated with birthweight, without EPDS

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>n</th>
<th>Least Squares Mean</th>
<th>Standard Error of the Mean</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birthweight</td>
<td>Maternal Age Continuous</td>
<td>450</td>
<td>3056.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>617.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.2508</td>
</tr>
<tr>
<td></td>
<td>Maternal Age Categorical</td>
<td>450</td>
<td></td>
<td></td>
<td>0.3819</td>
</tr>
<tr>
<td></td>
<td>&lt; 20</td>
<td></td>
<td>2442.7</td>
<td>224.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20-39</td>
<td></td>
<td>2469.6</td>
<td>218.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 40</td>
<td></td>
<td>2784.0</td>
<td>323.9</td>
<td></td>
</tr>
<tr>
<td>Trimester of Entry</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Trimester</td>
<td>450</td>
<td>2404.1</td>
<td>216.8</td>
<td>0.5294</td>
</tr>
<tr>
<td></td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Trimester</td>
<td></td>
<td>2452.5</td>
<td>219.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Trimester</td>
<td></td>
<td>2507.9</td>
<td>236.7</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
<td></td>
<td>2651.7</td>
<td>103.9</td>
<td>0.0050</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td></td>
<td>2404.4</td>
<td>107.1</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> – Arithmetic mean for entire population
<sup>b</sup> – Standard Deviation for entire population
The Maternal age and the trimester of entry into prenatal care were not statistically significant relative to infant birthweight in this study when including the larger sample size (all deliveries with a known birthweight). There was a trend of birthweight increasing with increasing trimester of entry, but it was not statistically significant (p > .05).

Race was statistically significant when associated with birthweight in this larger cohort. Infants born to white mothers had a significantly higher birthweight than those of black mothers.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>n</th>
<th>Least Squares Mean</th>
<th>Standard Error of the Mean</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPDS</td>
<td>Maternal Age Continuous</td>
<td>241</td>
<td>5.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.9929</td>
</tr>
<tr>
<td></td>
<td>Trimester of Entry</td>
<td>241</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Trimester</td>
<td></td>
<td>3.1</td>
<td>2.3</td>
<td>0.0388</td>
</tr>
<tr>
<td></td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Trimester</td>
<td></td>
<td>4.0</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Trimester</td>
<td></td>
<td>6.5</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td>241</td>
<td></td>
<td></td>
<td>0.9584</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td></td>
<td>4.9</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td></td>
<td>5.1</td>
<td>1.5</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> – Arithmetic mean for entire population with EPDS scores
<sup>b</sup> – Standard Deviation for entire population with EPDS scores

Finally, an analysis of independent factors (maternal age, trimester of entry into prenatal care, and race) was completed using the EPDS score as the dependent variable to determine if a relationship exists (Table 8). Maternal age and race were not statistically significant (p = 0.9929) relative to EPDS. The trimester of entry into prenatal care was statistically significant relative to the EPDS. The third trimester of entry into prenatal care was statistically significant compared to entry in the 1<sup>st</sup> trimester (p = 0.0122), and close to statistically significant for the 2<sup>nd</sup>
trimester entry into prenatal care \( (p = 0.0596) \). Race was not statistically significant \( (p = 0.9584) \) relative to EPDS as presented in Table 8.
Discussion

The descriptive statistics of mothers in Table 5 help in understanding the population attending the various health centers in Cincinnati. The CHD has a large Hispanic population at two health centers: Elm Street Health Center and Price Hill Health Center. While entry into prenatal care by the first trimester was low for Price Hill Health Center (28.6%), that health center had the lowest percentage of both LBW and preterm deliveries (4.5% and 10.5% respectively). If this logic holds true, according to the literature reviews for this study, the birth outcomes of increased birthweight and fewer preterm births could be due to the culture of the Hispanic population. Or, it could also be related to the low percentage of black population at that site. More studies are needed to determine if their Hispanic ethnicity acted as a protective factor against LBW and preterm births.

Many studies use only singleton births, and do not include stillbirths in their cohort. This study included all births because of the overall small sample size. With the recognition that twin births and stillbirths tend to be of LBW and often preterm, they are still a portion of birth outcomes for the CHD prenatal population, and thought to be of value in including. The stillbirth rate for the CHD 2009 total deliveries (Table 5) is 13.1 per 1,000. The 2004 stillbirth rate for the state of Ohio was 6.82 per 1,000 live births (ODH, 2004). This indicates that a disparity exists for these at-risk women.

In determining if a relationship exists between an infant’s birthweight and the age of the mother, it was found that the maternal age at the time of delivery (Tables 6 and 7) was not statistically significant relative to infant birthweight. It did show a trend of infant birthweight increasing as the maternal age increased. This would follow previous studies and data
supporting those with younger maternal age tending to have LBW infants (ODH, 2009). This study did not support that advancing maternal age also indicated a risk for having a LBW infant.

An analysis of data looking for any relationship between an infant’s birthweight and the trimester the mother entered into prenatal care, the results showed that the trimester of entry into prenatal care (Tables 6 and 7) was not statistically significant relative to infant birthweight. The data from 2004 did not hold true for this population, with those receiving late or no prenatal care having LBW infants (March of Dimes, 2008). However, it was significantly associated (Table 8) with the EPDS depression screening scores. Those that entered into prenatal care in their third trimester had higher depression screening scores than those entering prenatal care in both the first and second trimester. This could be due to ambivalence toward the pregnancy and/or social chaos, leading to stress (HRSA - Maternal and Child Health Bureau, 2006). Women who do not engage in early prenatal care are often considered at-risk women for a variety of reasons. Biological and social risk factors are usually not able to be addressed at the end of the pregnancy, factors such as perinatal depression, stress, domestic violence, and screening and management of other medical risks. These social and medical factors could have a large influence on their pregnancy outcome.

In determining what relationship exists between an infant’s birthweight and evidence of postpartum depression in their mothers, the results showed that the EPDS was statistically significant relative to infant birthweight (Tables 6 and 7). This could be related to either a previous episode of depression, or to antenatal depression. This cohort did not include information on antenatal depression, thus that conclusion cannot be made. However, anecdotally, the study cohort consisted of largely high risk prenatal patients, many of whom do have social chaos in their lives. Social chaos (and related factors) is a risk factor for stress and
depression (Hueston et al., 2003), but this study did not quantify individual risk factors for each prenatal patient. Many of the risk factors associated with prematurity and LBW are also risk factors for perinatal depression. It is not surprising that those that enter into prenatal care late and those with higher EPDS screening scores have lower birthweight infants. Consideration should also be given to the possibility that the mothers of the LBW infants had higher EPDS scores because their infants may have been hospitalized – or otherwise not doing well – because of their LBW, contributing to maternal depression. Of the CHD 2009 deliveries, 19.5% of those who were screened for depression had a score of 10 or above. This is considerably higher than the reported range of 12-15% nationally (Barclay, 2010; CDC, 2004; Leigh & Milgrom, 2008). Eleven point nine percent of the total deliveries were LBW. Future studies should quantify how many LBW infants were hospitalized, and/or if antenatal depression existed.

Race of the baby was significantly associated with birthweight (Tables 6 and 7). Infants born to white mothers had an appreciably higher birthweight than those of black mothers. This agrees with many other reports (March of Dimes, 2008). It is highly likely, although not otherwise quantified, that this cohort of high-risk black women have experienced increased psychosocial stressors thus resulting in increases in the occurrence of LBW (HRSA - Maternal and Child Health Bureau, 2006).
**Limitations**

Overall sample size limited the scope of the study. There were a very small percentage of “other” races in this study. Another factor worth noting is the low percentage of completed EPDS screens. While this tool was to be utilized beginning January 1, 2009, clearly not all sites embraced that directive. Hence, there were fewer EPDS scores to analyze due to non-routine and inconsistent administration of the screening tool, especially in the first half of 2009. The Cincinnati Health Department has since remedied this inconsistency. This analysis found that a relationship exists between EPDS scores and LBW infants.

In general, the vast majority (if not all) of the prenatal patients in this study have a low socioeconomic status (SES), and either qualify for Medicaid or were undocumented citizens who qualify for a self-pay sliding scale minimum fee. Therefore the generalizability of this study should be kept to those of a like SES.
Conclusions

Maternal age and trimester of entry into prenatal care were not statistically significant relative to infant birthweight. However, the EPDS score and maternal race was statistically significant relative to infant birthweight. Further, the trimester of entry was statistically significant relative to the EPDS score. Future studies should quantify how many LBW infants were hospitalized and/or if antenatal depression existed, and further quantify the ‘at-risk” factors for the study cohort.

Other studies are needed to add credence to the supposition of the relationship between depression and LBW, and depression and trimester of entry. More studies are also needed to determine if a Hispanic ethnicity acts as a protective factor against LBW and preterm births.
References


http://www.cdc.gov/PEDNSS/what_is/pnss_health_indicators.htm

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5405a5.htm


http://www.cdc.gov/goveproductivehealth/rv_prams.htm


http://www.cdc.gov/nchs/data/databriefs/db09.htm#Definitions


Appendix A

Cincinnati Health Centers

Prepared by Department of Community Development and Planning For Department of Health  Cincinnati Ohio July 2006
Appendix B

Public Health Competencies

Domain #1 Analytic Assessment Skills

• Defines a problem
• Determines appropriate uses and limitations of both quantitative and qualitative data
• Selects and defines variables relevant to defined public health problems
• Identifies relevant and appropriate data and information sources
• Evaluates the integrity and comparability of data and identifies gaps in data sources
• Applies ethical principles to the collection, maintenance, use, and dissemination of data and information
• Makes relevant inferences from quantitative and qualitative data
• Obtains and interprets information regarding risks and benefits to the community
• Applies data collection processes, information technology applications, and computer systems storage/retrieval strategies
• Recognizes how the data illuminates ethical, political, scientific, economic, and overall public health issues

Domain #2: Policy Development/Program Planning Skills

• Collects, summarizes, and interprets information relevant to an issue
• Identifies, interprets, and implements public health laws, regulations, and policies related to specific programs
• Utilizes current techniques in decision analysis and health planning

Domain #3: Communication Skills

• Communicates effectively both in writing and orally, or in other ways
• Solicits input from individuals and organizations
• Advocates for public health programs and resources
• Leads and participates in groups to address specific issues
• Uses the media, advanced technologies, and community networks to communicate information
• Effectively presents accurate demographic, statistical, programmatic, and scientific information for professional and lay audiences
• Listens to others in an unbiased manner, respects points of view of others, and promotes the expression of diverse opinions and perspectives

Domain #4: Cultural Competency Skills
• Utilizes appropriate methods for interacting sensitively, effectively, and professionally with persons from diverse cultural, socioeconomic, racial, ethnic and professional backgrounds, and persons of all ages and lifestyle preferences
• Understands the dynamic forces contributing to cultural diversity
• Understands the importance of a diverse public health workforce

Domain #5: Community Dimensions of Practice Skills
• Establishes and maintains linkages with key stakeholders
• Utilizes leadership, team building, negotiation, and conflict resolution skills to build community partnerships
• Identifies how public and private organizations operate with a community
• Accomplishes effective community engagements
• Identifies community assets and available resources
• Describes the role of government in the delivery of community health services
Domain #6: Basic Public Health Sciences Skills

- Identifies the individual’s and organization’s responsibilities within the context of the Essential Public Health Services and core functions
- Defines, assesses, and understands the health status of populations, determinants of health and illness, factors contributing to health promotion and disease prevention, and factors influencing the use of health services
- Understands the historical development, structure, and interaction of public health care systems
- Identifies and applies basic research methods used in public health
- Applies the basic public health sciences including behavioral and social sciences, biostatistics, epidemiology, environmental public health, and prevention of chronic and infectious diseases and injuries
- Identifies and retrieves current and relevant scientific evidence
- Identifies the limitations of research and the importance of observations and interrelationships
- Develops a lifelong commitment to rigorous critical thinking

Domain #7: Financial Planning and Management Skills

- Monitors program performance
- Applies basic human relations skills to the management of organizations, motivation of personnel, and resolution of conflicts
- Manages information systems for collection, retrieval, and use of data for decision-making

Domain #8: Leadership and Systems Thinking Skills

- Helps create key values and shared vision and uses these principles to guide action
- Identifies internal and external issues that may impact delivery of essential public health services (i.e. strategic planning)
• Facilitates collaboration with internal and external groups to ensure participation of key stakeholders
• Promotes team and organizational learning
• Contributes to development, implementation, and monitoring of organizational performance standards
• Applies theory of organizational structures to professional practice