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Maternal Characteristics and Infant Birth Weight in Dayton, Ohio

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Maternal Characteristics and Infant Birth Weight in Dayton, Ohio

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Abstract

Objective: To better understand and identify modifiable maternal risk factors that are driving the increased incidence of low birth weight (LBW) in Montgomery County.

Background Information: LBW has lifelong effects on growth and development. These medical and social implications are coupled with an enormous economic burden. In the US, over 5.8 billion dollars are spent annually to care for LBW babies. Despite the recognition of these medical and economic challenges and the implementation of public campaigns to decrease rates, LBW trends have continued to increase. Between 1995 and 2005 the LBW rates in the US incrementally increased from 7.3% to 8.2% of all births. This trend was mirrored on both the state and county level with even higher rates of increase. For the years 1995-2005, Ohio LBW rate rose from 7.3% to 8.7% of all births. In Montgomery County, the average LBW rate over the time period from 2002-2005 was 8.7%. This was well above the average for the US at 8% and Ohio at 8.5%. All of these are well above the Healthy People 2010 goal of <5% LBW. These trends in increasing LBW were the driving force in the development of Montgomery County's LBW Task Force. This interdisciplinary working group has designed and implemented a LBW registry. In conjunction with the LBW registry, the data from this current project will help us to better understand the factors driving LBW in Montgomery County.

Methodology: As an extension of the existing LBW registry, this project aims to establish a retrospective control population of non-LBW infants born over of the course of the first year of data collection. For this study, data was gathered from a database created by linking records from the Perinatal Database, maintained by Miami Valley Hospital's Quality Management Department, and the ADT (Admission, Discharge, Transfer) patient report that is a part of the patient medical record. The study included mothers who delivered at Miami Valley Hospital

from October 26, 2007 – October 26, 2008. Data was analyzed using basic descriptive statistics, ANOVA, and multiple linear regression.

Results: There were 5011 mothers in the study. Of these pregnancies, 555 (11.08%) resulted in the birth of LBW infants while 4456 (88.92%) resulted in the birth of non-LBW infants. The average birth weight of infants born to black mothers (3030g) was significantly lower then the average birth weight for infants born to mothers in every other racial/ethnic group. Black mothers had the significantly highest prevalence of LBW (15.28%). Mothers who delivered infants on government sponsored insurance plans had significantly lower average birth weight infants and a higher prevalence of LBW infants then those on private insurance plans. Young mothers (under 25 years) had significantly lower average birth weight infants than mothers in the median ages of childbearing (25 years-40 years). These young mothers also accounted for nearly 30% of LBW in this population. Mothers of LBW infants had significantly higher prevalence of tobacco, alcohol, marijuana, and cocaine use. LBW mothers also had a higher prevalence of chronic and gestational hypertension. Non-LBW mothers had a lower prevalence of Chorioamnionitis, but a higher prevalence of GBBS than LBW mothers.

Conclusion: In this population there are significant differences in the prevalence (non-LBW vs. LBW) of several maternal risk factors including; race/ethnicity, payer status, age at delivery, substance use, chronic medical conditions and infections. Further research is needed to determine the significance of sub-analyses performed within these risk factor categories. These trends may allow future interventions to be more accurately targeted.

Introduction

Low birth weight (LBW) is defined by the World Health Organization (WHO) as "weight at birth of less than 2,500 grams (5.5 pounds)," (United Nations Children's Fund [UNICEF], 2004). This classification has significance in terms of both short and long term outcomes for newborns that receive this designation. These infants are twenty times more likely to die than their non-low birth weight counterparts (UNICEF, 2004). The long-term impact of LBW on future development continues to be heavily researched, but current studies have linked LBW to everything from delays in development and decreases in intelligence to lower graduation rates and increases in attention disorders, depression, and weight issues in adolescence (Blond et al., 2008 & Reuner et al., 2009).

The economic impact of these tiny babies in the US alone has been measured at 5.8 billion dollars annually (Russell et al., 2007). It should be noted that the majority of LBW worldwide is concentrated in developing countries. On average, developing countries have rates that are double that of developed countries (UNICEF, 2004). Russell et al. in 2007 concluded that in terms of overall infant hospitalizations, LBW/premature babies represent 47% of all costs. The average stay for an uncomplicated newborn costs $600 while the LBW infant stay averaged $15,100 (Russell et al., 2007). Given the dire health and economic impact of LBW, both international and US policy initiatives have been created to address the challenge of LBW. The WHO campaign "A World Fit for Children" included the goal of cutting LBW rates worldwide by one-third by 2010 (UNICEF, 2004). The US Department of Health and Human Services (HHS) included LBW in its "Healthy People 2010" initiative. Under these guidelines, the US aim was to decrease LBW to 5% of the total birth by 2010 (Department of Health and Human Services, 2009).

Despite these efforts, the incidence of LBW continues to rise. These trends in increasing LBW were the driving force in the development of Montgomery County's LBW Task Force. This interdisciplinary working group designed and implemented a LBW registry that began in October 2007. The goal of the registry is to identify modifiable risk factors and develop strategic interventions to address LBW. The registry has collected data for over a year from the following three sources: the maternal medical record; birth certificate information; and a confidential interview with mothers of LBW infants. This data set has provided a wealth of information and insight into the factors driving LBW in our community.

There are many well-studied risk factors for LBW. Broadly, these factors include racial and economic disparities, as well as maternal differences in demographics, health behaviors, and health status.

While the variables discussed above have been studied in the general population, the extrapolation of this data to the population of Montgomery County continues to be a challenge. The aim of this study is to better understand the maternal characteristics of non-low birth weight infants in Montgomery County by creating a control study group for the mothers included the LBW registry. This information, in combination with the data already collected in the first year of the LBW registry, will allow us to better identify the risk factors driving LBW in our county and develop strategic interventions.

Literature Review

Between 1995-2005 the LBW rates in the US incrementally increased from 7.3% to 8.2% of all births (National Center for Health Statistics [NCHS], 2009). This trend was mirrored on both the state and county level with even higher rates of increase. During 1995-2005, the Ohio LBW rate rose from 7.3% to 8.7% of all births (NCHS, 2009). In Montgomery County, the

average LBW rate over the time period from 2002-2005 was 8.7%. The most recent data for 2007 shows that rate held steady at 8.7% (Ohio Department of Health, 2009). This was well above the average for the US at 8% and Ohio at 8.5% (NCHS, 2009). Other demographic changes in Montgomery County include a decrease in the population. The US Census Bureau reports that between 1990-2000 the population of the county fell from 573,809 to 559,062. Additionally, the 2007 estimates show a further decrease to 538,104 (US Census Bureau, 2009). The birthrate has fluctuated over the same time period, but overall is relatively consistent. In 1990, the birthrate was 67 per 1,000 women. In 2000, the birthrate dropped slightly to 65 per 1,000 women, but reached 67.5 per 1,000 women in 2007 (NCHS, 2009).

Racial and Economic Disparity

Racial and economic disparities are known to disproportionately impact LBW. Black women are more likely than their white counterparts to have a LBW baby (Nanyonjo et al., 2008 & Valero de Bernab et al., 2004). Many studies that look at race as a risk factor are poorly controlled for known socioeconomic disparities in racial groups (Valero de Bernab et al., 2004). The CDC reported data on LBW from 1980-2000 and found continued disparity between blacks at 13% and whites at 6.5% (Centers for Disease Control and Prevention [CDC], 2002). The most recent data available from the National Vital Statistics in 2003, found increased rates in both groups, but with continued disparity. The LBW rate for black mothers was 13.6% and 6.9% for white mothers (Martin et al., 2005). Other studies have shown that socioeconomic status (SES) is strong predictor of health status and that lowered SES increases the incidence of LBW (Collins et al., 2009, Nanyonjo et al., 2008, Valero de Bernab et al., 2004, & Zeska, Melly, & Schwartz, 2008). In 2007, Montgomery County mirrored these trends with LBW rates for black mothers at 11.5% and white mothers at 7.6% (ODH, 2009).

Maternal Age

The impact of maternal age on LBW is most strongly correlated at the extremes of childbearing. The youngest moms (15 − 19 years old) are at increased risk for complicating factors like social and financial support as well as increased risk behavior including smoking (Malamitsi-Puchner & Boutsikou, 2006, & Valero de Bernab et al., 2004). The other end of the age spectrum, moms (>40 years old) also contribute disproportionately to LBW. Some studies argue that this increased risk is a reflection of the increased complication in medical conditions as discussed above including hypertension and diabetes (Valero de Bernab et al., 2004). In Ohio, these two groups of moms represent the largest proportions of LBW by age; over 40 years (11.6%) and under 20 years (10.7%). This is despite the fact that respectively, they only account for 2.1% and 10.5% of all births (NCHS, 2009). In Montgomery County mothers under 20 years of age have a LBW rate of 10.7% while mothers over 40 years old have a rate of 7.3% (ODH, 2009).

Maternal substance use

Maternal health behaviors have also been shown to affect the incidence of LBW. Tobacco smoking is well established as a risk factor to LBW (Ward, Lewis, & Coleman, 2007, Leonardi-Bee, Smyth, Britton, & Coleman, 2008, Chiolero, Bovet, & Paccaud, 2005, Valero De Bernab et al., 2004). Many studies estimate that maternal tobacco smoking lowers birth weight by 150g-250g (Valero De Bernab et al., 2004, Chiolero et al., 2005). There does appear to be a dose response between cigarette smoking and birth weight with up to 0.5 kg weight decrease for a pack per day during pregnancy (Valero De Bernab et al., 2004). Chiolero et al. calculated an odds ratio of 2.7 for LBW in smokers (Chiolero et al., 2005). There is a growing body of evidence that environmental tobacco smoke (ETS) is also associated with decreased birth weight

and an increased incidence of LBW (Leonardi-Bee et al., 2008 & Valero De Bernab et al., 2004). Alcohol consumption has been shown to synergize the effects of cigarette smoking on LBW (Valero De Bernab et al., 2004). According to the March of Dimes, the proportion of women of childbearing age who smoke in Ohio is 27.4%, significantly higher then the US average of 21.2% (NCHS, 2009). In 2007, the Pregnancy Risk Assessment Monitoring System (PRAMS) reports that in the last three months of pregnancy 18% of Ohio mothers smoked cigarettes and 5.2% consumed alcohol (ODH, 2009).

The challenge in assessing the impact of illicit drug use on LBW is that many of the studies are confounded by other risk factors like cigarette smoking and socioeconomic status (Valero De Bernab et al., 2004 & Schempf, 2007). Maternal substance use in pregnancy has been associated with increased rates of prematurity (Vucinovic, Roje, Vucinovic, Capkun, Bucat, & Banovic, 2008). Prematurity is a key driver of low birth weight prevalence. The results on LBW have varied for specific drugs. Marijuana use, not controlled for cigarette smoking, has been shown to increase LBW, but other studies show a positive effect on birth weight even when maternal weight gain is controlled (Schempf, 2007). Any use of opiates during pregnancy can increase the relative risk of LBW to 3.81 (Schempf, 2007). Cocaine use has been most strongly associated with preterm birth and LBW (Valero De Bernab et al., 2004 & Schempf, 2007). While the specific link is still unknown, the proposed mechanism of action is the vasoconstrictive effects of the drug resulting in decreased fetal blood flow (Valero De Bernab et al., 2004 & Schempf, 2007). Cocaine has been shown to lower birth weight by 151g after adjusting for other drugs, tobacco, alcohol, adequate prenatal care, and medical risks (Schempf, 2007).

Maternal infections

A number of infections have been associated with LBW. Maternal infections in the first trimester are particularly consequential. Infections such as rubella, toxoplasmosis, cytomegalovirus, mycoplasm, b-hemolytic Streptococcus, Ureoplasma Urealyicum, and Bacterial Vaginosis have been implicated (Valero De Bernab et al., 2004). Other sexually transmitted infections including Herpes Simplex, Trichomoniasis, Chlamydia, and untreated Syphilis and Gonorrhea have also been associated with LBW (Valero De Bernab et al., 2004). Additionally, infections such as Chorioamnionitis, which increase the likelihood of preterm delivery and infant prematurity, have been associated with LBW (Mann, Bao, & Bersabe, 2009).

Maternal Chronic Medical Conditions

Several maternal medical conditions have been associated with an increased risk of LBW. Several studies have suggested that maternal anemia, hemoglobin <10g/dl, is a risk factor for LBW (Valero De Bernab et al., 2004 & Levy et al., 2005). There is also evidence that maternal hemoglobin >12g/dl may also increase the risk of LBW suggesting that optimal hemoglobin distribution is a U shaped curve (Valero De Bernab et al., 2004). Maternal hypertension has also been shown to increase the incidence of LBW (Enriquez et al., 2007, Rahman, Hairi, & Salleh, 2008, Romundstad et al., 2007 & Valero De Bernab et al., 2004). As an independent risk factor for LBW, pregnancy induced hypertension has an odds ratio of 5.06 [2.63 to 9.71] (Rahman et al., 2008). Hypertension has a synergistic effect on birth weight when maternal asthma is concerned (Enriquez et al., 2007). Many studies have shown that maternal asthma is a risk factor for LBW (Enriquez et al., 2007, Dombrowski, 2006 & Syed et al., 2008). Enriquez et al. (2007) demonstrated that the relationship between LBW and maternal asthma was dose dependent with risk increasing across a spectrum. The lowest risk was found in mothers

with asthma alone and an increased risk found in patients with exacerbated asthma and the highest risk was found when there was asthma with hypertension. Diabetes Mellitus also has been shown to impact LBW and increase the risk of preterm delivery (Nicholson et al., 2006 & Valero De Bernab et al., 2004). The impact on birth weight varies greatly depending on the type of diabetes being studied. Gestational diabetes mellitus (GDM) has been linked to macrosomia or infants that large for gestational age. Mezger et al. (2008) in the Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study found that a diagnosis of GDM provided an odds ratio of 1.38 [1.32 to 1.44] for birth weight above the 90th percentile. The odds ratio for mothers with GDM to deliver an infant that is large for gestational age has been estimated as high as 3.5 times their non-diabetic counterparts (Ray et al., 2001). The diagnosis of type 1 diabetes mellitus also carries a risk of macrosomia for infants, but an interesting relationship has been described by Haeri et al. (2008). Their research stratified pregnant women with type 1 diabetes by the extent of vasculopathy the women had developed at the time of pregnancy. The odds ratio for LBW increased as the degree of vasculopathy increased. Even after controlling for maternal age, gestational age, and race the increased odds ratio persisted. The prevalence of macrosomia decreased with the increasing severity of vasculopathy (Haeri et al., 2008). Type 2 diabetes mellitus also carries an increased risk of LBW. It is known that type 2 diabetes mellitus disproportionately affects black Americans and that black Americans are already more likely to give birth to LBW infants. However, even after adjusting for this disparity in disease prevalence, there remains an increased risk of LBW in type 2 diabetic mothers (Nicholson et al., 2006).

Objectives

The research questions for this study include the following; do mothers of non-low birth weight (>2500 g) infants in Montgomery County have significantly lower rates of known risk factors than LBW mothers?

1. Are there significant demographic differences (race, age) between mothers who give birth to non-low birth weight (≥2500 g) infants vs. mothers who give birth to low birth weight infants?

2. Are mothers of non-low birth weight (≥2500 g) infants less likely to smoke tobacco, consume alcohol, or abuse illicit drugs during pregnancy than mothers of low birth weight infants?

3. Are mothers of non-low birth weight (≥2500 g) infants less likely to have chronic medical conditions (HTN, DM, or asthma) than mothers of low birth weight infants?

4. Are mothers of non-low birth weight (≥2500 g) infants less likely to have a history of maternal infections than mothers of low birth weight infants?

Methods

As an extension of this existing research, the ultimate goal of this project is to establish a retrospective control population of non-LBW infants born over of the course of data collection (October 2007 – October 2008) for the LBW registry. For this study, data was gathered from a database created by linking records from the Perinatal Database, maintained by Miami Valley Hospital's Quality Management Department, and the ADT (Admission, Discharge, Transfer) patient report that is included in the patient's medical record. The infant's medical record number linked this combined database. Data in this combined database includes 5188 infants

born at Miami Valley Hospital over the time period of October 26, 2007 – October 26, 2008. The study included 5011 mothers. Of these pregnancies, 4456 (88.92%) resulted in the birth of non-LBW infants ($\geq$2500 g) while 555 (11.08%) resulted in the birth of LBW infants (<2500 g).

Mothers of multiple gestation pregnancies were only counted one time. Additionally, 30 mothers were excluded because their multiple gestation pregnancies resulted in the birth of an infant in both the non-LBW and LBW groups. There were 43 mothers included in the other data results whose insurance status was unknown at the time of delivery and were therefore not included in the calculations based on payer group. No other patients were excluded from the study.

As a result of combining two independent databases to create the study group, some patient information was duplicated in the new database. These duplications enabled data to be crosschecked between the databases. Inconsistencies discovered within the data were clarified by retrieving information from the patient medical record in EPIC.

The variables of interest are outlined in the research questions above. They include: maternal demographic information, maternal substance use, and maternal medical history including infections and chronic medical conditions (see appendix A for complete list of variables requested).

The databases that provided the study population included additional patient information. This data was beyond the scope of the planned analysis, but was intentionally kept within the database for future study. This project was designed to augment the ongoing LBW registry project. Future analysis of this data may be needed with respect to the LBW registry. The LBW registry collected data on 463 mothers from October 2007 through October 2008. This project data will eventually be analyzed against the data from the LBW registry.

The newly created database allowed variables to be assigned to groups. Racial and ethnic data was complied into four groups based on maternal race/ethnicity; White or Caucasian, Black or African-American, Hispanic, or Other (including mothers of Asian, Middle Eastern, American-Indian, and Pacific Islander descent). Payer group was determined by maternal insurance coverage at the time of delivery. Any mother with a private insurance carrier was included in the Private group. Any mother with a government-sponsored plan including Medicaid HMOs and military plans was included in the Government group. Mothers were assigned to age groups based on their age at delivery. Age groups were every five years; mothers 20 years old and younger, mothers >20 years up to 25 years, mothers >25 years up to 30 years, mothers >30 years up to 35, mothers >35 up to 40 years, and finally mothers >40 years old.

Data in this study was analyzed using several methods including descriptive statistical analysis of maternal risk factors. Basic statistics including mean weight with 95 percent confidence intervals for racial/ethnic group, payer group, and age group was calculated in the statistical data package Statistica. Prevalence for each maternal risk factor in the non-LBW and LBW group was calculated by categorical risk factors (racial/ethnic group, payer group, and age group) from pivot table data in Excel.

Statistica was also used to calculate analysis of variance, (ANOVA) a statistical technique used to examine differences among two or more groups by comparing variability between the groups to the variability within the groups. An ANOVA was performed between birth weight and each of the categorical risk factors; racial/ethnic group, payer group, and age group. Significance was noted for p values of ≤ 0.05. Subsequently a Tukey HSD post hoc analysis was completed on each of the categorical risk factors to determine differences within each risk factor category.

Additionally, Statsitica was used to calculate multiple linear regression to determine significant differences between birth weight and non-categorical risk factors;

1. maternal substance use including; tobacco use, alcohol use, marijuana use, cocaine use, other drug use, any substance use (an overall category that included mothers who used any of studied substances),

2. maternal chronic medical conditions including; maternal anemia, maternal asthma, type 1 diabetes mellitus, type 2 diabetes mellitus, gestational diabetes mellitus, chronic hypertension, gestational hypertension, any chronic medical condition (an overall category that included mothers who had any of chronic medical conditions that were studied),

3. and maternal infections including; Group B Beta Streptococcus infections, Chlamydia infections, Chorioamnionitis infections, Herpes Simplex Virus infections, Human Papilloma Virus infections, Hepatitis B infections, Hepatitis C infections, Gonorrhea infections, Trichomoniasis infections, Other infections (including urinary tract infections, bacterial vaginosis, and any other genitourinary infection), and any infection (an overall category that included mothers who had a history of any infection that was studied).

Significance was noted for risk factors that had a p values of ≤ 0.05.

Results

There were 5011 mothers included in the study. Of these pregnancies, 555 (11.08%) resulted in the birth of LBW infants while 4456 (88.92%) resulted in the birth of non-LBW infants. Table 1 is a summary of the maternal demographics for the study population.

Table 1: Maternal Demographics of Women Delivering at Miami Valley Hospital between October 26, 2007 – October 26, 2008

Maternal Demographics	n	non-LBW	LBW	Average birth weight	CI [95%]	Prevalence of non-LBW	Prevalence of LBW	Overall p value[a]
Race								
White	3441	3105	336	3286	[3263, 3310]	90.24	9.76	
Black	1263	1070	193	3030[b]	[2994, 3069]	84.72	15.28	
Hispanic	154	141	13	3324	[3220, 3432]	91.56	8.44	
Other	153	140	13	3324	[3097, 3310]	91.50	8.50	
Total	**5011**	**4456**	**555**	**3203**		**88.92**	**11.08**	**0.000000**
Payer								
Private	1932	1805	127	3368	[3339, 3399]	93.43	6.57	
Government	3036	2616	420	3128[c]	[3103, 3152]	86.17	13.83	
Total	**4968**	**4421**	**547**	**3221**		**88.99**	**11.01**	**0.000000**
Age (yrs)								
<20]	919	790	129	3101[d]	[3058, 3146]	85.96	14.04	
(20 - 25]	1547	1365	182	3167[e]	[3135, 3200]	88.24	11.76	
(25-30]	1400	1277	123	3292	[3257, 3328]	91.21	8.79	
(30-35]	742	666	76	3290	[3244, 3339]	89.76	10.24	
(35-40]	345	307	38	3330	[3261, 3402]	88.99	11.01	
>40	58	51	7	3240	[3068, 3415]	87.93	12.07	
Total	**5011**	**4456**	**555**	**3220**		**88.92**	**11.08**	**0.023858**

[a]This represents the P value for the ANOVA between birth weight and the given maternal demographic

[b]Infants born to black mothers had significantly lower average birth weight than every other racial/ethnic group
[c]Infants born to mothers insured by government programs had significantly lower average birth weight than infants born to privately insured mothers
[d]Infants born to mothers in this age group had significantly lower average birth weight than infants whose mothers were in the age groups (25-30], (30-35], and (35-40].
[e]Infants born to mothers in this age group had significantly lower average birth weight than infants whose mothers were in the age groups (25-30], (30-35], and (35-40].

RACE/ETHNICITY

The analysis of variance demonstrated a statistically significant difference in birth weight when comparing maternal races. The Tukey HSD post hoc analysis illustrated that the average birth weight of infants born to black mothers (3030 g) was significantly lower then the average

birth weight for infants born to mothers in every other racial/ethnic group. (White mothers at 3286 g, Hispanic mothers at 3324 g, and Other races at 3324 g).

Black mothers also had the highest prevalence of LBW (15.28%). The lowest prevalence of LBW (8.44%) was seen in infants born to Hispanic mothers. White mothers had a LBW prevalence of 9.76% and all other racial and ethnic groups had an overall prevalence of 8.5% (Figure 1).

Figure 1 Prevalence of LBW by racial/ethnic group.
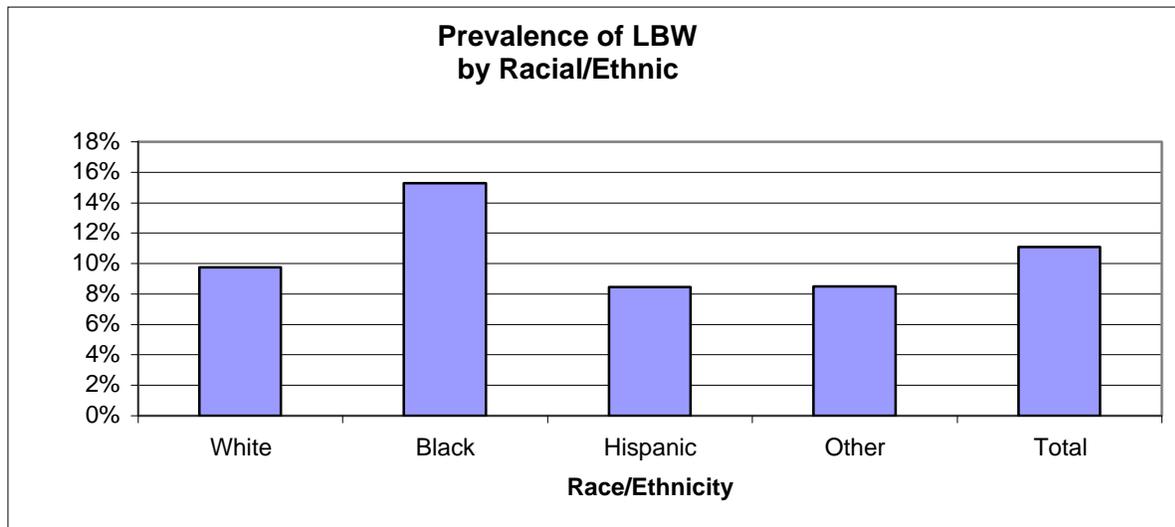
The prevalence of maternal substance use, chronic medical conditions, and infections were broken down by racial/ethnic group and birth weight, allowing comparison between non-LBW and LBW groups. The results are below in Tables 2-4.

Table 2: Prevalence Rates of Substance Use by Racial/Ethnic Group and Birth Weight

	Non- Low Birth Weight (non-LBW)					Low Birth Weight (LBW)					.
Race/ Ethnicity	White	Black	Hispanic	Other	Total	White	Black	Hispanic	Other	Total	Overall Total
Tobacco use	15.72	11.87	2.84	12.86	**14.30**	28.87	18.13	0.00	15.38	**24.14**	**15.39**
Alcohol use	0.58	0.65	0.00	0.00	**0.56**	2.38	2.07	0.00	0.00	**2.16**	**0.74**
Marijuana use	4.35	8.79	0.71	1.43	**5.21**	5.95	10.88	0.00	0.00	**7.39**	**5.45**
Cocaine use	1.29	0.75	0.00	0.71	**1.10**	2.68	4.66	0.00	0.00	**3.24**	**1.34**
Other drug use	0.87	0.28	0.00	0.00	**0.67**	1.19	0.00	0.00	0.00	**0.72**	**0.68**
Any substance use	17.26	17.01	2.84	12.86	**16.61**	30.95	22.28	0.00	15.38	**26.85**	**17.74**

Table 3: Prevalence Rates of Chronic Medical Conditions by Racial/Ethnic Group and Birth Weight

	Non- Low Birth Weight (non-LBW)					Low Birth Weight (LBW)					.
Race/Ethnicity	White	Black	Hispanic	Other	Total	White	Black	Hispanic	Other	Total	Overall Total
Anemia	1.19	4.95	7.09	3.57	**2.36**	2.08	4.66	0.00	0.00	**2.88**	**2.41**
Asthma	0.64	1.68	0.00	1.43	**0.90**	0.89	1.55	0.00	0.00	**1.08**	**0.92**
DM Type 1	0.42	0.37	0.00	0.00	**0.38**	0.60	0.00	0.00	0.00	**0.36**	**0.38**
DM Type 2	0.58	0.84	0.71	0.71	**0.65**	1.19	0.00	0.00	0.00	**0.72**	**0.66**
Gestational DM	4.38	3.93	9.22	12.14	**4.67**	3.27	6.74	15.38	23.08	**5.23**	**4.73**
Chronic HTN	1.71	2.62	0.00	0.00	**1.82**	4.76	5.18	0.00	7.69	**4.86**	**2.16**
Gestational HTN	3.32	3.08	0.71	2.14	**3.14**	5.65	1.55	7.69	0.00	**4.14**	**3.25**
Any chronic medical condition	11.40	15.51	17.73	19.29	**12.84**	16.37	17.10	23.08	30.77	**17.12**	**13.31**

DM – Diabetes Mellitus
HTN – Hypertension

Table 4: Prevalence Rates of Maternal Infections by Racial/Ethnic Group and Birth Weight

Race/ Ethnicity	Non- Low Birth Weight (non-LBW)					Low Birth Weight (LBW)					.
	White	Black	Hispanic	Other	Total	White	Black	Hispanic	Other	Total	Overall Total
GBBS	13.40	23.27	14.89	14.29	**15.84**	7.14	12.44	7.69	7.69	**9.01**	**15.09**
Chlamydia	0.74	4.21	1.42	0.00	**1.57**	0.89	2.07	0.00	0.00	**1.26**	**1.54**
Chorio-amnionitis	1.51	1.87	2.84	0.71	**1.62**	5.06	4.15	0.00	0.00	**4.50**	**1.94**
HSV	1.93	4.02	1.42	3.57	**2.47**	1.79	2.07	0.00	0.00	**1.80**	**2.39**
HPV	1.55	1.78	2.13	0.71	**1.59**	0.30	1.55	0.00	0.00	**0.72**	**1.50**
Hep B	0.13	0.37	0.00	3.57	**0.29**	0.00	0.52	0.00	0.00	**0.18**	**0.28**
Hep C	0.71	0.28	0.71	0.00	**0.58**	0.60	0.00	0.00	0.00	**0.36**	**0.56**
Gonorrhea	0.19	1.68	0.00	0.71	**0.56**	0.89	0.52	0.00	0.00	**0.72**	**0.58**
Trichomon-iasis	0.23	1.78	0.71	0.00	**0.61**	0.00	1.04	0.00	0.00	**0.36**	**0.58**
Other	0.58	1.31	1.42	1.43	**0.81**	0.30	2.07	0.00	0.00	**0.90**	**0.82**
Any infection	18.87	33.08	23.40	21.43	**22.51**	16.07	20.21	7.69	7.69	**17.12**	**21.91**

GBBS - Group B Beta Streptococcus
HSV - Herpes Simplex Virus
HPV -Human Papilloma Virus
Hep - Hepatitis

From Tables 2-4, several variables were determined to have significant differences when compared against birth weight and are discussed below.

Substance use

Overall the prevalence of tobacco smokers was significantly different between the two groups. Mothers in the non-LBW group had a prevalence of 14.30% while mothers in the LBW group had a smoking prevalence of 24.14%. The trends in smoking prevalence by race can be seen in Table 2. While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. The prevalence of tobacco smokers was highest in White mothers in both groups; 15.72% in the non-LBW group and almost twice as high (28.87%) for the LBW group. Hispanic mothers had the lowest smoking rates in both groups. No mothers in the Hispanic LBW group smoked and only 2.84% smoked in the non-LBW group (Table 2).

While the overall prevalence of alcohol use was much lower than other substances, the difference between the non-LBW and LBW group was significant. Mothers in the non-LBW group had a prevalence of 0.56%, while mothers in the LBW group had a prevalence of 2.16%. The trends in alcohol prevalence by racial/ethnic group can be seen in Table 2. While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. The highest prevalence was in White mothers with 2.38% in the LBW group and only 0.58% in the non-LBW group. A similar difference was seen between groups of Black mothers with 2.07% in the LBW group and 0.65% in the non-LBW group. Hispanics and Other races had no mothers in either group using alcohol (Table 2).

Overall there was a significantly lower prevalence of marijuana use in non-LBW mothers versus the LBW group. Mothers in the non-LBW group had a prevalence of 5.21% while mothers in the LBW group had a prevalence of 7.39%. The trends in marijuana prevalence by racial/ethnic group can be seen in Table 2.

While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. Marijuana use was highest in Black mothers for both groups with (10.88%) in the LBW group and (8.79%) in the non-LBW group. The prevalence among White mothers was (5.95%) in the LBW group and (4.35%) in the non-LBW group. Hispanics and Other races had the lowest rates with no mothers in the LBW groups using marijuana (Table 2).

The overall prevalence of cocaine in this population was very low (1.34%). There was a significantly lower prevalence of cocaine use in non-LBW mothers versus the LBW group. Mothers in the non-LBW group had a prevalence of 1.10 % while mothers in the LBW group

had a prevalence of 3.24%. The trends in cocaine prevalence by racial/ethnic group can be seen in Table 2.

While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. The prevalence of cocaine use in the LBW group was highest in Black mothers (4.66%). In the non-LBW group the highest prevalence was among White mothers (1.29%). Hispanic mothers in both groups did not use cocaine (see Table 2).

In this population, 17.74% of mothers had a history of some substance use. There was a significantly higher prevalence of substance use in the LBW group (28.85%) versus the non-LBW group (16.61%). While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. The highest prevalences of substance use for both groups were seen in White mothers in the LBW group (30.95%) and 17.26% in the non-LBW group. Hispanic mothers had the lowest overall substance use in both groups; 2.84% in the non-LBW group and 0% in the LBW group (Table 2).

Maternal Chronic Medical Conditions

Overall there was a significantly lower prevalence of chronic hypertension in non-LBW mothers versus the LBW group. Mothers in the non-LBW group had a prevalence of 1.82% while mothers in the LBW group had a prevalence of 4.86%. The trends in chronic hypertension prevalence by race can be seen in Table 3.

While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. The highest prevalence of chronic hypertension in the LBW group was seen in the Other races group (7.69%). In contrast there were no mothers in the Other races group that had chronic hypertension in the non-LBW group.

Black mothers had the highest prevalence (2.62%) in the non-LBW group. Hispanic mothers had no chronic hypertension in either the LBW or non-LBW groups (Table 3).

Overall there was a significantly lower prevalence of gestational hypertension in non-LBW mothers versus the LBW group. Mothers in the non-LBW group had a prevalence of 3.14% while mothers in the LBW group had a prevalence of 4.14%. The trends in chronic hypertension prevalence by race can be seen in Table 3.

While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. In contrast to the chronic hypertension prevalence, Hispanic mothers had the highest prevalence of gestational hypertension (7.69%) in the LBW group and in the non-LBW group had a prevalence of 0.71%. White mothers had the highest prevalence (3.32%) among the non-LBW groups. Black mothers had a higher prevalence in the non-LBW group (3.08%) than the LBW group (1.55%). This trend was mirrored in mothers of Other races with 2.14% in the non-LBW group and 0% in the LBW group (Table 3).

When the study considered the prevalence of any chronic medical condition that a mother had, a significant difference was found between the mothers in each group. The prevalence in the non-LBW group was 12.84% while the LBW group had a prevalence of 17.12% (Table 3).

While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. The highest prevalence was seen in mothers of Other races at 30.77% for the LBW group and 19.29% in the non-LBW group. White mothers had the lowest rates of chronic medical conditions in both groups; 16.37% in the LBW group and 11.40% in the non-LBW group (Table 3).

The other chronic medical conditions studied showed no significant difference when compared to birth weight. These chronic medical conditions include asthma, anemia, and diabetes mellitus (Table 3).

Maternal Infections

Many infections studied showed no significant difference in prevalence between mothers of LBW infants and those of non-LBW infants including; Chlamydia, Herpes Simplex Virus (HSV), Human Papilloma Virus (HPV), Hepatitis B, Hepatitis C, Gonorrhea, and Trichomoniasis. Additionally, there was no significant difference in birth weight between women with any infection and those with no infection.

There were significant differences in LBW between mothers with Group B Beta Streptococcus (GBBS) and those without the infection. Overall the mothers in the non-LBW group had a prevalence of 15.84% while mothers in the LBW group had a prevalence of 9.01%. The trends in maternal infections prevalence by race can be seen in Table 4.

While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. The highest rates of GBBS were seen in Black mothers in both groups; 12.44% in the LBW group and 23.27% in the non-LBW group. A similar trend was seen across racial groups with higher rates of infection in the non-LBW group of mothers. The lowest prevalence in both groups was seen in mothers of Other races; 7.69% in the LBW group and 14.29% in the non-LBW group (Table 4).

In regards to Chorioamnionitis, there was also a significant difference seen in LBW. Overall the mothers in the non-LBW group had a prevalence of 1.62 % while mothers in the LBW group had a prevalence of 4.50%. The trends in maternal infections prevalence by race can be seen in Table 4.

While the following differences were observed in prevalence among racial/ethnic groups, these differences have not been tested for significance. The highest rates of Choriamnionitis in the LBW group were seen in White mothers (5.06%). Hispanic mothers had no Choriamnionitis infections in the LBW group, but had a prevalence of 2.84% in the non-LBW group. The lowest prevalence in both groups was seen in mothers of Other races; 0% in the LBW group and 0.71% in the non-LBW group (Table 4).

There were 41 mothers that were positive for infections other than the nine specific infections included in the maternal characteristics. There was a significant difference in LBW for mothers with "other" infections. Other infections accounted for a total prevalence of 0.82% of mothers in the study. In total the non-LBW group had a lower prevalence (0.81%) than the LBW group (0.90%). Among the different racial groups there was no identified trend in the prevalence (Table 4).

PAYER

The analysis of variance performed demonstrated a statistically significant difference in birth weight when comparing to payer groups. Additionally, the Tukey HSD post hoc analysis indicated that the average birth weight of infants born to mothers on government sponsored insurance plans was significantly lower then the average birth weight for infants born to mothers insured privately.

There was a significantly higher rate of LBW (13.83%) seen in infants born to mothers on government sponsored health plans versus the LBW rate (6.57%) seen in infants born to mothers on private insurance (Figure 2).
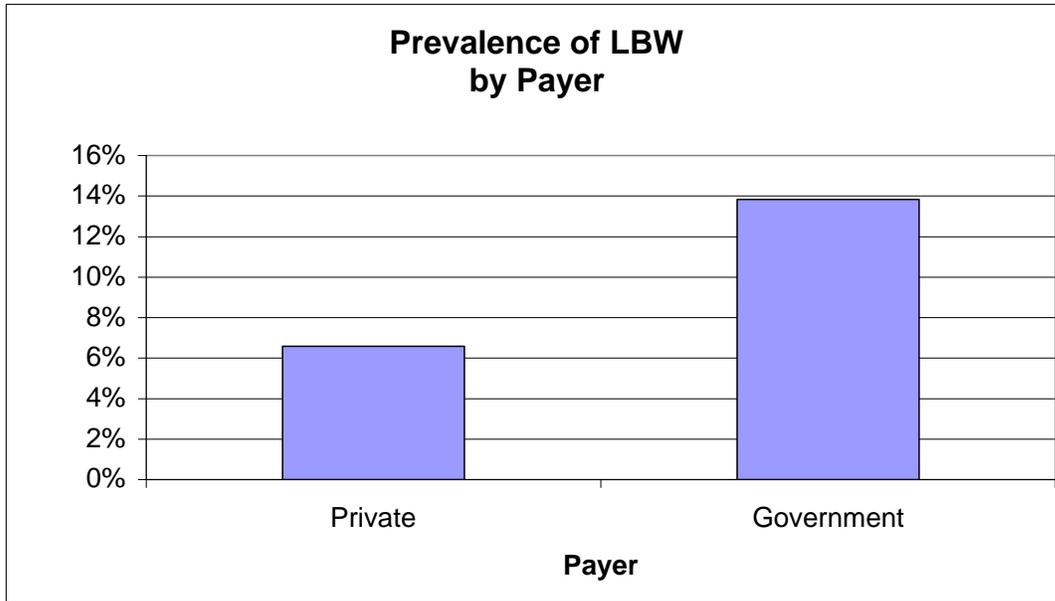
Figure 2: Prevalence of LBW by payer group

The prevalence rates of maternal substance use, chronic medical conditions, and infections were broken down by payer group and birth weight, allowing comparison between non-LBW and LBW groups. The results are below in Tables 5-7.

Table 5: Prevalence of Substance Use by Payer Group and Birth Weight

Payer	Non Low Birth Weight (non-LBW)			Low Birth Weight (LBW)			
	Private	Government	Total	Private	Government	Total	Overall Total
Tobacco use	3.66	21.44	**14.18**	3.94	30.24	**24.13**	**15.28**
Alcohol use	0.11	0.88	**0.57**	1.57	2.14	**2.01**	**0.72**
Marijuana use	0.17	8.60	**5.16**	0.00	9.76	**7.50**	**5.41**
Cocaine use	0.06	1.83	**1.11**	0.00	4.29	**3.29**	**1.35**
Other drug use	0.11	1.07	**0.68**	0.00	0.95	**0.73**	**0.68**
Any substance use	3.93	25.15	**16.49**	4.72	33.57	**26.87**	**17.63**

Table 6: Prevalence of Chronic Medical Conditions by Payer Group and Birth Weight

Payer	Non Low Birth Weight (non-LBW)			Low Birth Weight (LBW)			Overall Total
	Private	Government	Total	Private	Government	Total	
Anemia	0.22	3.75	**2.31**	2.36	3.10	**2.93**	**2.38**
Asthma	0.33	1.30	**0.90**	3.15	0.48	**1.10**	**0.93**
DM Type 1	0.33	0.42	**0.38**	0.00	0.48	**0.37**	**0.38**
DM Type 2	0.44	0.80	**0.66**	1.57	0.48	**0.73**	**0.66**
Gestational DM	5.37	4.17	**4.66**	7.09	4.52	**5.12**	**4.71**
Chronic HTN	1.94	1.72	**1.81**	3.94	5.24	**4.94**	**2.15**
Gestational HTN	2.44	3.56	**3.10**	6.30	3.33	**4.02**	**3.20**
Any chronic medical condition	10.53	14.30	**12.76**	22.05	15.48	**17.00**	**13.22**

DM – Diabetes Mellitus

HTN - Hypertension

Table 7: Prevalence of Maternal Infections by Payer Group and Birth Weight

Payer	Non Low Birth Weight (non-LBW)			Low Birth Weight (LBW)			Overall Total
	Private	Government	Total	Private	Government	Total	
GBBS	13.13	17.47	**15.70**	5.51	10.00	**8.96**	**14.96**
Chlamydia	0.22	2.52	**1.58**	0.00	1.67	**1.28**	**1.55**
Chorio-amnionitis	1.16	1.95	**1.63**	2.36	5.24	**4.57**	**1.95**
HSV	1.88	2.91	**2.49**	1.57	1.90	**1.83**	**2.42**
HPV	0.89	2.10	**1.61**	0.79	0.71	**0.73**	**1.51**
Hep B	0.28	0.31	**0.29**	0.00	0.00	**0.00**	**0.26**
Hep C	0.00	0.99	**0.59**	0.00	0.48	**0.37**	**0.56**
Gonorrhea	0.11	0.88	**0.57**	0.00	0.95	**0.73**	**0.58**
Trichomon-iasis	0.00	0.99	**0.59**	0.00	0.48	**0.37**	**0.56**
Other	0.39	1.11	**0.81**	0.00	1.19	**0.91**	**0.83**
Any infection	17.01	26.15	**22.42**	9.45	19.29	**17.00**	**21.82**

GBBS - Group B Beta Streptococcus

HSV - Herpes Simplex Virus

HPV -Human Papilloma Virus

Hep - Hepatitis

Substances Use

Overall the prevalence of tobacco smokers was significantly different between the two groups. Mothers in the non-LBW group had a prevalence of 14.18% while mothers in the LBW

group had a prevalence of 24.13%. The trends in smoking prevalence by payer can be seen in Table 5.

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. The prevalence of tobacco smokers was highest in mothers who were on government sponsored insurance plans in both groups, 21.44% in the non-LBW group and 30.24% for the LBW group. The prevalence of tobacco smoking in both groups was low for mothers insured privately, 3.66% in the non-LBW group and 3.94% in the LBW group (Table 5).

While the overall prevalence of alcohol use was much lower than other substances, the difference between the non-LBW and LBW group was significant. Mothers in the non-LBW group had a prevalence of 0.57% while mothers in the LBW group had a prevalence of 2.01%. The trends in alcohol prevalence by payer group can be seen in Table 5.

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. The highest use was in mothers who were on government sponsored insurance plans in both groups, 0.88% in the non-LBW group and 2.14% for the LBW group. The prevalence of alcohol use in both groups was low for mothers insured privately, 0.11% in the non-LBW group and 1.57% in the LBW group (Table 5).

Overall there was a significantly lower prevalence of marijuana use in non-LBW mothers verses the LBW group. Mothers in the non-LBW group had a prevalence of 5.16% while mothers in the LBW group had a prevalence of 7.50%. The trends in marijuana prevalence by payer groups can be seen in Table 5.

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. The prevalence of marijuana users was highest

in mothers who were on government sponsored insurance plans in both groups, 8.60% in the non-LBW group and 9.76% for the LBW group. The prevalence of marijuana use in both groups was low for mothers insured privately, 0.17% in the non-LBW group and 0% in the LBW group (Table 5).

There was a significantly lower prevalence of cocaine use in non-LBW mothers verses the LBW group. Mothers in the non-LBW group had a prevalence of 1.11%. While mothers in the LBW group had a prevalence of 3.69%. The trends in cocaine prevalence by payer groups can be seen in Table 5.

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. The prevalence of cocaine use was highest in mothers who were on government sponsored insurance plans in both groups, 1.83% in the non-LBW group and 4.29% for the LBW group. The prevalence of cocaine use in both groups was low for mothers insured privately, 0.06% in the non-LBW group and 0.0% in the LBW group (see Table 5).

In this population, 17.63% of mothers had a history of some substance use. There was a significantly higher prevalence of substance use in the LBW group (26.87%) versus the non-LBW group (16.49%).

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. The prevalence of any substance use was highest in mothers who were on government sponsored insurance plans in both groups, 25.15% in the non-LBW group and 33.57% for the LBW group. The prevalence of any substance use in both groups was low for mothers insured privately, 3.93% in the non-LBW group and 4.72% in the LBW group (Table 5).

Maternal Chronic Medical Conditions

Overall there was a significantly lower prevalence of chronic hypertension in non-LBW mothers verses the LBW group. Mothers in the non-LBW group had a prevalence of 1.81%, while mothers in the LBW group had a prevalence of 4.94%. The trends in chronic hypertension prevalence by payer groups can be seen in Table 6.

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. The prevalence of chronic hypertension was higher for both payer populations in the LBW group. Mothers who were on government sponsored insurance plans had a chronic hypertension prevalence of 5.24% in the LBW group and 1.72% for the non-LBW group. Mothers in private plans had a prevalence of 3.94% in the LBW group and 1.94% for the non-LBW group (Table 6).

Overall there was a significantly lower prevalence of gestational hypertension in non-LBW mothers verses the LBW group. Mothers in the non-LBW group had a prevalence of 3.10%, while mothers in the LBW group had a prevalence of 4.94%. The trends in chronic hypertension prevalence by payer group can be seen in Table 6.

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. The prevalence of gestational hypertension for mothers in private plans was 6.30% in the LBW group and 2.44% for the non-LBW group. Mothers who were on government sponsored insurance plans had similar prevalence in both groups, 3.33% in the LBW group and 3.56% for the non-LBW group (Table 6).

When the study considered the prevalence of any chronic medical condition that a mother had, a significant difference was found between the mothers in each group. The prevalence in the

non-LBW group was 12.76% while the LBW group had a prevalence of 17.00%. Trends for any chronic medical condition can be seen in Table 6.

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. Mothers in the LBW group who had private insurance had the highest prevalence of any chronic medical condition (22.05%). The non-LBW group had a prevalence of 10.53% for mothers covered by private insurance. Mothers who were on government sponsored insurance plans had a prevalence of 15.48% in the LBW group and 14.30% for the non-LBW group (Table 6).

Maternal infections

There were significant differences in LBW between mothers with Group B Beta Streptococcus (GBBS) and those without the infection. Overall the mothers in the non-LBW group had a prevalence of 15.70% while mothers in the LBW group had a prevalence of 8.96%. The trends in maternal infections prevalence by payer group can be seen in Table 7.

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. Mothers in the non-LBW group who had government insurance had the highest prevalence of GBBS infections (17.47%). The LBW group had a lower prevalence at 10.00%. Mothers who were on private insurance plans had a prevalence of GBBS at 13.13% in the non-LBW group and also had a lower prevalence for the LBW group (5.51%; Table 7).

Choriamnionitis had a significant difference in LBW. Overall the mothers in the non-LBW group had a prevalence of 1.63% while mothers in the LBW group had a prevalence of 4.57%. The trends in maternal infections prevalence by payer group can be seen in Table 7.

While the following differences were observed in prevalence between payer groups, these differences have not been tested for significance. Mothers in the LBW group who had government sponsored insurance had the highest prevalence of Choriamnionitis infections (5.24%). The non-LBW group of who had a lower prevalence (1.95%). Mothers who were on private insurance plans had a prevalence of 2.36% in the LBW group and also had a lower prevalence of 1.16% for the non-LBW group (Table 7).

MATERNAL AGE

The analysis of variance performed demonstrated a statistically significant difference in birth weight when comparing to maternal age groups. Additionally, the Tukey HSD post hoc analysis indicated that the average birth weight of infants born to mothers in the youngest age group (mothers who were 20 years or younger) was significantly lower (3101 g) then the average birth weight for infants born to mothers in the age groups 25-30 years (3293 g), 30-35 years (3290 g), and 35-40 years (3330 g). Mothers in the age group 20-25 years also had a significantly lower average birth weight than mothers in the age groups of 25-30 years, 30-35 years, and 35-40 years.

The prevalence of LBW formed a U-shaped curve with respect to maternal age. The highest prevalence of LBW was seen in infants born to mothers in the youngest age group (20 years old and younger, 16.67%). There was a step-wise decrease in LBW as maternal age increased; mothers between the ages of 20-25 years (14.00%), 25-30 years (11.76%), and 30-35 years (8.79%). The prevalence of LBW increased again for mothers over 35 years old. Mothers 35-40 years had a LBW prevalence of 10.24% and mothers over 40 years had a LBW prevalence of 11.01% (Figure 3).
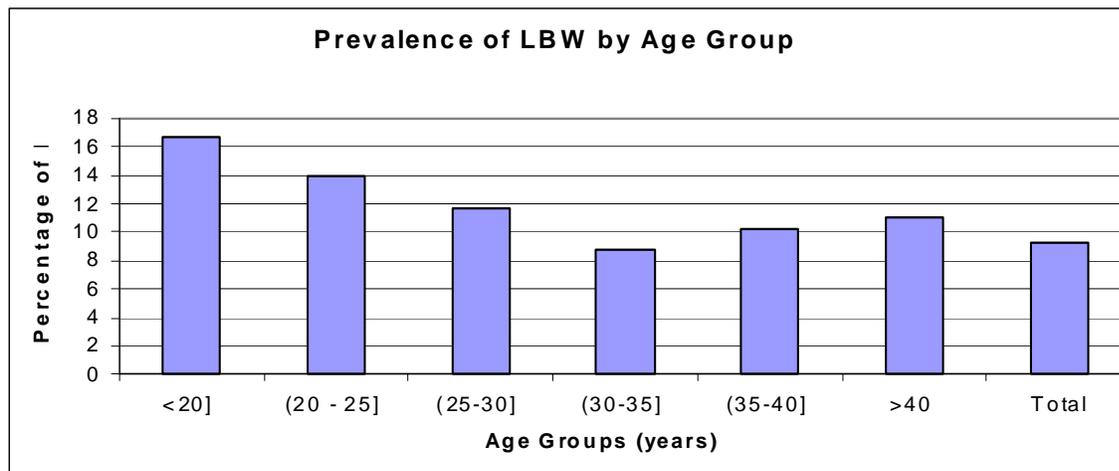
Figure 3: Prevalence of LBW by age group.

The prevalence rates of maternal substance use, chronic medical conditions, and infections were broken down by age group and birth weight, allowing comparison between non-LBW and LBW groups. The results are below in Tables 8-10.

Table 8: Prevalence of Substance Use by Age Group and Birth Weight

Age (yrs)	Non Low Birth Weight (non-LBW)							Low Birth Weight (LBW)							Overall Total
	<20]	(20 - 25]	(25-30]	(30-35]	(35-40]	>40	Total	<20]	(20 - 25]	(25-30]	(30-35]	(35-40]	>40	Total	
Tobacco use	16.20	18.83	13.39	8.26	6.84	9.80	**14.30**	24.81	25.82	21.95	25.00	21.05	14.29	**24.14**	**15.39**
Alcohol use	0.38	0.81	0.47	0.75	0.00	0.00	**0.56**	1.55	1.10	1.63	2.63	7.89	14.29	**2.16**	**0.74**
Marijuana use	6.84	8.50	3.45	2.10	1.30	0.00	**5.21**	6.98	9.34	5.69	7.89	5.26	0.00	**7.39**	**5.45**
Cocaine use	0.51	1.25	1.49	0.45	1.95	0.00	**1.10**	1.55	2.75	0.81	7.89	7.89	14.29	**3.24**	**1.34**
Other drug use	0.51	0.88	0.63	0.75	0.33	0.00	**0.67**	0.00	1.65	0.81	0.00	0.00	0.00	**0.72**	**0.68**
Any substance use	19.37	22.64	14.41	9.76	7.82	9.80	**16.61**	27.13	29.67	21.95	26.32	28.95	28.57	**26.85**	**17.74**

Table 9: Prevalence of Chronic Medical Conditions by Age Group and Birth Weight

Age (yrs)	Non Low Birth Weight (non-LBW)							Low Birth Weight (LBW)							Overall Total
	<20]	(20-25]	(25-30]	(30-35]	(35-40]	>40	Total	<20]	(20-25]	(25-30]	(30-35]	(35-40]	>40	Total	
Anemia	4.05	3.00	1.64	0.90	1.63	0.00	**2.36**	2.33	2.75	0.00	9.21	2.63	0.00	**2.88**	**2.41**
Asthma	1.39	0.95	0.63	1.05	0.33	0.00	**0.90**	0.00	0.00	1.63	3.95	2.63	0.00	**1.08**	**0.92**
DM Type 1	0.25	0.37	0.31	0.30	1.30	0.00	**0.38**	0.00	1.10	0.00	0.00	0.00	0.00	**0.36**	**0.38**
DM Type 2	0.13	0.66	0.63	0.45	2.28	1.96	**0.65**	0.00	0.55	0.00	2.63	2.63	0.00	**0.72**	**0.66**
Gestational DM	1.77	2.86	5.72	6.46	10.75	11.76	**4.67**	1.55	3.30	1.63	14.47	13.16	42.86	**5.23**	**4.73**
Chronic HTN	0.89	1.17	1.25	3.60	4.56	7.84	**1.82**	2.33	3.30	6.50	7.89	7.89	14.29	**4.86**	**2.16**
Gestational HTN	3.80	3.66	2.74	1.80	3.26	5.88	**3.14**	4.65	3.85	4.88	3.95	2.63	0.00	**4.14**	**3.25**
Any chronic medical condition	11.39	11.87	11.90	13.81	20.20	27.45	**12.84**	10.85	14.29	14.63	31.58	26.32	42.86	**17.12**	**13.31**

DM – Diabetes Mellitus
HTN – Hypertension

Table 10: Prevalence of Maternal Infections by Age Group and Birth Weight

Age (yrs)	Non Low Birth Weight (non-LBW)							Low Birth Weight (LBW)							Overall Total
	<20]	(20-25]	(25-30]	(30-35]	(35-40]	>40	Total	<20]	(20-25]	(25-30]	(30-35]	(35-40]	>40	Total	
GBBS	21.90	16.19	13.94	13.21	12.38	15.69	**15.84**	15.50	7.69	7.32	7.89	2.63	0.00	**9.01**	**15.09**
Chlamydia	4.56	2.12	0.31	0.15	0.00	0.00	**1.57**	3.10	1.10	0.81	0.00	0.00	0.00	**1.26**	**1.54**
Chorio-amnionitis	3.42	1.61	1.02	1.05	0.98	0.00	**1.62**	6.98	3.85	3.25	6.58	0.00	0.00	**4.50**	**1.94**
HSV	2.15	2.20	3.05	2.40	2.28	1.96	**2.47**	3.10	1.10	3.25	0.00	0.00	0.00	**1.80**	**2.39**
HPV	2.78	1.83	1.25	0.75	0.98	0.00	**1.59**	0.78	0.55	0.81	0.00	2.63	0.00	**0.72**	**1.50**
Hep B	0.13	0.29	0.16	0.60	0.65	0.00	**0.29**	0.00	0.00	0.00	0.00	2.63	0.00	**0.18**	**0.28**
Hep C	0.38	0.81	0.70	0.15	0.65	0.00	**0.58**	0.00	0.55	0.81	0.00	0.00	0.00	**0.36**	**0.56**
Gonorrhea	1.14	0.66	0.31	0.15	0.33	1.96	**0.56**	0.78	1.10	0.81	0.00	0.00	0.00	**0.72**	**0.58**
Trichomon-iasis	0.89	1.03	0.47	0.00	0.00	0.00	**0.61**	0.78	0.00	0.00	1.32	0.00	0.00	**0.36**	**0.58**
Other	0.63	0.95	0.63	0.75	1.30	1.96	**0.81**	1.55	1.10	0.00	1.32	0.00	0.00	**0.90**	**0.82**
Any infection	31.77	23.30	19.81	17.72	17.26	19.61	**22.51**	25.58	15.93	13.82	17.11	7.89	0.00	**17.12**	**21.91**

GBBS - Group B Beta Streptococcus
HSV - Herpes Simplex Virus
HPV -Human Papilloma Virus
Hep – Hepatitis

Substance use

Overall the prevalence of tobacco smokers was significantly different between the two groups. Mothers in the non-LBW group had a prevalence of 14.30% while mothers in the LBW group had a prevalence of 24.14%. The trends in smoking prevalence by age group can be seen in Table 8. While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. Tobacco use trends among the non-LBW group followed a U-shaped curve with prevalence peaking in the age group of 20-25 years (18.83%) and dipping to a low of 6.84% in the age group of 35-40 years. A small increase was seen in the age group over 40 years (9.80%). The LBW group saw relatively high rates of smoking across age groups with highest prevalence in the age group of 20-25 years (25.82%).

Alcohol use among the non-LBW group was low across age groups, but the difference between the non-LBW and LBW group was significant. Mothers in the non-LBW group had a prevalence of 0.56% while mothers in the LBW group had a prevalence of 2.16%. The trends in alcohol prevalence by age group can be seen in Table 8.

While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. The LBW group saw rates of alcohol use increase with advancing maternal age. The highest prevalence was in mothers over 40 years old (14.29%).

Overall there was a significantly lower prevalence of marijuana use in non-LBW mothers versus the LBW group. Mothers in the non-LBW group had a prevalence of 5.21 % while mothers in the LBW group had a prevalence of 7.39%. The trends in marijuana prevalence by age group can be seen in Table 8.

While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. Marijuana use among the non-LBW group saw

a relative decline in prevalence as maternal age increased. There was a peak in the age group of 20-25 years (8.50%) and then a bottoming out at 0.0% in the age group over 40 years. The LBW group saw relatively high prevalences of marijuana use across age groups with the highest prevalence in the age group of 20-25 years (9.34%) (Table 8).

The overall prevalence of cocaine in this population was very low (1.34%). There was a significantly lower prevalence of cocaine use in non-LBW mothers versus the LBW group. Mothers in the non-LBW group had a prevalence of 1.10 % while mothers in the LBW group had a prevalence of 3.24%. The trends in cocaine prevalence by age group can be seen in Table 8.

While the following differences were observed in cocaine prevalence among age groups, these differences have not been tested for significance. The LBW group saw prevalence increase with advancing age with highest prevalence in the age group over 40 years (14.29%; Table 8).

In this population, 17.74% of mothers had a history of some substance use. There was a significantly higher prevalence of substance use in the LBW group (28.85%) verses the non-LBW group (16.61%).

While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. The prevalence of mothers in the non-LBW group who used any substance also followed a U-shaped curve with prevalence peaking in the age group of 20-25 years (23.00%) and dipping to a low of 8.00% in the age group of 35-40 years. A small increase was seen in the age group over 40 years (10.00%). The LBW group saw relatively high rates of smoking across age groups with highest prevalence in the age group of 20-25 years (29.67%; Table 8). There were 34 mothers who took drugs other than marijuana or cocaine. There were no significant differences measured in birth weight for these mothers.

Maternal Chronic Medical Conditions

Overall there was a significantly lower prevalence of chronic hypertension in non-LBW mothers versus the LBW group. Mothers in the non-LBW group had a prevalence of 1.82% while mothers in the LBW group had a prevalence of 4.86%. The trends in chronic hypertension prevalence by age group can be seen in Table 9.

While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. Chronic hypertension among both the non-LBW group and LBW group increased with advancing maternal age. The lowest prevalence in both groups was seen in the age group 20 years and younger. For the non-LBW group prevalence was 0.89% and it was 2.33% in the LBW group. The highest prevalence in both groups was seen in the age group over 40 years (7.89%) in the non-LBW group and (14.29%) in the LBW group (Table 9).

Overall there was a significantly lower prevalence of gestational hypertension in non-LBW mothers versus the LBW group. Mothers in the non-LBW group had a prevalence of 3.14% while mothers in the LBW group had a prevalence of 4.14%. The trends in chronic hypertension prevalence by age group can be seen in Table 9.

While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. The prevalence of mothers in the non-LBW group with gestational hypertension also followed a U-shaped curve with prevalence peaking in the age group over 40 years (5.88%) after a low of 1.80% in the age group of 30-35 years. The LBW group saw relatively consistent prevalence across age groups with highest prevalence in the age group of 25-30 years (4.88%; Table 9).

Anemia, asthma, and diabetes mellitus (type 1, type 2, and gestational) did not show any significant difference between mothers of LBW and non-LBW infants. Significant difference in birth weight was measured when mothers with any of these chronic conditions were compared to mothers with no chronic health problems.

When the study considered the prevalence of any chronic medical condition that a mother had, a significant difference was found between the mothers in each group. The prevalence in the non-LBW group was 12.84% while the LBW group had a prevalence of 17.12%.

While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. The prevalence of any maternal chronic medical condition among both the non-LBW group and LBW group increased with advancing maternal age. The lowest prevalence in both groups was seen in the age group 20 years and younger with a prevalence of 11.39% in the non-LBW group and 10.89% in the LBW group. The highest prevalence in both groups was seen in the age group over 40 years in the non-LBW group (27.45%) and 42.86% in the LBW group.

Maternal Infections

There were significant differences in LBW between mothers with Group B Beta Streptococcus (GBBS) and those without the infection. Overall the mothers in the non-LBW group had a prevalence of 15.84% while mothers in the LBW group had a prevalence of 9.01%. The trends in maternal infections prevalence by age group can be seen in Table 10.

While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. The prevalence of mothers in the non-LBW group with GBBS infections also followed a U-shaped curve with prevalence peaking in the age group of 20 year olds and younger (21.90%) and reaching a low of 12.38) in the age group of 35-

40 years. There was an increase in prevalence in the age group over 40 years (15.69%). The LBW group saw decreasing prevalence with increasing maternal age with highest prevalence in the youngest age group (15.50%) and the lowest prevalence in the age group over 40 years (0.0%) (Table 10).

Choriamnionitis also had a significant difference seen in LBW. Overall the mothers in the non-LBW group had a prevalence of 1.63% while mothers in the LBW group had a prevalence of 4.57%. The trends in maternal infections prevalence by age group can be seen in Table 10.

While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. The prevalence of mothers in the non-LBW group with Choriamnionitis infections decreased with advancing maternal age with prevalence peaking in the youngest age group (3.42%) and dropping to 0.0% in mothers over 40 years. The LBW group had no identifiable trend in the prevalence rates. The highest prevalence was also in the youngest age group (6.98%) and the lowest prevalence also in mothers over 40 years (0.0%, Table 10).

While the following differences were observed in prevalence among age groups, these differences have not been tested for significance. There were no identified trends in either group for prevalence of Other infections. The highest prevalence in the non-LBW group was in mothers over 40 years (1.96%). Several age groups in the LBW group (age group of 25-30 years, 35-40, and over 40 years) had no mothers with Other infections. The highest rate of Other infections in the LBW group was in the age group 20 years old and younger (1.55%).

Discussion

This study demonstrates that the birth weight of infants in this population is associated with key maternal characteristics including; racial/ethnic heritage, payer status at time of delivery, age, substance use, a history of chronic medical conditions, and infections.

Of the risk factors examined in the study, several were found to have a significant difference in prevalence between mothers of non-LBW infants and LBW infants. These significant risk factors included; tobacco use, alcohol use, marijuana use, cocaine use, any substance use history, a history of chronic hypertension, a history of gestational hypertension, a history of any maternal chronic medical condition, Group B Beta Streptococcus infection, Chorioamnionitis infection, and a history of Other infections.

The risk factors listed above have a significant difference in prevalence between non-LBW mothers and LBW mothers. In a sub-analysis, prevalence for each of these variables was calculated according to the primary end points of racial/ethnic group, payer status, and maternal age. These sub-analyses have not yet been tested for significance, and thus are a limitation to the study, but allow trends in the data to be identified for future study.

RACE/ETHNICITY

The results of the study demonstrate that the average weight of infants born to Black mothers (3030 g) is significantly lower than that of all other racial/ethnic groups (White mothers at 3286 g, Hispanic mothers at 3324 g, and Other races at 3324 g). Additionally, Black mothers in this population have the highest prevalence of LBW (15.28%). The prevalence of LBW in infants born to Black mothers was almost twice as high as Hispanic mothers (8.44%), who had the lowest prevalence of LBW. These racial disparities in the prevalence of LBW are consistent with the literature and national trends. In previous studies, Black mothers have a significantly

higher prevalence of LBW then their non-Black counterparts (Nanyonjo et al., 2008 & Valero de Bernab et al., 2004). This racial disparity is present in the Dayton population as well and deserves consideration in any future interventions targeting LBW in the community.

Maternal Substance Use

There was a significant difference in the prevalence of tobacco smokers between mothers in the non-LBW group (14.30%) and mothers in the LBW group (24.14%). This almost 70 percent increase in prevalence in the LBW group is also supported by the literature and follows both state and national trends (ODH, 2009, NCHS, 2009, & Valero De Bernab et al., 2004).

The sub-analysis of racial/ethnic tobacco use indicates several interesting trends. Among White mothers, there is almost a two-fold increase in prevalence of tobacco smoking between the non-LBW (15.72%) group and the LBW (28.87%) group. Black mothers follow this expected pattern but with smaller differences in their prevalence rates between non-LBW and LBW mothers (Table 2). Mothers that were in the Hispanic and Other race categories had very few LBW babies. This small n (13 infants for each group) made it difficult to interpret any possible trend. None of the 13 Hispanic mothers who had a LBW infant were identified as tobacco smokers in their medical record. The very low prevalence rates in Hispanics may be the result of cultural differences in the expectations of mothers. However, these same expectations may also result in the under-reporting of substance use in this demographic. Further study and in-depth analysis of this growing population in Dayton is needed.

Alcohol consumption was very low in the population overall. There was however, a significant difference in prevalence between non-LBW (0.56%) and LBW (2.16%). This is an almost four-fold increase in prevalence for mothers in the LBW group. The low numbers of mothers who actually consumed alcohol may amplify this difference. This increased prevalence

of alcohol use in the LBW group was expected. It has been theorized that alcohol has a synergistic interaction with tobacco increasing the risk of LBW (Valero De Bernab et al., 2004). With such a small number of women in this study consuming alcohol, this synergy was not examined.

The sub-analysis of racial/ethnic alcohol use indicates several interesting trends. In both White and Black mothers, the consumption of alcohol follows a pattern similar to the overall trend with nearly a four-fold increase in prevalence for mothers in the LBW group (Table 2). Interestingly, there were no mothers in either the Hispanic or Other race categories that consumed alcohol. Again these minorities had a sample size and may have cultural approaches to alcohol consumption or motherhood that differ from their White and Black counterparts. Additionally, these cultural differences may also contribute to under-reporting in these groups.

The prevalence of marijuana use was significantly lower in the non-LBW group (5.21%) verses the LBW group (7.39%). National studies have shown mixed effects of marijuana use on birth weight (Valero De Bernab et al., 2004 & Schempf, 2007). This study, like many that examine maternal risk factors was not controlled for tobacco smoking when examining illicit drug use. Tobacco, as a well studied cause of LBW, may confound the variable and impact prevalence between the two groups.

The sub-analysis of racial/ethnic marijuana use indicated several interesting trends. Unlike the prevalence of tobacco and alcohol use, marijuana use was highest in Black mothers (Table 2). The trend for both Black and White mothers followed the overall trend with a high prevalence of marijuana use in the LBW group. The results of both Hispanics and Other races indicate that more women used marijuana in the non-LBW group then the LBW group (Table 2). This may again be the result of the low numbers in these groups or the cultural differences

discussed earlier, but this may also be a reflection of the mixed results of marijuana use seen in other studies (Schempf, 2007).

The prevalence of cocaine use was extremely low in this population at 1.34% overall. Despite this low prevalence the difference between the two groups was still significant. There were almost three times as many cocaine users in the LBW (3.24%) than the non-LBW group (1.10%; Table 2). This difference was expected and the trend is consistent with previous studies that have shown an association between LBW and cocaine use (Schempf, 2007).

The sub-analysis of racial/ethnic cocaine use indicated that nearly 5% of Black mothers in the LBW group used cocaine while only 0.75% of mothers in the non-LBW group used cocaine. Mothers in the LBW group were 80% more likely to use cocaine. This difference should be studied further to determine the significance of such a disparity. White mothers mirrored these trends with a smaller difference in prevalence between the non-LBW and LBW group (Table 2). Hispanic mothers had no cocaine users in either group. The possible explanations for cocaine include those explained above for other substances. The Other races group had no cocaine users in the LBW group and 0.72% prevalence in the non-LBW group. This result is likely due again to the small number of mothers (13) in the Other races group that had LBW infants.

There was also a significant difference in the prevalence of mothers who used any substance during pregnancy with 28.85% of LBW mothers using any substance vs. 16.61% of non-LBW mothers. These results are also consistent with previous studies that demonstrate that the use of substances during pregnancy increases the risk of delivering a LBW infant (Schempf, 2007).

Maternal Chronic Medical Conditions

This study demonstrates that for this population, there was 62% increase in the prevalence of chronic hypertension in mothers who gave birth to LBW infants (4.86%) verses their non-LBW (1.82%) counterparts. Hypertension has been extensively studied and shown to increase the prevalence of LBW (Enriquez et al., 2007, Rahman, et al., 2008, Romundstad et al., 2007 & Valero De Bernab et al., 2004). The results of this study are consistent with previous studies and hypertension may be a risk factor in which public health and medical interventions could improve outcomes.

The sub-analysis of racial/ethnic chronic hypertension indicates several interesting trends. Most interesting was that no mothers in the Hispanic group had chronic hypertension diagnosed in their medical record (Table 3). This might be a reflection of the relatively recent immigration of these women. The population of Hispanics in Dayton is largely first generation immigrants to the US. Many of these families are still living active lifestyles, employed in manual labor, and eating traditional foods. This was very different from the mothers in the Other races group who had the highest prevalence of chronic hypertension (Table 3). This group is made up of minorities in Dayton who are neither Black nor Hispanic. Many of the immigrants in the Other races group may be second or third generation immigrants from India, Asia, and the Middle East. These immigrants over successive generations may have adopted more of an American lifestyle and diet, leading to outcomes similar to that of Black and White mothers.

Pregnancy induced hypertension, more commonly referred to as gestational hypertension has been shown to be an independent risk factor for LBW (Rahman et al., 2008). Consistent with those results, this study demonstrated a significantly lower prevalence of gestational hypertension in non-LBW mothers (Table 3).

The sub-analysis of racial/ethnic gestational hypertension indicates several interesting trends. In the opposite direction of the results of chronic hypertension, Hispanic mothers in the LBW group had the highest prevalence of gestational hypertension. The nearly eight-fold increase in prevalence in the Hispanic LBW group is another trend that could be further explored for possible intervention in this population.

When examining mothers who had any of the chronic medical conditions that the study followed, the non-LBW group had significantly lower prevalence of LBW (Table 3). These results are also consistent with the literature that there is an increased risk of LBW with certain chronic illnesses. Diabetes mellitus, examined in this study as well, has had conflicting results in the literature. This study looked at three types of diabetes; type 1, type 2, and gestational and found no significant difference in prevalence between the non-LBW group and the LBW group. While diabetes has been looked at a risk factor for LBW by previous studies, each of these diagnoses carries a risk of macrosomia as well. This conflicting outcome requires additional study in the population to determine what the impact of each type of diabetes has on birth weight. There are additional challenges to understanding diabetes in this population, including a small n for both type 1 and type 2 patients, but there is also continued debate in the obstetrics literature on a shared definition of gestational diabetes (Ray et al., 2001).

There was no significant difference in prevalence of anemia between the two groups. Anemia is supported in previous studies as a risk factor, but previous studies also indicate that hemoglobin that is too high can also increase LBW (Valero De Bernab et al., 2004 & Levy et al., 2005). This study was unable to stratify patients based on the actual level of hemoglobin and instead was only able to examine patients with a diagnosis of anemia vs. non-anemic patients. Future studies may include greater analysis of hemoglobin.

Asthma was also found to have no significant difference in prevalence between the non-LBW and LBW groups. While the literature supports asthma as a risk factor for LBW, the effect appears to be dose dependent (Enriquez et al., 2007). In this study there was no way to stratify the patients based on asthma severity and the overall number of asthmatics was relatively low (<100).

Maternal Infections

Many infections studied showed no significant difference in prevalence between mothers of LBW infants and those of non-LBW infants including; Chlamydia, Herpes Simplex Virus (HSV), Human Papilloma Virus (HPV), Hepatitis B, Hepatitis C, Gonorrhea, and Trichomoniasis. This was surprising given that these infections have been associated with higher prevalence of LBW in previous studies (Mann, Bao, & Bersabe, 2009 &Valero De Bernab et al., 2004).

However, despite the large sample size in this study, there were relatively low prevalences of these infections. This could be due to the limitation that data in this study was only collected from one source in the medical record. Future studies may be able to examine the full medical record and identify previously unknown cases of these infections. Additionally, this study had no way to determine when the infection was acquired during pregnancy. Studies have shown that infections acquired in the first trimester have a strong association with LBW (Valero De Bernab et al., 2004).

Group B Beta Streptococcus (GBBS) infections did have a significant difference in prevalence between the non-LBW and LBW groups (Table 4). This study demonstrated a surprising result; the non- LBW group had a significantly higher prevalence of GBBS infections (15.84%) vs. the LBW group with a prevalence of 9.01%. While the literature clearly implicates

many maternal infections that are responsible for increasing LBW, the role of GBBS is relatively unknown. GBBS is well studied as a cause of newborn infection and sepsis, but there is limited data available relating to birth weight (Benitz, Gould, & Druzin, 1999). Future studies should consider the role of GBBS and what affect it may have on birth weight. The sub-analysis of racial/ethnic GBBS infections indicates that all races had higher rates of infection in the non-LBW group then the LBW group (see Table 4).

The significant difference between the non-LBW group (1.63%) and LBW group (4.57%) in prevalence of Chorioamnionitis was also expected. Chorioamnionitis is a well studied risk factor for preterm labor and prematurity and thus can lead to increased prevalence of LBW (Mann, Bao, & Bersabe, 2009). The sub-analysis of racial/ethnic Chorioamnionitis infections indicates that Black and White mothers follow the overall pattern with higher prevalence of Chorioamnionitis in the LBW group (Table 4). The Hispanic and Other races groups had surprising results with higher prevalences in the non-LBW groups. This result underlines the importance of determining the significance of these prevalence rates as a next step in analysis. If these differences are significant other factors may need to be examined to determine why Chorioamnionitis infections are driving LBW in this population.

There was also a significant difference between the non-LBW group (0.81%) and the LBW group (0.90%) in terms of Other infections. These were maternal infections other then the nine specific infections that the study examined. It is not surprising that these infections had a higher prevalence in the LBW group. Many infections have been associated with increased prevalence of LBW. Some of the infections included in the Other infections group were urinary tract infections and bacterial vaginosis; these infections are known risk factors for LBW in previous studies (Mann, Bao, & Bersabe, 2009 &Valero De Bernab et al., 2004). These

infections occurred with very low prevalence in the population, which was the basis for grouping them together in a single category. Further study is needed to evaluate these infections individually and assess any impact that they have individually on birth weight.

PAYER

While low socioeconomic status is a known risk factor for LBW, the studies that evaluate this risk factor use various metrics to determine a patient's socioeconomic status (SES). Each of these metrics has a variety of limitations. In this study, payer status of the mother at the time of delivery was used to approximate socioeconomic status with the assumption that mothers covered by government insurance in general were of a lower socioeconomic status then their privately insured counterparts. This assumption has various limitations; chiefly that Dayton has a military population that is included in the government coverage. The military population has its own unique characteristics that may complicate the results. This group is likely to have increased access to care, as well as, increased rates of prenatal care in comparison to individuals covered by other government plans. Additionally, the results were limited by the 43 mothers included in the other data results whose insurance status was unknown at the time of delivery.

There was a significant difference in average birth weight for infants born to mothers on governmental plans. Additionally, the prevalence of LBW was twice as high in the governmentally insured group (Figure 2). These results are consistent with the literature that continually demonstrates that SES is a strong predictor of health and can impact LBW (Collins et al., 2009, Nanyonjo et al., 2008, Valero de Bernab et al., 2004, & Zeska, Melly, & Schwartz, 2008).

The general discussion about each of the following risk factors was included above in the Racial/Ethnic group section. The following are the sub-analysis of each risk factor by payer group. These trends in the data have not yet been tested for significance.

Substance Use

Considering tobacco use by payer status, both payer groups followed the general trend with higher prevalences in the LBW group (Table 5). This, as explained above was expected and consistent with previous studies. Interestingly, the government group had much higher tobacco use in both groups then the private insurance group. This difference should be further tested for significance. If this difference is significant, interventions designed to address tobacco use may be more effectively targeted.

Alcohol use between payer groups also followed the trend of overall alcohol use. There was higher prevalence of use in the LBW group of both government and private insurance groups. This is also consistent with previous studies as explained above.

The sub-analysis of marijuana, cocaine, and any substance use by payer group indicates that almost all of the drug use is in mothers on government insurance (Table 5). These results need to be tested for significance in order to accurately interpret the trend, but may be able to help target future interventions. The trend also demonstrates that mothers in the LBW have a higher prevalence of use in each of these illicit drugs. These results are also consistent with previous studies as discussed above.

The difference between payer groups in terms of drug use may be due to bias of health care providers. The information for this study was taken from information obtained by health care providers and placed in the patient medical record. Health care providers needed to ask a patient if she was using illicit drugs to have the information placed in the medical record. This

question may be disproportionately asked of patients on government-sponsored health care (Van Ryn, 2002). Additionally, this information is often obtained by ordering a urine drug screen on patients. Internal biases may influence which patients are chosen for urine drug screen assessment (Van Ryn, 2002).

Chronic Medical Conditions

The sub-analysis of chronic hypertension by payer group was similar to the overall trend in chronic hypertension with higher prevalences in the LBW group for both payer groups (Table 6). This was the expected result as discussed above.

The sub-analysis of gestational hypertension by payer groups was also consistent with the overall gestational hypertension trend with the exception that in the government group, there was almost no difference seen in prevalence of gestational hypertension between non-LBW mothers, and LBW mothers.

The sub-analysis of any chronic medical condition by payer also had expected results that were consistent with the overall trend. The highest prevalence in both payer groups was in the LBW population (Table 6). The patients in the private payer group had the highest prevalence of diagnosed chronic medical conditions. This might be explained by the make up of the American health care system. Individuals with private insurance are more likely to have a physician that they see on a regular basis. This ongoing relationship with a care provider is needed, especially by women, to self-identify as having a disease (Fox & Chesla, 2008).

Maternal Infections

The sub-analysis of GBBS infections by payer group demonstrated the same trend as the overall GBBS infection prevalence. The highest prevalence in both the government and private

insurance groups was in the non-LBW mothers (Table 7). This trend is interesting for the reasons discussed above.

The sub-analysis of Chorioamnionitis infections by payer group also demonstrated the same trend as the overall Chorioamnionitis infection prevalence. The highest prevalence in both the government and private insurance groups was in the LBW mothers (Table 7). The trend was consistent with previous studies as discussed above.

MATERNAL AGE

Several previous studies have demonstrated that the maternal age has an impact on LBW. Particularly, strong associations have been confirmed for mothers at the extremes of the age spectrum, the youngest and oldest mothers (Malamitsi-Puchner & Boutsikou, 2006, & Valero de Bernab et al., 2004). The overall results in this study are consistent with these previous studies. The prevalence of LBW by age group was a U-shaped curve (Figure 3), supporting this established trend, however the curve in this data was skewed toward younger mothers. Over 30% of the LBW infants born in this population are born to mothers under the age of 25 years. This identified trend could have important implications for future interventions designed to address LBW in the community.

The general discussion about each of the following risk factors was included above in the Racial/Ethnic group section. The following are the sub-analysis of each risk factor by age group. These trends in the data have not yet been tested for significance.

Substance use

When considering tobacco use by age group some interesting trends were demonstrated. The non-LBW group follows the same U-shaped pattern of the overall trend, but the LBW group

has relatively steady rates of tobacco use across age groups. It appears from these results that smoking is a risk factor shared across age groups.

The sub-analysis of alcohol use by age group illustrated a very different trend from tobacco. Overall the prevalence of alcohol use was higher in each age group among mothers in the LBW group (Table 8). However, mothers older than 35 years appear to have a disproportionately higher prevalence of alcohol use then their younger counterparts.

The sub-analysis of marijuana use by age group demonstrates as expected that prevalence in each age group is higher in the LBW group (Table 8). This is consistent with previous studies as explained above. Marijuana use, similar to tobacco use, appears to be distributed across age groups as a relatively shared risk factor.

Cocaine use by age group demonstrates a pattern very similar to alcohol use in the sub-analysis. The overall prevalence of cocaine use was very low at 1.34%. The pattern was consistent with other substance use in that each age group had a higher prevalence in the LBW group than the non-LBW group. The somewhat interesting trend in this population was observed in mothers over 30 years old, who appear to have a disproportionately higher prevalence of cocaine use then their younger counterparts.

The sub-analysis of any substance use by age group indicated that the prevalence of any substance use was higher in each age group for the LBW group then the non-LBW group. This was expected and consistent with previous studies as discussed above. In the non-LBW group, there was a general decrease in substance use as maternal age increased. Interestingly in the LBW group, the prevalence was relatively high across age groups. This was expected after the sub-analyses of each of the substances individually. Both tobacco and marijuana use had relatively high prevalence across age groups in the LBW group, but were highest in the younger

age groups. Alcohol and cocaine use, in contrast, had prevalences that were concentrated in the older age groups in the LBW group. These substances contributed together to an overall high prevalence of any substance use at all age groups in the LBW group.

Chronic Medical Conditions

The sub-analysis of chronic hypertension by age group was similar to the overall trend in chronic hypertension with higher prevalences in the LBW group for all age groups (Table 8). As expected, the prevalence of chronic hypertension increased with advanced maternal age and was highest in the oldest women who had LBW infants.

The sub-analysis of gestational hypertension by age group did not follow a pattern similar to the overall gestational hypertension prevalence. There were no identifiable trends in the data by age group. Unlike other chronic medical conditions, the prevalence did not appear to increase with increasing maternal age.

The prevalence of any chronic medical condition did have increased prevalence with increasing maternal age. Additionally, in each age group the prevalence was greater in the LBW group then the non-LBW group. These were the expected results based on previous studies as discussed above.

Maternal Infections

The sub-analysis of GBBS infections by age group demonstrated the same trend as the overall GBBS infection prevalence. The highest prevalence in all age groups was in the non-LBW mothers (Table 10). This trend is interesting for the reasons discussed above.

The sub-analysis of Chorioamnionitis infections by age group also demonstrated the same trend as the overall Chorioamnionitis infection prevalence. The highest prevalence in both

the government and private insurance groups was in the LBW mothers (Table 10). The trend was consistent with previous studies as discussed above.

Conclusion

In conclusion, this study has demonstrated that there are significant differences in the prevalence (non-LBW vs. LBW) of several maternal demographic indicators in this population. In regard to race/ethnicity, Black mothers have significantly lower average birth weight infants and a higher prevalence of LBW infants then other races. Mothers who deliver infants on government sponsored insurance plans have significantly lower average birth weight infants and a higher prevalence of LBW infants then those on private insurance plans. Young mothers (under 25 years) have significantly lower average birth weight infants than mothers in the median ages of childbearing (25 years-40 years). These young mothers also account for nearly 30% of LBW in this population.

There are also significant differences in the prevalence (non-LBW vs. LBW) of maternal risk factors in this population. Non-LBW mothers have lower prevalence of tobacco, alcohol, marijuana, and cocaine use than LBW mothers. Non-LBW mothers have lower prevalence of chronic and gestational hypertension than LBW mothers. While non-LBW mothers have a lower prevalence of Chorioamnionitis, they did have a higher prevalence of GBBS than LBW mothers. Further research is needed to determine the significance of sub-analyses performed within these risk factors. These trends may allow future interventions to be more accurately targeted.

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Complete List of Study Variables.
- Race/ ethnicity
- Maternal insurance coverage at delivery
- Maternal age at delivery
- Evidence of tobacco smoking
- Evidence of alcohol use
- Evidence of marijuana use
- Evidence of cocaine use
- Evidence of other substance use
- Maternal asthma diagnosis
- Maternal anemia prior to delivery
- Any maternal hypertension diagnosis
- Any maternal diabetes mellitus diagnosis
- Any maternal history of sexually transmitted diseases
- Other maternal infections (UTI, GBBS, BV, Yeast)