Fall 12-14-2011

Identifying Data Needs to Support the Public Health Program of First Care

Rachele D. Ulysse

Identifying Data Needs to Support the Public Health Program of First Care

By

Rachele D Ulysse PT

BS., Hunter College

A Capstone Submitted to the Graduate Faculty
of Georgia State University in Partial Fulfillment
of the
Requirements for the Degree
MASTER OF PUBLIC HEALTH
ATLANTA, GEORGIA
2011

Identifying Data Needs to Support the Public Health Program of First Care

By

Rachele D Ulysse PT

Approved:
Michael P. Eriksen, SC.D.

Committee Chair:
Ike S Okosun, MS, MPH, PhD, FRSPH

Committee Member:
Teena François MPH

Acknowledgments

First and foremost, I want to acknowledge and thank my Lord and Savior, Jesus Christ, through whom I can accomplish all things small and great. In Him my faith, hope, confidence and foundation are built upon.

I would like to thank my husband, who is my best friend and hero. Who is an answered prayer from God, Jean you brought stability and love in my life. I have found no better friend.

I want to thank my parents whose life examples of persistence despite set backs pushed me forward in pursuing a career change in spite of life challenges.

I want to thank and remember my grandparents, Arsenio and Juliet, whose honesty, determination and hard work in everything they did still shapes me today.

I want to thank my brother, Raymund, whose innocence and difficulties in his life provoke me throughout my life to work hard to protect vulnerable individuals like him.

I would like to thank my committee chair, Dr. Okosun, for his time and willingness to work with me as I pursue my dreams.

I would also like to thank my committee member, Teena Francois, for her ever-positive attitude and knowledge.

I would like to thank my colleagues and friends, Helen Dulock for her expert knowledge in research as well as, Lu and Lang Huang. They selflessly gave me their time and access to their brilliant minds.

I also want to thank Gao Yang for encouraging me and forever being a positive role model.

In presenting this capstone as a partial fulfillment of the requirements for an advanced degree from Georgia State University, I agree that the Library of the University shall make it available for inspection and circulation in accordance with its regulations governing materials of this type. I agree that permission to quote from, to copy from, or to publish this capstone may be granted by the author or, in his/her absence, by the professor under whose direction it was written, or in his/her absence, by the Associate Dean, College of Health and Human Sciences. Such quoting, copying, or publishing must be solely for scholarly purposes and will not involve potential financial gain. It is understood that any copying from or publication of this capstone which involves potential financial gain will not be allowed without written permission of the author.

_____Rachele D Ulysse_____
Signature of Author

All theses deposited in the Georgia State University Library must be used in accordance with the stipulations prescribed by the author in the preceding statement.

The author of this capstone is:

Student's Name: Rachele Ulysse

Street Address: 1235 Monroe Drive Apt 1

City, State, and Zip Code: Atlanta, GA, 30306

The Chair of the committee for this thesis is:

Professor's Name: Ike S. Okosun

Department: Public Health

College: Health and Human Sciences

Georgia State University
P.O. Box 3995
Atlanta, Georgia 30302-3995

Users of this thesis who not regularly enrolled as students at Georgia State University are required to attest acceptance of the preceding stipulation by signing below. Libraries borrowing this thesis for the use of their patrons are required to see that each user records here the information requested.

NAME OF USER	ADDRESS	DATE	TYPE OF USE (EXAMINATION ONLY OR COPYING)

1235 Monroe Dr, Apt1
Atlanta, GA, 30306
Cell 917 239-0992
Pht.ed.pt@gmail.com

Rachele D. Ulysse

Objective To provide optimal care as a physical therapy professional in a pediatric facility and thereby improve the independent functioning and physical ability of patients under my care.

State Licensed **Physical Therapy Licensed in GA**
Certification **CPR and AED certified**

Education

- Bachelor of Science Degree-Physical Therapy Program, Fall of 1994
  Hunter College, New York, NY
- Masters in Public Health- Institute of Public Health, Fall of 2011
  GSU in Atlanta, GA

Professional Experience:

- **Staff Physical TherapistAtlanta Pediatrics, Inc.,** Atlanta, GA (2005- Present)
- **PRN Staff Physical Therapist**
  RehabCare: Presbyterian Village SNF, Austell, GA (2008-Present)
- **Staff Physical Therapist**
  New York Board of Education,
  Queens, NY (1999- 2005) Staff Physical Therapist
- **Pinecrest Developmental Center,**
  Pineville, LA (1998- 1999)
- **Traveling Physical Therapist/Independent Contractor** (1997- 1998)

Current Volunteering: Hagar House (women/children shelter) write grant, tutor and mentor

Languages English, Tagalog, conversational Spanish

References Available upon request

Table of Contents Pages

List of Figures

List of Tables

Capstone Title: Identifying Data Needs to Support the Public Health Program of First Care

I. Introduction

First Care (FC) is a statewide public health (PH) program whose goal is to ensure that every infant born in Georgia with low birth weight (less than 2500 grams), very low birth weight (less than 1,500 grams), preterm or prematurity (<37 completed weeks of gestation) conditions or those considered high risk infants with physical, neurological and social delays have access to skilled public health nurses. The role of the PH nurses is to assess, plan interventions and as necessary refer parents in order to lessen or prevent disabilities or illnesses in high-risk infants during their first year of life ("Welcome to SouthHealthDistrict.com - Children with Special Needs," n.d.). First Care is part of the Child Health Unit, in the Maternal Child Health (MCH) Program, of the state Department of Public Health. The state MCH programs are supported by Title V MCH Block grants, which are awarded to each state. The purpose of these State Block Grants is the creation of a partnership community service system that addresses the critical needs facing maternal and child health ("MCH," 2011). FC is currently in the process of becoming part of an evidence-based home visiting program for vulnerable newborns, called "Nurses for Newborns". Georgia will be implementing the curriculum of the "Nurses for Newborns" program statewide in the future. Thus providing an opportunity to analyze the data needs to support the revised FC program.

a. Purpose

Public Health (PH) core functions such as assessment, policy development and assurance of services are central to the viability of every PH program. One of the essential services under the assessment function is the role of monitoring health status and understanding the health issues facing the community("OperationalDefinitionBrochure-2.pdf," n.d.),("core_functions.pdf," n.d.). This essential service is the main focus of this project, which is to examine and identify essential data needs to support FC program. A more detailed explanation of the purpose is as follows.

1. Describe current health outcomes of GA infants less than one year of age.
   - Current baseline data of IMR (infant mortality rate), premature, very low birth weight (VLBW) and low birth weight (LBW) births
2. Use data to inform FC program in order to improve the IMR, as well as the overall health outcomes of LBW, VLBW, and premature (preterm) infants less than 1 years of age in GA.
   - Identifying common diagnoses resulting in the hospitalization of infants less than one.

The health status of a population is clearly demonstrated by its health outcomes. For the FC population of high-risk infants specific indicators are essential for PH programs to track and monitor. These health outcomes are LBW, VLBW, infant mortality rates (IMR) and preterm births. A survey of indicators and a comparison of Georgia's ranking among other states is essential to provide FC programs with the important information necessary

to help to set priorities. Eventually, this data will aide in the determination of resource limitation, expanding program demands, sound government decision making on public policies as well a providing quality services("Welcome to the Health Indicators Warehouse (HIW)," n.d.). Health outcomes and indicators cannot be used in isolation but must be applied and compared. Healthy People Objectives provide a valuable science based tool to improve GA MCH health outcomes by establishing national health objectives and measures("Healthy People 2020 - Improving the Health of Americans," n.d.).

b. Background

First Care has been in existence for more than a decade providing services to under served populations in GA. Through qualified nursing personnel the central role of the program is to positively identify cases of premature births, LBW and VLBW births as well as other conditions that increase the morbidity and mortality rates for high risk infants. The role of FC nurses includes coordinated and integrated home visit (HV) services, nursing assessments, collaboration with primary care and other healthcare providers as well as monitoring of health outcomes and indicators targeting this population. This core function cannot overshadow the health service role. Vital essential services include monitoring high-risk infants hospital discharges and enrollments to understand special health conditions in this population on a continual basis. FC implements on-going quality improvement of PH services and staff. The program

facilitates the exchange of information and data with community groups and other agencies to allow parents to make informed decisions collaboratively.

II. Literature Review

a. Health Outcomes

High-risk infants suffer from a variety of conditions and diagnoses. They can range from congenital malformation, newborns affected by complication of maternal pregnancy, short gestation and respiratory distress. The health outcome measurements of infants and newborns will be our focus in FC's high-risk infants population. These include: preterm births, infant mortality rates (IMR), LBW and VLBW. All 4 indicators have been associated with maternal health/nutrition, access to care, social economic status and finally public health practices("Infant Deaths --- United States, 2000--2007," n.d.),("ACOG Education Pamphlet AP173 -- Early Preterm Birth," n.d.)("Welcome to the Health Indicators Warehouse (HIW)," n.d.).

b. Preterm Births

High rates of premature births in GA are a PH concern. These infants completed less than 37 weeks gestational period. Extremely preterm newborns are babies who completed less than 28 weeks gestation. This group of preterm presents more risk than their later term premies. Prematurity is the leading cause of mortality accounting for 1/3 of all deaths during the first year of life("Infant Deaths --- United States, 2000--2007," n.d.),("CDC Features - Premature Birth," n.d.). Other studies show that nearly 2/3 of all infants deaths occur in the preterm population (Schempf, Branum, Lukacs, & Schoendorf, 2007). The earlier the birth, the greater the risk for death and morbidity

from disease and disabilities (J. A. Martin et al., 2005)(Green et al., 2005). Due to premature state, these infants' organs are underdeveloped and are not equipment to face the natural full term infant physiological demands of breathing, feeding and defending themselves from infections. Survivors of premature births have a variety of health problems such as respiratory illness (asthma), motor delay, cerebral palsy, lower IQ, and behavioral problems. In addition studies also indicate difficulties with education, resulting in increased academic and family stress (McCormick, Litt, Smith, & F, 2011) (Schempf et al., 2007)(Saigal & Doyle, 2008).

c. Low and Very Low Birth Weights

Birth weight is a salient indicator of maternal health, nutrition and possibly the newborns risk for acute and long-term complications. US data reveals that almost all VLBW infants and close to 2/3 of LBW infants are considered premature (J. A. Martin et al., 2005). The evidence indicates a correlation between the degree of immaturity and serious complications("Criteria for Determining Disability in Infants and Children: Low Birth Weight. Summary of Evidence Report/Technology Assessment, No. 70," n.d.). Since lower birth weight infants are considered preterm, they also have immature organs and greater susceptibility to health complications. Although birth weight is not a perfect marker for prematurity versus gestational age("Criteria for Determining Disability in Infants and Children: Low Birth Weight. Summary of Evidence Report/Technology Assessment, No. 70," n.d.), both LBW (<2,500 grams) and VLBW (<1,500g) give rise to health and survivability risks for children but VLBW with or without co-morbidities has

greater association with mortality and long term disabilities such as respiratory disorders, mental retardation (MR), cerebral palsy (CP), hearing/speech/visual/language/behavioral impairments and delayed growth("Criteria for Determining Disability in Infants and Children: Low Birth Weight. Summary of Evidence Report/Technology Assessment, No. 70," n.d.). Similar to preterm births, LBW and VLBW also result in difficulties later in life in areas of education, academic progress and internal family stresses(McCormick et al., 2011)(Saigal & Doyle, 2008).

d. Infant Mortality Rates

One of FC's critical markers is IMR, defined as the number of infant deaths per 1,000 live births in a population of infants' that are less than one year of age. Georgia consistently has a higher IMR than the national average ("2008_Infant_Mortality_Data_Summary_DPH08.301HW.pdf," n.d.). GA was ranked ninth in infant mortality compared to other states from national data reports of 2004-2006 vital statistic records.("A Snapshot of Infant Mortality," n.d.) According to Kochanek etal 2002, among the top leading causes of death has been the following: "congenital malformation and chromosomal abnormalities, disorders related to short gestation, low birth weight and lastly maternal complications of pregnancy". The percentages of preterm births and LBW infants are two major predictors of infant health("Products - Health E Stats - Recent Trends in Infant Mortality - 2002," n.d.). Supporting this study, GA's most common causes associated with infant deaths was found to be the following: LBW, VLBW and prematurity("2008_Infant_Mortality_Data_Summary_DPH08.301HW.pdf,"

n.d.). The findings indicated that LBW accounted for 2/3 of all infant deaths in GA("A Snapshot of Infant Mortality," n.d.).

e. Hospitalization

Infants and children with histories of prematurity, LBW/VLBW and extremely low birth weight (<1000 grams) have about 2-3 times the rate of hospital admissions as compared to full term infants after their initial hospital discharge (Saigal & Doyle, 2008). A major reason for this is due to their immature respiratory system. The probability of respiratory syncytial virus (RSV) related hospitalization was found to be 11.2% for infants born less than 32 weeks gestation (Stevens, Sinkin, Hall, Maniscalco, & McConnochie, 2000). RSV can lead to respiratory infections such as bronchiolitis or pneumonia and severe cases hospitalizations ("Respiratory syncytial virus activity-- United States, July 2007-December 2008.," 2008). Bronchopulmonary Dysplasisa (BPD) affects more than half of all VLBW or LBW infants, it is describe as inflammation and scarring of the lungs seen in premature infants with immature lungs. BPD has been commonly seen in recurrent hospitalization for these high-risk infants (Loughran-Fowlds, Oei, & Lui, 2009)(McCormick et al., 2011). The rate of respiratory distress was found to be higher in preterm infants than in full term infants(Valcamonico et al., 2007) They also have a higher incidence of, hypoglycemia, sepsis, and jaundice (Wang, Dorer, Fleming, & Catlin, 2004).

Repiratory distress was found to be associated with feeding and sucking delays (Cleaveland, 2010). Difficulty in feeding and failure to thrive is evident in the small

stature and lower growth attainment of preterm and VLBW infants as compared to their normal weighted counter parts (Saigal & Doyle, 2008). Due to immature renal function, premature infants are susceptible to extreme change in fluid/electrolyte balance requiring critical medical management to correct (Wada, Kusuda, Takahashi, & Nishida, 2008). These infants are also at risk for developing necrotizing enterocolitis (NEC) which is a condition commonly seen in preterm infants with immature circulatory systems who have difficulty fighting infection, balancing digestion and who develop inflammation in their intestinal lining ("Necrotizing Enterocolitis," n.d.). Early onset of sepsis in VLBW infants was also found to be ten times higher than full term infants due to their immature organs and invasive interventions(Wang et al., 2004)(McCormick et al., 2011).

Major and minor neurological sequela are outcomes of preterm and VLBW births. Various nervous system complications of white matter insults, sensory disorders, intracranial hemorrhage was found to affect 20%-25% of VLBW infants (Valcamonico et al., 2007)(McCormick et al., 2011). More severe hemorrhages can also results in hydrocephalus and motor impairments such as cerebral palsy. Hearing and visional impairments are other outcomes, with retinopathy of prematurity being the most prevalent morbidity in these infants (Saigal & Doyle, 2008)(McCormick et al., 2011).

f. Economic Burden

High-risk infants are varied in diagnoses, conditions and presentations. One common point that medically fragile or high-risk infants share is the high cost in their care. Information provided by the March of Dimes indicates that the healthcare costs for a preterm infant could be 10 times greater than that for a full term infant, $32,000 versus $3,200 respectively. An estimated $15 billion is spent annually on preterm births, this was found to represent almost half of all infant hospitalization costs (Green et al., 2005). The long-term costs of educational and medical services and providing care for preterm or very low birth weight children later in life in addition to the increasing cost of NICU care for these high risk neonates prompts a controversial debate regarding the justification for providing care to preterm neonates of borderline viability("The economic and societal costs | Mission | March of Dimes," n.d.)(Green et al., 2005).

g. Problem

FC program implementation has encountered obstacles in achieving optimum efficiency in delivery of their core functions. Due to insufficient program funding, understaffing at the county level and high turnover among PH nurses, FC functions were streamlined targeting healthcare coordination of services, equipping, and providing skills training for their staff. Unfortunately, ongoing and continued monitoring of health outcomes such as birth weights, discharges and current trends in GA ranking has not been focused on. Current baselines of health outcomes and indicators are necessary to make informed collaborative decisions with stakeholders. Eventually using this data will guide policy

and programmatic modifications to focus their efforts. In addition, aggregating these baselines can improve the understanding of the problems specific to high-risk infants. This in effect will promote ongoing quality improvements and allow for comparisons between the 2020 Healthy People (HP) Objectives and the current statistics for our state.

The following 2020 Healthy People Objectives are also the FC's focus.

HP's Goal: "Improve the health and well-being of women, infants, children, and families." ("Healthy People 2020 - Improving the Health of Americans," n.d.)

- 6.0 infant deaths per 1,000 live births
- 7.8 percent LBW
- 1.4 percent VLBW
- 11.4 percent total Preterm Births

Source: www.healthypeople.gov ("Healthy People 2020 - Improving the Health of Americans," n.d.)

III. Methods

This capstone project did not require Institutional Review Boards approval. Online available secondary data was used to identify data needs for the FC program. No unproven treatment strategies involving human subjects were used, which would entail health research methods. This project was a public health practice involving the monitoring of health status for the FC population in GA.

The Online Analytical Statistical Information System or OASIS is a set of web based tools which provide a means to access a standardized health data repository from Georgia's Department of Public Health("OASIS information," n.d.). Two main sets of tools were used for aggregating our health indicators and outcomes: OASIS Web Queries (Infant Death, Maternal and Child Health and Population) and GIS Mapping Tool("OASIS information," n.d.).

The OASIS Web Queries were selected to access infant death, maternal/child health and population statitistics. Four main health indicators were chosen IMR, preterm births, LBW and VLBW. With each indicator, subcategories of years (2008), geography (GA and Public Health District- PHD), race (All Races, White and Black) and ethnicity (Latino/Hispanic) were created. The resulting data was aggregated to construct 4 tables containing health outcomes. The 4 excel tables were divided by races (all races, whites and blacks) and ethnicity (Hispanics). Each table contained our 4 main indicators for GA and each PHD. An extension to these tables are 4 bar graphs with major health indicators of IMR, LBW, VLBW and preterm births for the selected year of 2008 and all races.

Individual PHDs were placed on the abcissa in each of bar graphs while the specific health indicator was placed on the y-axis. A horizontal line containing specific GA rates or percentages was contrasted with each individual PHD. Population categories were chosen in addition to sub categories of geography (GA), date (1998 and 2008), age (all life stages), race (all races), and ethnicity (all ethnicity) and sex (all sexes). The population data was then calculated to obtain population growth in GA from 1998 to 2008.

The OASIS and GIS Mapping Tools were used to produce statistical maps containing infant death and maternal/child health. For Maternal Child Health Statistics the following subcategories were chosen: measure (percent of births), years (2008), geography (PHD), Age (all ages), Race (all races), ethnicity (all ethnicities), number of weeks gestation (preterm 32-36 weeks), infant weights (<1,500 grams and 1,500-2,499 grams), education level (all education levle), marital status (all marital status) and number of data classes (4). Four statistical maps were synthesized containing our four main health measures: IMR, preterm births, LBW and VLBW.

To analyze and compare GA's standing among other states the Annie E. Casey Foundation's Kid Count Data Center was evaluated("KIDS COUNT Indicators and percents," n.d.). To obtain GA's ranking with our 4 main indicators, Data Across the State category was selected. Birth Outcome indicators (preterm births, LBW and VLBW) and Vital Statistics (infant death) were our targeted measures. Upon selecting our indictors the next step included chosing 123 Ranking with the following

subcategories: geographic areas (show state data), year (2008 for birth outcomes and 2007 for infant deaths), data type (rate- IMR and percent- preterm, L/VLBW), sorted/ordered by (numerical value) and finally all ranking charts were placed in descending order. The result was 4 pyramid charts of preterm biths, LBW, VLBW and IMR. These rankings describe GA's standing compared to all the other states.

GA's profiles obtained from Kid Count Data Center were evaluated and compared to HP 2010 measures. The main category chosen was "Data by the State" for GA profiles then a custom profile for health indicators was slected with the available indicators of preterm births and IMR. The years of 1998-2008 were utilized. Percentages were used to describe preterm data while rates were used to describe IMR. US indicators for preterm births and IMR were obtained by using Data Across the States category and proceeding to preterm births and IMRs between the years of 1998-2008. This data was aggregated to produce a line graph comparing national and GA data with HP 2010.

The Georgia Department of Public Health's Office of Health Indicators for Planning or OHIP was accessed to obtain data on hospital discharges. Specific categories were used to limit the aggregated data set including the following: year of 2008, in state of GA, divided in GA PHD, and infants less than 1 years of age. Statistical Analysis Software or SAS was used to evaluate related diagnoses in infants less than one year of age. FC's related diagnosis of infants under 1 year of age was aggregated into new categories requiring recoding into a new set of 27 diagnoses with specific ICD9 codes("2008 ICD-9-CM Volume 1 Diagnosis Codes," n.d.). Non-pertinent diagnoses were placed into a

category of “Other”. Proc freq, order, tables and proc sort (by PHD) was used to produce a table of discharge counts with diagnosis and PHD heading. The population (pop) per PHD were created using 2000 Census using “Sex by Age” files where populations under 1 year of age per GA counties(“Census 2000 Gateway,” n.d.). The individual county populations where then totaled into related 18 GA PHD. An excel document of PHD populations was merged with hospital discharge counts including their newly created rates. Discharge rates were calculated using the formula of rate=count/pop*1000. Individual PHD and GA rates (rate=count/121249*1000) were calculated separately and later merged into table form. Total counts of discharges (count=sum) per PHD and GA were summed or tallied. Final product created was an excel table.

The Peristats web tool from March of Dimes was accessed to obtain national statistical maps and health indicators(“Peristats - March of Dimes,” n.d.). National maps were created containing 4 main health outcomes: IMR, VLBW, LBW and preterm births. Per the choropleth maps, three classes of percentages or rates distinguish the magnitude of health indicators. National and GA 2008 data for LBW were utilized from the Peristats web tool. Counts were collected into table form and translated into line graphs comparing national and GA counts of LBW with HP 2010.

Deliverables

1. Construct tables and graphs of health indicators from Annie E. Casey Foundation, Kids Count Data Center. Present state ranking of health indicators.

2. Prepare the number and percentage of preterm, low and very low birth weight (LBW and VLBW) newborns as well as infant mortality rates in each of the 18 Health Districts in Georgia (GA) using the Department of Public Health (DPH) Online Analytical Statistical Information System (OASIS). Number and counts to be depicted in table and graph comparison.

3. Prepare OASIS Mapping of Public Health Statistics of health indicators in GA.

4. Prepare Peristat Mapping of health indicators across the United States

5. Prepare the causes for re-hospitalization of infants less than one year of age in Georgia.

IV. Results

a. Nationally

According to several sources, GA has consistently lagged in achieving MCH indicators set by HP 2010. In 2008, GA was ranked 39th in preterm births (Appendix A-1), while ranking 44th and 46th in VLBW and LBW respectively, when compared nationally("Home - KIDS COUNT Data Center," n.d.) (Appendix A-2 and A-3). GA's IMR in 2007 was ranked 42nd among the 50 states("KIDS COUNT," n.d.) (Appendix A-4). In addition, data sources from March of Dimes' Peristats mapping tool produces national maps of indicators supporting the evidence of GA's failure to compare with other states. (Figure 1 a, b, c, d) US IMR 2006 maps and US preterm, LBW and VLBW 2008 maps demonstrates a concentration of lagging indicators in the south eastern states which includes GA("Peristats - March of Dimes," n.d.).

From 1998 to 2008, GA experienced a 23% increase in population growth as per OASIS data sources("Office of Health Indicators for Planning OASIS," n.d.). With a growing population, GA will also experience an increase in the PH needs. Healthy People 2010 has given very clear objectives to compare baseline data in GA.

They are as follows:

Infant Mortality Rate: 4.5 per 1,000

Low Birth Weight 5.0%

Very Low Birth Weight 0.9%

Preterm Births 7.6%

Source: www.healthypeople.gov ("HP 2010 Objectives," n.d.)

Upon inspection of statewide and national health outcomes from1998-2010 against HP 2010, there are clear disparities demonstrated (Appendix B). The IMR graph (figure 2) demonstrates that GA's count is twice that of HP 2010 while being an average 20% higher than the US's IMR. (Figure 3) GA's Preterm birthrate of 13.0% was close to the national average percentage of 12.36% but was still twice that of HP 2010. (Figure 4) LBW is twice of HP 2010 measures while GA scored 20%-15% higher than the national percentage("Healthy People 2010 Home Page," n.d.),("Home - KIDS COUNT Data Center," n.d.).

b. Public Health Districts

One way to understand the GA measures is to examine the outcomes in the public health district level (Appendix B and C). In 2008 the statewide IMR (figure 5) was 8 deaths per 1000 live births. When compared locally, more than half of the districts (11) have measures higher than GA. North, East and West Central Health District (HD) scored an alarming 11, 10.5, and 11.9 deaths per 1000. Geographic patterns (figure 6) of IMR provide evidence of these high rates seen in the midsection and southeastern part of GA.

Premature birth percentages (figure 7) revealed that 10 districts scored above the average GA measure of 13.3%. Four districts scored considerably higher for preterm births: West Central HD (16.9%), Coastal HD (15.6%), the Southeast and South HD were essentially equal at 15.3%. GA preterm geographic map (figure 8) demonstrates these lagging HD's are congregated at the western midsection and south/southeastern portions of the state.

The GA LBW measure (figure 9) was 9.6%, ten health districts scored above this level. Southwest and South HD scored as follows for LBW: 11.9% and 11.8% respectively. While West Central and South Central HD both scored 11.7% in LBW. Statewide the VLBW percentage (figure 10) is a 1.8%, a total of 10 districts rated above this measure. West Central, South Central, Southwest and Clayton County HD measured a 2.7%, 2.3%, 2.3% and 2.6% for VLBW respectively ("Office of Health Indicators for Planning OASIS," n.d.). Geographic mapping (figures 11 and 12) demonstrates that the high rates for both LBW and VLBW are similar at the southwestern parts of the state.

c. Disparities

Substantial racial disparities are evident in the literature regarding maternal child health outcomes (Appendix B) ("Infant Deaths --- United States, 2000--2007," n.d.),("CDC - Preterm Birth-Prematurity - Maternal Infant Health - Reproductive Health," n.d.). When races are juxtaposed, GA health measures of preterm, IMR, LBW and VLBW births reflect considerable disparities with blacks lagging considerably. For whites and Hispanics, LBW and VLBW percentages were half that of Blacks (figure 13). The

preterm percentage for Blacks was nearly 30% higher than for their White and Hispanic counter parts. (Figure 14) An IMR of 13.8 per 1000 for Blacks was nearly twice that of Whites and more than three times that of Hispanics(“Neonatal Intensive-Care Unit Admission of Infants with Very Low Birth Weight --- 19 States, 2006,” n.d.).

d. Hospital Discharges

Results from GA 2008 hospital discharges (Appendix D) indicate the top twenty-five diagnoses affecting children less than one year of age, and strongly indicates common conditions that affect high-risk infants such as preterm, LBW and VLBW infants. High-risk infants, such as preterm and LBW infants may have immature respiratory systems increasing their risks for pneumonia, bronchitis/bronchiolitis, respiratory syncytial virus, chronic respiratory disease and respiratory distress syndromes(“Bronchiolitis,” n.d.),(“CDC - RSV: Homepage,” n.d.),(Loughran-Fowlds et al., 2009) ,(“Respiratory Distress Syndrome,” n.d.),(“CDC Features - Premature Birth,” n.d.),(“PrematurityAnOverviewandPublicHealthImplications.pdf,” n.d.). Due to fragile conditions of prematurity, neonates with immature organs have difficulty fighting infections, managing circulatory systems and digestion, resulting in a varied array of conditions such as seen in the hospital discharges: feeding difficulties, electrolyte imbalances and necrotizing enterocolitis and septicemia(“Necrotizing Enterocolitis,” n.d.). Morbidity from neurological sequalae is inversely related to gestational age which becomes evident in the neurodevelopment progress of preterm and LBW/VLBW children later in life(“PrematurityAnOverviewandPublicHealthImplications.pdf,”

n.d.),(“Pretermbith3.pdf,” n.d.). This condition can result from intraventricular hemorrhage and other hypoxic events(“Hypoxic-Ischemic Encephalopathy,” n.d.).

A closer examination of PHD reveals a trend of higher rates of morbidity in Athens (Northeast PHD), Dublin (South Central PHD), Clayton (Jonesboro PHD), Savannah (Coastal), Valdosta (South PHD), Waycross (Southeast PHD), Gainesville (West Central PHD). The geographic areas that demonstrate this pattern fall in the Southern, Southeastern, Central Sections of GA not including North and Northeastern District and Jonesboro areas. The diagnoses of Respiratory Distress Syndrome and Pneumonia due to RSV were found to be highest in Valdosta PHD. For the diagnosis of Primary apnea of newborn, acute bronchitis/bronchiollitis and Disorders relating to other preterm infants 2000-2499 grams Dublin was found to have accrued the highest rates for both. Necrotizing Enterocolitis and Feeding Problems were found to be highest in Jonesboro. Waycross PHD had the highest rates for the diagnosis of Failure to thrive and in Savannah PHD it was septicemia of newborn. Disorders relating to extreme immaturity were highest in Athens PHD.

V. Discussion and Conclusion

a. Capstone Goal

The three core public health functions are an integral part of FC services targeting high-risk infants less than 1 year of age. The purpose of this capstone is the assessment of the core PH functions, which include monitoring the health status as well as understanding the health issues of our FC population. It attempts to provide current data baselines on the health outcomes of GA infants less than one year of age, as well as provide information regarding current hospitalizations. In addition it provides FC with valuable data that will hopefully improve its overall health outcomes. This project provides national, statewide, and PHD health outcomes in high-risk infants. Results produced demonstrate lagging indicators in GA and southern/midsection PHD in GA. Also results from our hospital discharges indicate 6-7 PHDs that repeatedly had higher morbidity distributions. The capstone confirmed the need for continual surveillance of baseline data regarding the health outcomes and hospital discharges. Surveillance is necessary to have a more complete view of the health trends and patterns within the FC population. The capstone also reveals the need for further investigation of the data, from the level of the PHD to the county level for these health outcomes. County level data can explain if interventions are succeeding and can determine a more strategic target of needs. Finally, the capstone reveals the need for a broader scope of health outcomes, for example neonatal, post neonatal death and very preterm births, should all be included.

While the capstone goals are providing data baselines, FC's goals are to ensure that infants born with the high-risk backgrounds described have access to skilled public health nurses. Their eventual focus is to improve the overall health outcomes through their interventions. With a 23% increase in GA's population from 1998 to 2008, FC's essential services will experience even more demand. In 2008, GA had 146,500 births and approximately 13% of these births were premature, 10% were LBW and 2% were VLBW births. These births, and other high-risk infant diagnoses such as congenital and genetic syndromes, place infants at an increased risk and therefore create an increased need for FC intervention. These services include then monitoring and assessment of data, public policy development and planning, and finally the assurance of an excellent and competent workforce.

b. Clustering of Health Outcomes

A study by Goldhagen supported the finding of poor child health outcomes in the "deep south" including GA. Using indicators of LBW and IMR as well as other categories, he found that "living in the deep south was a stronger predictor of poor child health outcomes" vs other variables. Poor access, or poor utilization of child health services has been sighted as possible reasons for this health disparity, which maybe due to the lower SES backgrounds of the population in rural GA (Goldhagen et al., 2005) (Larson & Halfon, 2010)(Byrd, Katcher, Peppard, Durkin, & Remington, 2007). A preliminary interpretation of the clustering in our health outcomes can be partially explained by evidence gathered from previous studies on SES. Increases in poorer health outcomes

have reflected lower education attainment and overall lower SES (Karpati, Galea, Awerbuch, & Levins, 2002)(Chen, A. Martin, & Matthews, 2006). Lower SES and health disparities are prominent in the black population, thus we also see evidence of significant racial disparities (Schempf et al., 2007). Another interpretation for the health indicator clusters may reflect limited access to healthcare in rural parts of GA. These areas do not have accessible specialized pediatric physicians or the technical medical equipment to address complicated and critical medical conditions. Specialized hospitals such as Northside Hospital, and the Children's Healthcare of Atlanta are well known in the state for theirs specialized care for both mother and child . For example, congenital multiple malformations such as Robert's Syndrome or muscular torticollis require a constant host of orthopedic and/or allied health professionals, as well as a team of specialty physicians to address multiple health conditions which would not be available in rural and under popularized areas.

c. Racial Disparities

Our results revealed large racial disparities between blacks and their counter parts (whites and Hispanic/Latino) when it comes to poor birth outcomes. Many studies have revealed similar findings, mainly that "black infants were more than two times more likely then white infants to die within the first year of life"(Schempf et al., 2007). Several possible reasons can be given to account for these discrepancies. From OASIS, Kids Count Data Center and PeriStats we determined that blacks have a very high number of preterm births, this finding is supported by the GIS mapping which shows the same clustering in

(figure 8) noted in the midsection and southern regions. As in the literature review premature birth is the leading cause of infant deaths and was found to be the cause of 1/3 to 2/3 of all infants deaths. It has been well documented that black preterm birth rates were double that of whites and Hispanics (Saigal & Doyle, 2008). The increased percentage of preterm births for blacks predisposes them to a high IMR as supported by the literature (Saigal & Doyle, 2008). Another possible reason for this disparity is poor access and utilization of health care as well as poorer access to medical insurance and lower education attainment (Byrd et al., 2007)(Larson & Halfon, 2010). Maternal educational attainment is an important indicator for birth outcomes. Several sources agree (OASIS) that lagging maternal educational indicators in blacks can account for the clustering seen in our four GIS GA maps. For Hispanics/Latinos a paradox exists which describes their robust birth outcomes similar to whites despite lower SES and poor access to health care. One study reveals that Mexican immigrants had 10% lower rates in IMR than whites (Hummer, Powers, Pullum, Gossman, & Frisbie, 2007). Possibly due their healthy dietary and prenatal practices, infants born to Latino and Hispanic mothers demonstrate low incidences of prematurity and LBW births(Fuller et al., 2009). This supports our results where Hispanics/Latino display better birth outcomes than blacks.

d. Public Health Significance

The public health significance of this capstone project rests in its impact and the various opportunities for change. Since FC is focused on preventing illness and ameliorating disability through home visiting services, adjustments to distribution of funding may be

allocated differently to address areas of higher concern or needs. From the hospital discharge specific PHD distribution results, intervention may be tailored accordingly to diagnosis presentation. This approach can best utilize funding resources to address the MCH issues which plague specific districts. For example Valdosta and Dublin presented with very high respiratory related diagnoses, strategies for prenatal and perinatal smoking cessation intervention maybe beneficial to these districts. High rates for feeding related morbidities were also found in Clayton, which may reflect their current under funded status as per GA MCH histories. A revision in funding may better improve health outcomes in the Clayton PHD. From the results a few districts such as Athens, Dalton and Gainesville perform very well when compared to districts such as Columbus, Valdosta, and Savannah. Next steps are to evaluate current PH initiatives and strategies in these better performing districts to determine their effectiveness in improving birth outcomes, as well as assess if current interventions in the poorer performing districts have made any progress. Since the health disparities reflected the observed racial disparities and SES, strategies for MCH should be focused on initiatives to increase access to prenatal care and increasing maternal education. Areas of lagging indicators would benefit from concentrated approaches especially ones focused on blacks with lower SES.

e. Hospital Discharges

Upon closer examination of the hospital discharges, Southern, Southeastern, Central Sections of GA including North, Northeastern District and Jonesboro frequently demonstrated higher rates of hospital discharges. From the top 25 hospital diagnoses,

20% of the diagnoses were directly related to disorders of immaturity or preterm births. Preterm births were found to be one of the leading causes of mortality in infants less than one, supporting current literature. Nearly ¼ of all the ICD 9 coded hospital diagnoses of infants under one were related to respiratory disorders common in VLBW/LBW and preterm infants. ICD 9 codes of "acute bronchitis and bronchiolitis", "respiratory distress syndrome in newborn" as well as "pneumonia due to respiratory syncytial virus" were among the top 3 diagnoses, respectively(Loughran-Fowlds et al., 2009)(Stevens et al., 2000). Another large category of diagnoses was related to feeding, NEC, and sepsis/septicemia, these represent about a quarter of the top 25 hospital discharges. This finding is supported by the literature (Cleaveland, 2010)(Wada et al., 2008). Finally neurological sequela seen in VLBW and preterm births was demonstrated in our data with the following diagnosis: "hydrocephalus", and "Intraventricular hemorrhage, grade IV"(Saigal & Doyle, 2008)(McCormick et al., 2011)(Valcamonico et al., 2007). The hospital discharge patterns mirror the lagging public health district health outcomes.

f. Strengths and Limitations

The strength of the project was the clear and defined purpose and expected deliverable. Our purpose was focused on providing current data baselines on the health outcomes, as well as providing information regarding current hospitalizations. Our deliverable clearly produced tables, graphs, and maps of our current health outcomes. It also determined the causes of hospitalization per PHD. By focusing on examining PHD health outcomes, the

strength of our project was the clarity in patterns and distribution of disparity and indicators. For example the GIS maps, can easily indicate lagging indicators.

The limitation to my project was the scope was narrow and may have benefited by including other health indicators. The first limitation came from the strategy of only focusing on PHDs rather than on the county level. Including data from the county level would give a better scope of the health indicator and areas of concern in a particular health district. The second limitation was the focus on only four indicators; a wider scope which includes more indicators, would have resulted in a finer and more detailed picture of the FC population. IMR should have included categories of neonatal and post neonatal deaths, while for births expanding preterm births to very preterm births can achieve a better more detailed picture. The advantage of a narrow focuses on our 4 health outcomes it that this allows for easier comparisons of the health categories.

g. Data sources

My sources were all secondary data from OASIS, OHIP, PeriStats and Kids Counts Data Center. An advantage of these secondary sources is that they are free to all users. They allow the user to be more efficient with their time, and the services are extremely accessible be it on line or DCH portal. The limitations were that specific time periods may not always be available, the outcome categories may not be available, and reliability of data was a question ("Advantages and Disadvantages of Using Secondary Analysis," n.d.). For example Peristats did not have the 2008 national IMR map available or

mismatching categories in OASIS between the web query and GIS mapping tool. PeriStats web tool appeared to be the most accessible but categories appear very restrictive, it was difficult to find categories to compare with narrower focus indicators. OASIS and Kids Count Data Center each have many categories, but indicators do not match to allow comparisons. OHIP requires multiple steps to analyze. After aggregating the appropriate categories, SAS was used to evaluate and specific commands to interpret results and to translate morbidities.

h. Conclusion

National and statewide indicators of health outcomes have consistently shown a sluggish performance for GA. Among the 50 states ranking in preterm, LBW, VLBW and IMR, GA ranks among the bottom 10 for all 4 categories. When compared with HP 2010 among these indicators, GA presented with twice the rate and percentages on these objectives demonstrating an overall lag in accomplishing these objectives. Embedded in the GA outcomes are the considerable disparities between the outcomes of blacks when compared to that of either whites or Hispanics, demonstrating nearly twice the percentage and IMR.

Our findings suggest Southern, Southeastern, Central Sections of GA including North and Northeastern District and Jonesboro frequently demonstrate poor MCH outcomes when hospital discharges and geographic maps were evaluated. These geographic patterns may indicate a trend that will require further surveillance and rigorous

monitoring in order to develop a clearer understanding of the findings. Current results are only preliminary underscoring the need for continued research. Possible modifications in ICD9 codes can impact future results in hospital discharges and are subject to change.

There are many challenges for FC in the new decade. Resources are currently limited; reimbursements are poor for services, thus impacting the FC core function in their local PHD. Their current need for funding has limited their resources, the training of PH staff, the availability of tools and equipment, as well as its ability to update policy guidelines. Critical is the lack of support for monitoring indicators and health measures. Emphasizing their need for monitoring will allow FC to focus on this critical role, and address a current need that will only grow with an ever-expanding population.

References

2008 ICD-9-CM Volume 1 Diagnosis Codes. (n.d.). *2008 ICD-9-CM Volume 1 Diagnosis Codes*. Retrieved August 22, 2011, from http://www.icd9data.com/2008/Volume1/default.htm

2008_Infant_Mortality_Data_Summary_DPH08.301HW.pdf. (n.d.). . Retrieved from http://health.state.ga.us/pdfs/epi/mch/2008_Infant_Mortality_Data_Summary_DPH08.301HW.pdf

A Snapshot of Infant Mortality. (n.d.). . Retrieved September 26, 2011, from http://dch.georgia.gov/02/dch/home/0,2467,31446711,00.html

ACOG Education Pamphlet AP173 -- Early Preterm Birth. (n.d.). . Retrieved September 16, 2011, from http://www.acog.org/publications/patient_education/bp173.cfm

Advantages and Disadvantages of Using Secondary Analysis. (n.d.). *Colorado State University*. Retrieved November 20, 2011, from http://writing.colostate.edu/guides/research/survey/com4c2a.cfm

Bronchiolitis. (n.d.). . Retrieved October 10, 2011, from http://kidshealth.org/parent/infections/bacterial_viral/bronchiolitis.html?tracking=P_RelatedArticle#

Byrd, D., Katcher, M., Peppard, P., Durkin, M., & Remington, P. (2007). Infant mortality: explaining black/white disparities in Wisconsin. *Maternal & Child Health Journal*, *11*(4), 319-326.

CDC - Preterm Birth-Prematurity - Maternal Infant Health - Reproductive Health. (n.d.). . Retrieved September 25, 2011, from http://www.cdc.gov/reproductivehealth/MaternalInfantHealth/PretermBirth.htm

CDC - RSV: Homepage. (n.d.). . Retrieved October 10, 2011, from http://www.cdc.gov/rsv/

CDC Features - Premature Birth. (n.d.). . Retrieved September 25, 2011, from http://www.cdc.gov/Features/PrematureBirth/

Census 2000 Gateway. (n.d.). . Retrieved October 31, 2011, from http://www.census.gov/main/www/cen2000.html

Chen, E., Martin, A., & Matthews, K. (2006). Understanding health disparities: the role of race and socioeconomic status in children's health. *American Journal of Public Health*, *96*(4), 702-708.

Cleaveland, K. (2010). Feeding challenges in the late preterm infant. *Neonatal Network*, *29*(1), 37-41.

core_functions.pdf. (n.d.). . Retrieved from http://www.idph.state.ia.us/downloads/core_functions.pdf

Criteria for Determining Disability in Infants and Children: Low Birth Weight. Summary of Evidence Report/Technology Assessment, No. 70. (n.d.). . Retrieved September 16, 2011, from http://www.ahrq.gov/clinic/epcsums/lbwdissum.htm

Fuller, B., Bridges, M., Bein, E., Heeju Jang, Sunyoung Jung, Rabe-Hesketh, S., Halfon, N., et al. (2009). The Health and Cognitive Growth of Latino Toddlers: At Risk or Immigrant Paradox? *Maternal & Child Health Journal*, *13*(6), 755-768.

doi:Article

Goldhagen, J., Remo, R., Bryant, T., Wludyka, P., Dailey, A., Wood, D., Watts, G., et al. (2005). The health status of southern children: a neglected regional disparity. *Pediatrics*, *116*(6), e746-e753.

Green, N. S., Damus, K., Simpson, J. L., Iams, J., Reece, E. A., Hobel, C. J., Merkatz, I. R., et al. (2005). Research agenda for preterm birth: recommendations from the March of Dimes. *American Journal Of Obstetrics And Gynecology*, *193*(3 Pt 1), 626-635.

Healthy People 2010 Home Page. (n.d.). . Retrieved September 30, 2011, from http://www.healthypeople.gov/2010/redirect.aspx?url=/2010/document/tableofcontents.htm#toc

Healthy People 2020 - Improving the Health of Americans. (n.d.). . Retrieved August 22, 2011, from http://healthypeople.gov/2020/

Healthy People 2020 - Improving the Health of Americans. (n.d.). . Retrieved from http://healthypeople.gov/2020/

Home - KIDS COUNT Data Center. (n.d.). . Retrieved August 20, 2011, from http://datacenter.kidscount.org/

HP 2010 Objectives. (n.d.). . Retrieved from http://www.healthypeople.gov/2010/document/pdf/Volume2/16MICH.pdf

Hummer, R. A., Powers, D. A., Pullum, S. G., Gossman, G. L., & Frisbie, W. P. (2007). PARADOX FOUND (AGAIN): INFANT MORTALITY AMONG THE MEXICAN-ORIGIN POPULATION IN THE UNITED STATES. *Demography*,

44(3), 441-457. doi:Article

Hypoxic-Ischemic Encephalopathy. (n.d.). . Retrieved October 10, 2011, from http://emedicine.medscape.com/article/973501-overview

Infant Deaths --- United States, 2000--2007. (n.d.). . Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/su6001a9.htm?s_cid=su6001a9_w

Infant Deaths --- United States, 2000--2007. (n.d.). . Retrieved September 26, 2011, from http://www.cdc.gov/mmwr/preview/mmwrhtml/su6001a9.htm?s_cid=su6001a9_w

Karpati, A., Galea, S., Awerbuch, T., & Levins, R. (2002). Variability and vulnerability at the ecological level: implications for understanding the social determinants of health. *American Journal of Public Health*, *92*(11), 1768-1772.

KIDS COUNT. (n.d.). . Retrieved from http://www.aecf.org/MajorInitiatives/KIDSCOUNT.aspx

KIDS COUNT Indicators and percents. (n.d.). . Retrieved August 29, 2011, from http://www.aecf.org/MajorInitiatives/KIDSCOUNT.aspx

Larson, K., & Halfon, N. (2010). Family Income Gradients in the Health and Health Care Access of US Children. *Maternal & Child Health Journal*, *14*(3), 332-342. doi:Article

Loughran-Fowlds, A., Oei, J., & Lui, K. (2009). Bronchopulmonary Dysplasia: An Imbalance of Inflammation. *Current Respiratory Medicine Reviews*, *5*(3), 174-189. doi:Article

Martin, J. A., Hamilton, B. E., Sutton, P. D., Ventura, S. J., Menacker, F., & Munson, M. L. (2005). Births: final data for 2003. *National Vital Statistics Reports: From The Centers For Disease Control And Prevention, National Center For Health Statistics, National Vital Statistics System*, *54*(2), 1-116.

McCormick, M., Litt, J., Smith, V., & F. (2011). Prematurity: an overview and public health implications. *Annual Review of Public Health*, *32*, 367-379.

MCH. (2011, July 23). . Retrieved July 23, 2011, from zotero://attachment/126/

Necrotizing Enterocolitis. (n.d.). . Retrieved October 10, 2011, from http://www.chp.edu/CHP/P02388

Neonatal Intensive-Care Unit Admission of Infants with Very Low Birth Weight --- 19 States, 2006. (n.d.). . Retrieved October 14, 2011, from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5944a4.htm

OASIS information. (n.d.). . Retrieved October 16, 2011, from http://health.state.ga.us/healthdata/oasis.asp

Office of Health Indicators for Planning OASIS. (n.d.). . Retrieved October 9, 2011, from http://oasis.state.ga.us/oasis/oasis/qryPopulation.aspx

OperationalDefinitionBrochure-2.pdf. (n.d.). . Retrieved from http://www.naccho.org/topics/infrastructure/accreditation/upload/OperationalDefinitionBrochure-2.pdf

Peristats - March of Dimes. (n.d.). . Retrieved October 10, 2011, from http://www.marchofdimes.com/peristats/

PrematurityAnOverviewandPublicHealthImplications.pdf. (n.d.). . Retrieved from

http://www.ilmaternal.org/ipihn/resources/PrematurityAnOverviewandPublicHealthImplications.pdf

Pretermbith3.pdf. (n.d.). . Retrieved from http://luci.ics.uci.edu/websiteContent/weAreLuci/biographies/faculty/djp3/LocalCopy/sdarticle1.pdf

Products - Health E Stats - Recent Trends in Infant Mortality - 2002. (n.d.). . Retrieved September 16, 2011, from http://www.cdc.gov/nchs/data/hestat/infantmort/infantmort.htm

Respiratory Distress Syndrome. (n.d.). . Retrieved October 10, 2011, from http://emedicine.medscape.com/article/976034-overview

Respiratory syncytial virus activity-- United States, July 2007-December 2008. (2008). *MMWR. Morbidity And Mortality Weekly Report*, *57*(50), 1355-1358.

Saigal, S., & Doyle, L. W. (2008). An overview of mortality and sequelae of preterm birth from infancy to adulthood. *Lancet*, *371*(9608), 261-269.

Schempf, A. H., Branum, A. M., Lukacs, S. L., & Schoendorf, K. C. (2007). The Contribution of Preterm Birth to the Black-White Infant Mortality Gap, 1990 and 2000. *Am J Public Health*, *97*(7), 1255-1260. doi:10.2105/AJPH.2006.093708

Stevens, T. P., Sinkin, R. A., Hall, C. B., Maniscalco, W. M., & McConnochie, K. M. (2000). Respiratory syncytial virus and premature infants born at 32 weeks' gestation or earlier: hospitalization and economic implications of prophylaxis. *Archives of Pediatrics & Adolescent Medicine*, *154*(1), 55-61.

The economic and societal costs | Mission | March of Dimes. (n.d.). . Retrieved

September 28, 2011, from http://www.marchofdimes.com/mission/prematurity_costs.html

Valcamonico, A., Accorsi, P., Sanzeni, C., Martelli, P., La Boria, P., Cavazza, A., & Frusca, T. (2007). Mid- and long-term outcome of extremely low birth weight (ELBW) infants: An analysis of prognostic factors. *Journal of Maternal-Fetal & Neonatal Medicine*, *20*(6), 465-471. doi:Article

Wada, M., Kusuda, S., Takahashi, N., & Nishida, H. (2008). Fluid and electrolyte balance in extremely preterm infants <24 weeks of gestation in the first week of life. *Pediatrics International*, *50*(3), 331-336. doi:Article

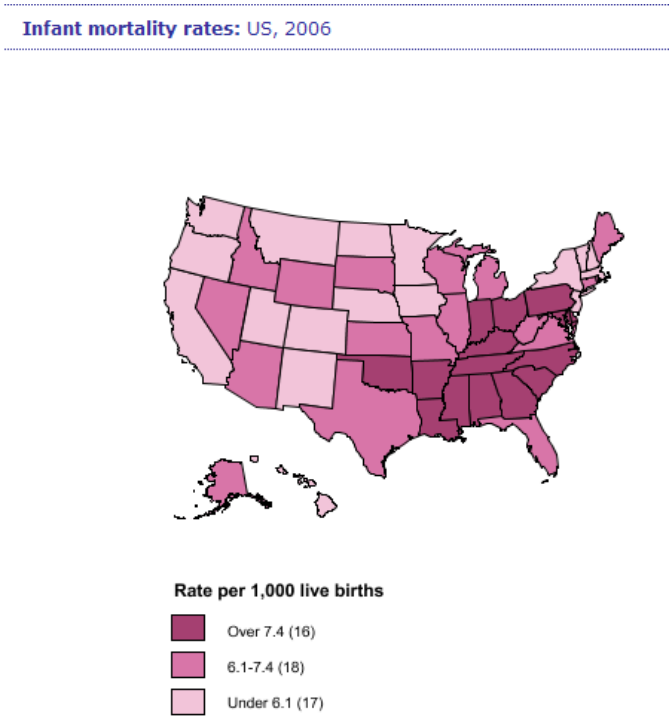
Wang, M. L., Dorer, D. J., Fleming, M. P., & Catlin, E. A. (2004). Clinical Outcomes of Near-Term Infants. *Pediatrics*, *114*(2), 372-376. doi:Article

Welcome to SouthHealthDistrict.com - Children with Special Needs. (n.d.). . Retrieved July 24, 2011, from http://www.southhealthdistrict.com/content.asp?nst=1&pid=219&id=86

Welcome to the Health Indicators Warehouse (HIW). (n.d.). . Retrieved August 14, 2011, from http://www.healthindicators.gov/

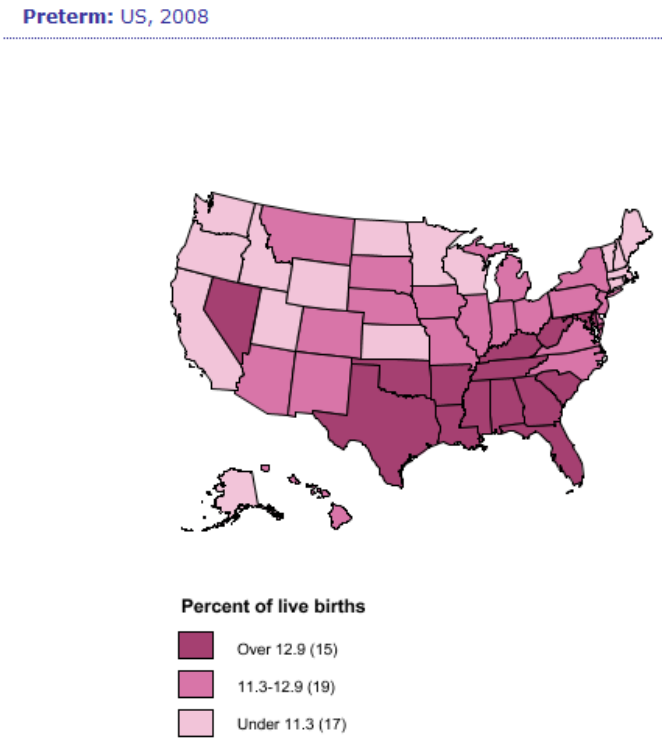
Appendix I

Figure 1a



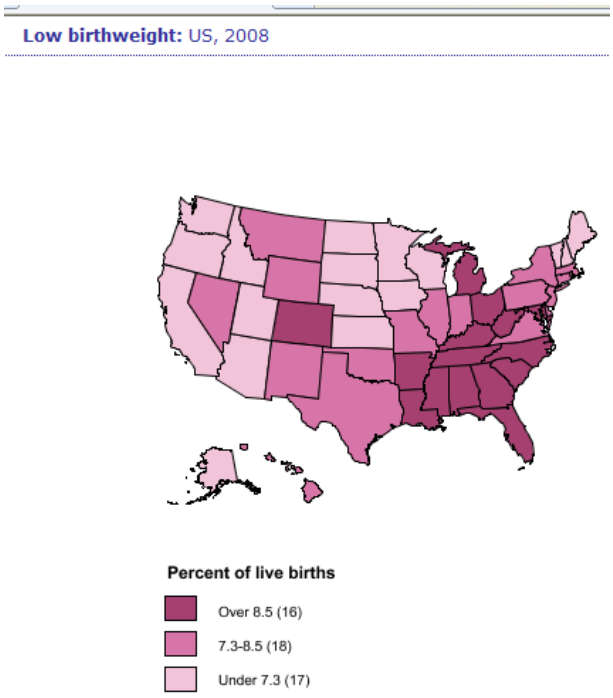
Source: PeriStats from March of Dimes

Figure 1 b



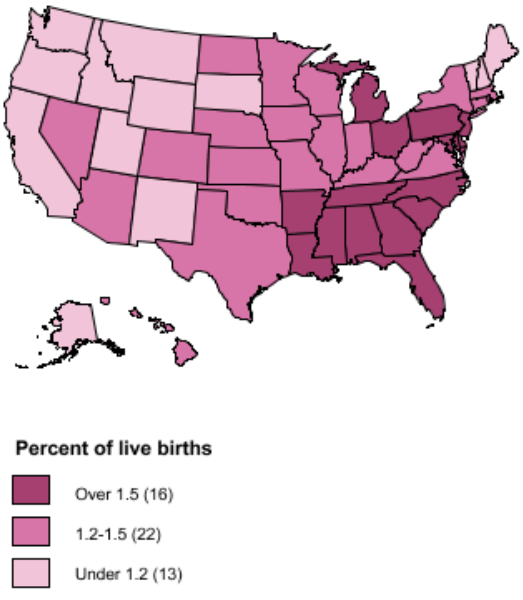
Source: PeriStats from March of Dimes

Figure 1 c



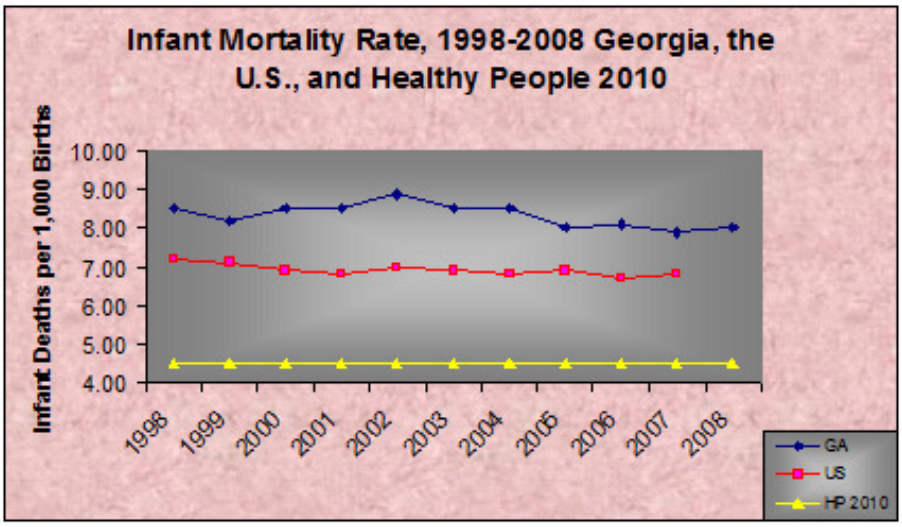
Source: PeriStats from March of Dimes

Figure 1 d



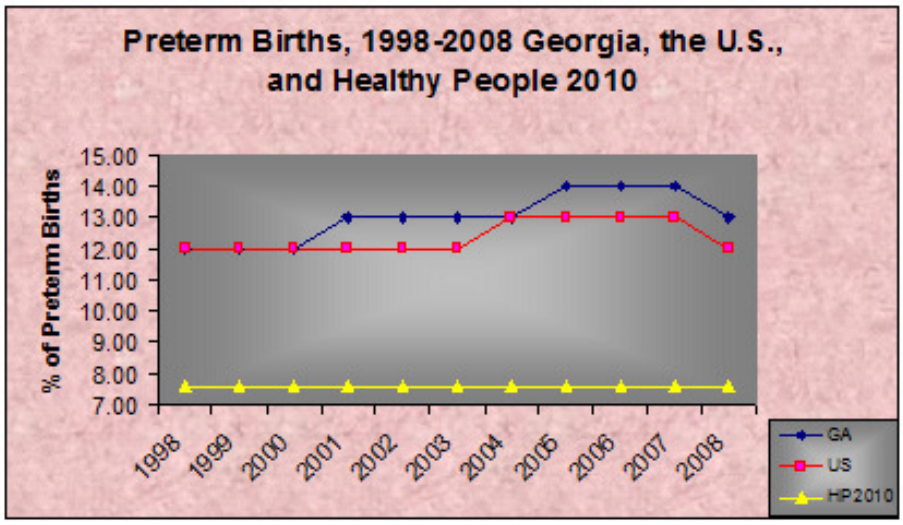
Source: PeriStats from March of Dimes

Figure 2



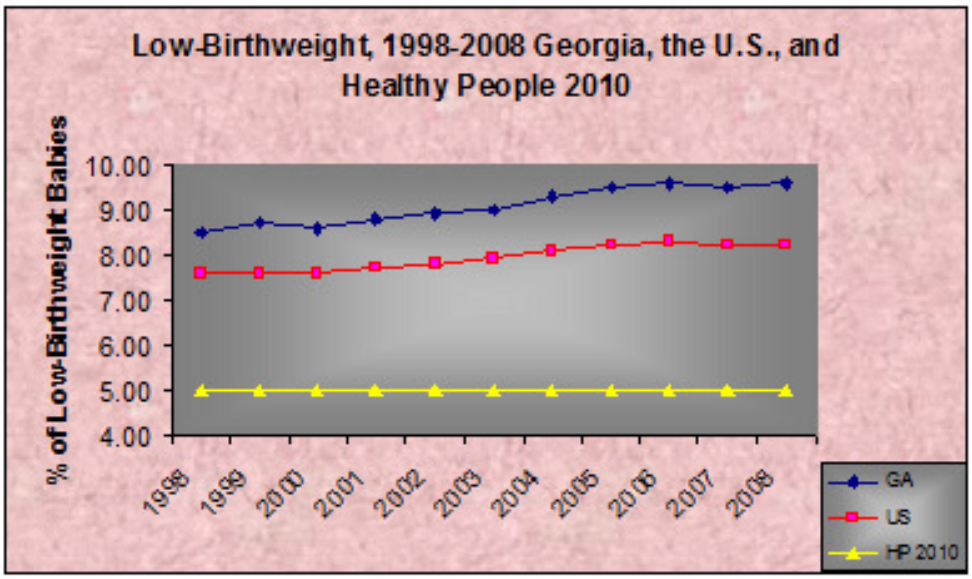
Source: Healthy People 2010 and Kids Count Data Center

Figure 3



Source: Healthy People 2010 and Kids Count Data Center

Figure 4



Source: Healthy People 2010 and Kids Count Data Center

Figure 5

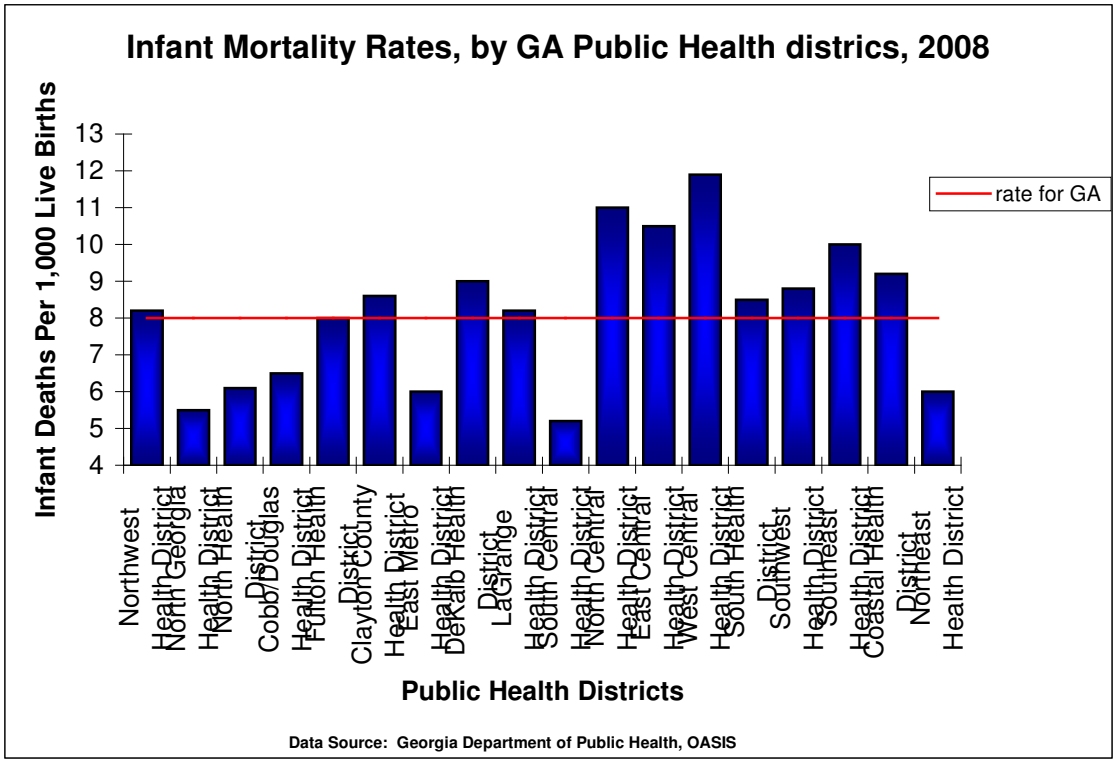
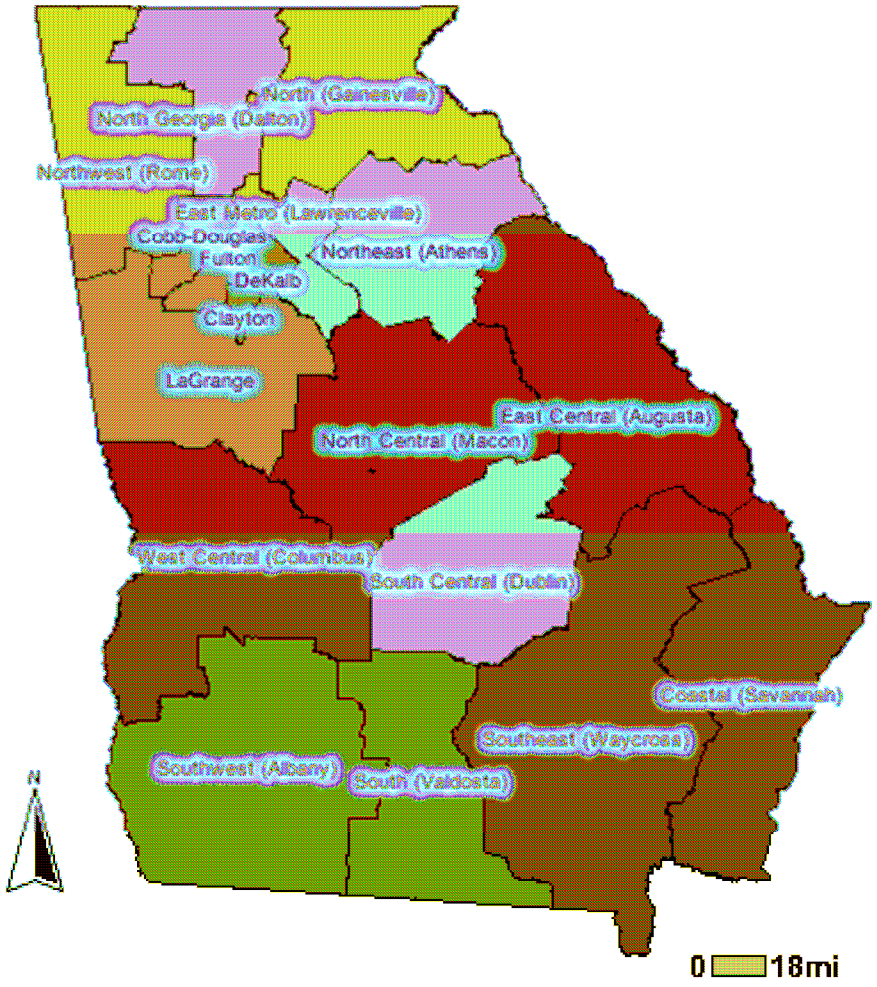

Infant Mortality Rates, by GA Public Health districts, 2008
Infant Deaths Per 1,000 Live Births
13
12
11
10
9
8
7
6
5
4
rate for GA
Northwest Health District
North Georgia Health District
North Health District
Cobb/Douglas Public Health
Fulton County
Clayton County
Health District
East Metro
Health District
Dekalb County
Health District
LaGrange
District
Health
South Central
Health District
North Central
Health District
East Central
Health District
West Central
Health District
South Health
District
Southwest
Health District
Southeast
Health District
Coastal Health
District
Northeast
Health District
Public Health Districts
Data Source: Georgia Department of Public Health, OASIS

Figure 6

Infant Mortality Rate by GA Public Health District, 2008



Rate

- 5.2 - 6.0
- 6.1 - 8.2
- 8.5 - 9.0
- 9.2 - 11.9

Map Created: Sep 12, 2011
Note: This is a color map.
Data Classification Method: Quantiles

OASIS Mapping Tool http://oasis.state.ga.us
Georgia Department of Public Health

Office of Health Indicators for Planning (OHIP)

Figure 7

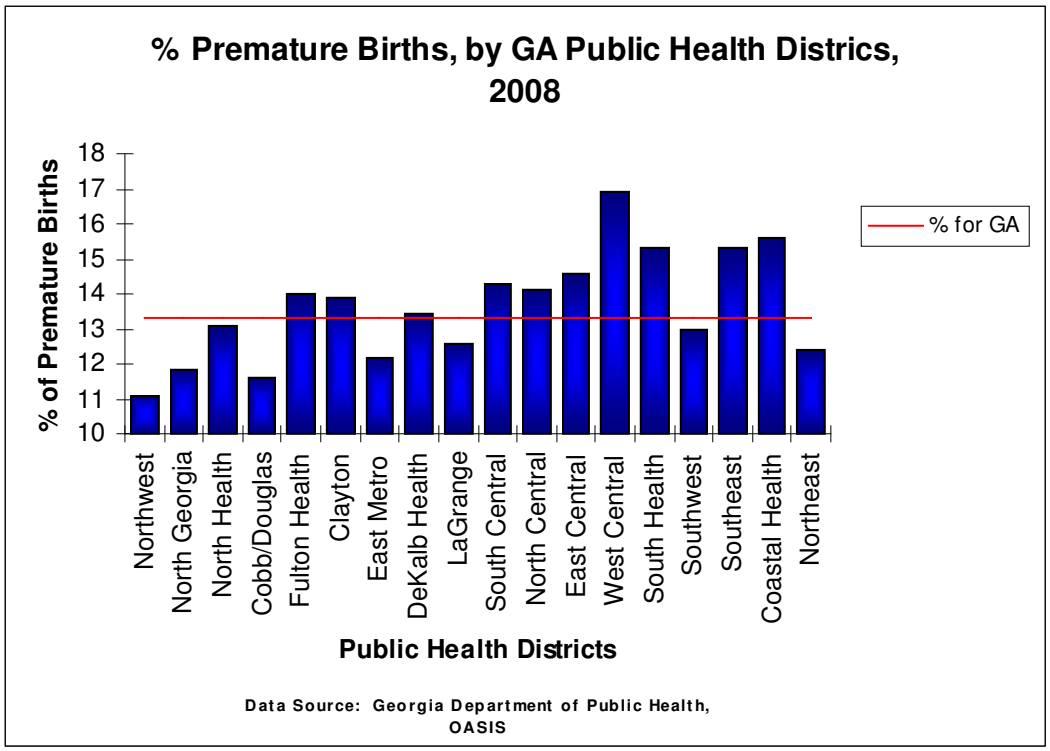
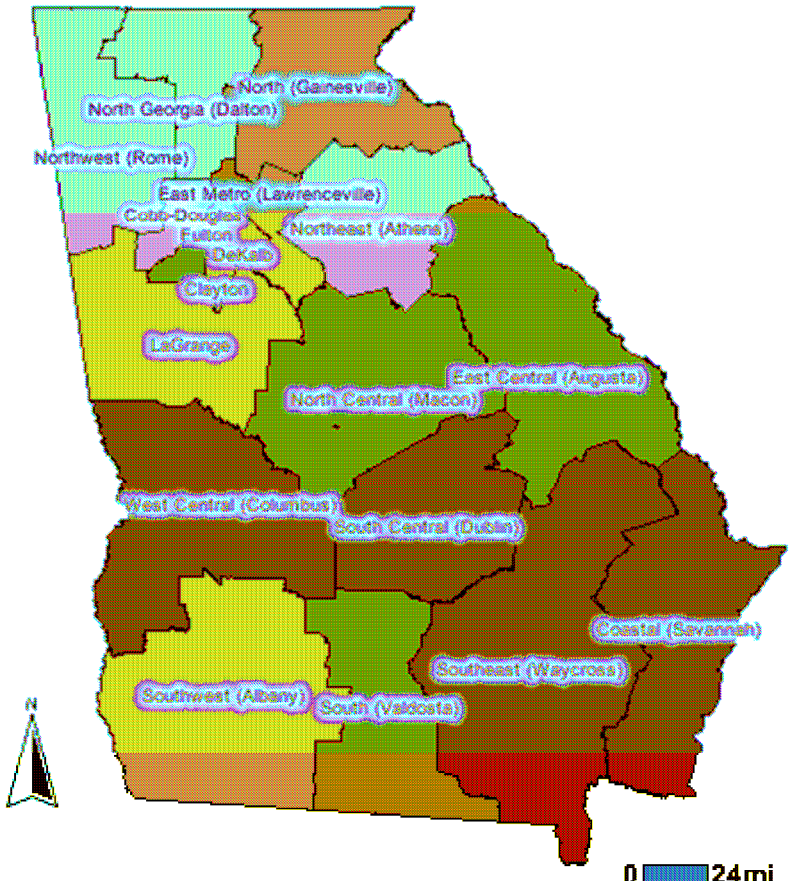

% Premature Births, by GA Public Health Districts, 2008
% of Premature Births
18
17
16
15
14
13
12
11
10
% for GA
Northwest
North Georgia
North Health
Cobb/Douglas
Fulton Health
Clayton
East Metro
DeKalb Health
LaGrange
South Central
North Central
East Central
West Central
South Health
Southwest
Southeast
Coastal Health
Northeast
Public Health Districts
Data Source: Georgia Department of Public Health, OASIS

Figure 8 **Percent of Births, Preterm (32-36 weeks) by GA Public Health District, 2008**



OASIS Mapping Tool http://oasis.state.ga.us
Georgia Department of Public Health
Office of Health Indicators for Planning (OHIP)

Map Created: Sep 12, 2011
Note: This is a color map.
Data Classification Method: Quantiles

Percentage

- 11.1 - 12.2
- 12.4 - 13.4
- 13.9 - 14.3
- 14.6 - 16.9

Figure 9

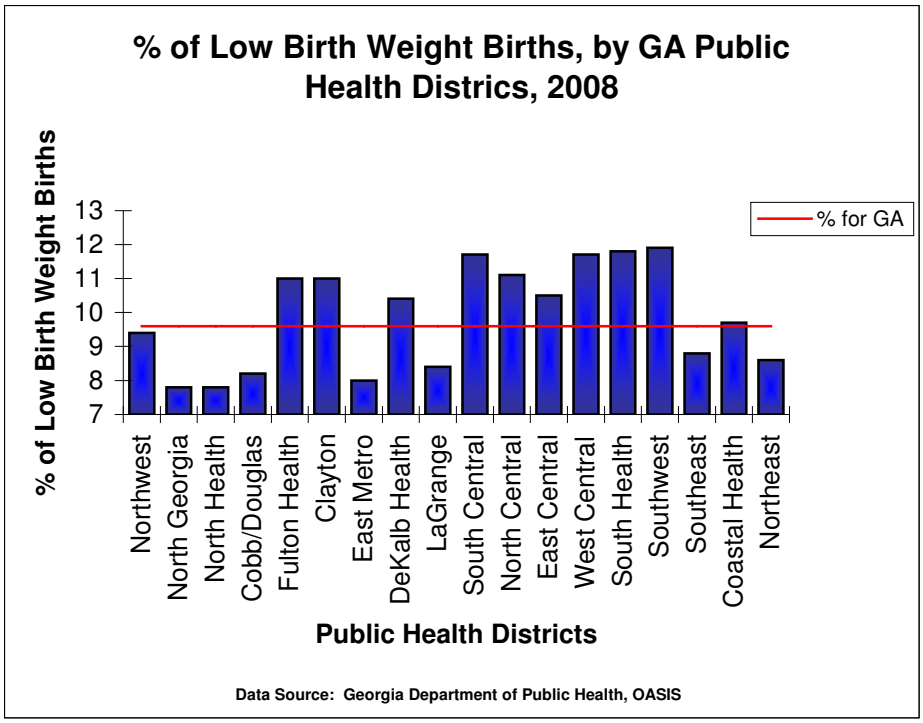


Figure 10

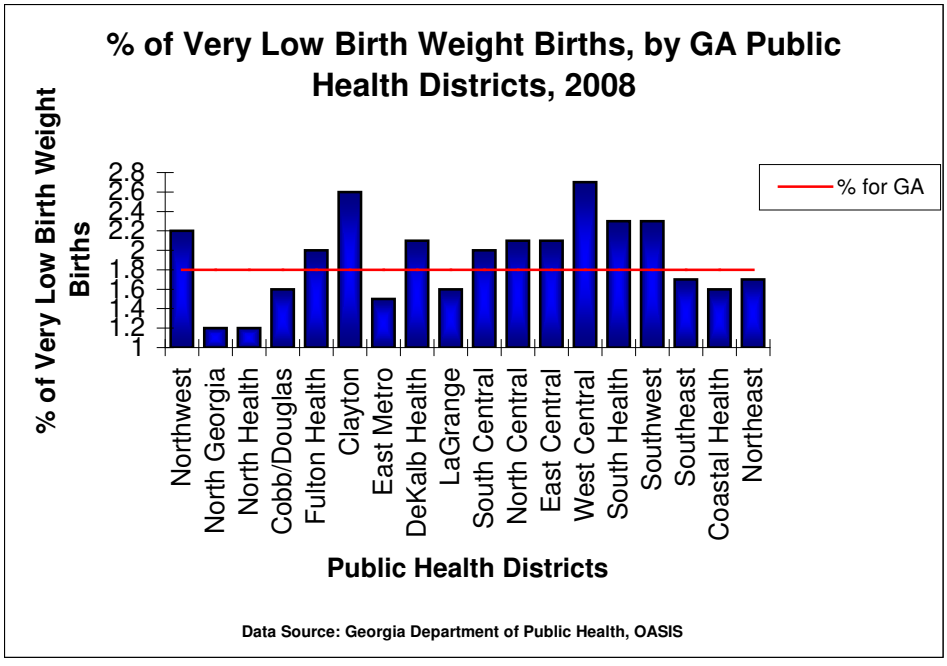
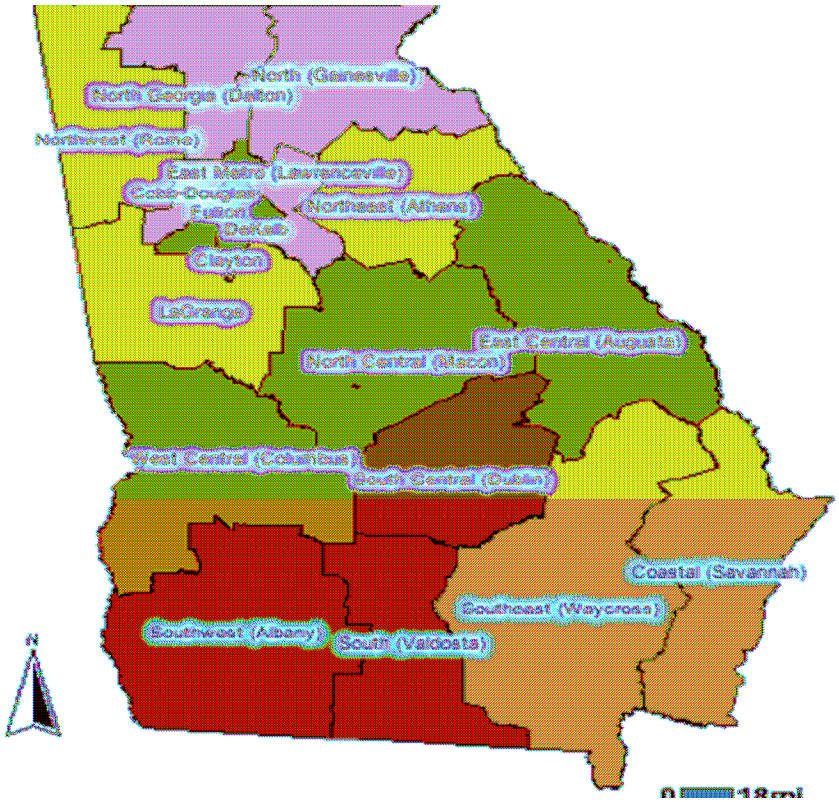


Figure 11 **Percent of Births, Low Birth Weight 1500-2499 grams by GA Public Health District, 2008**



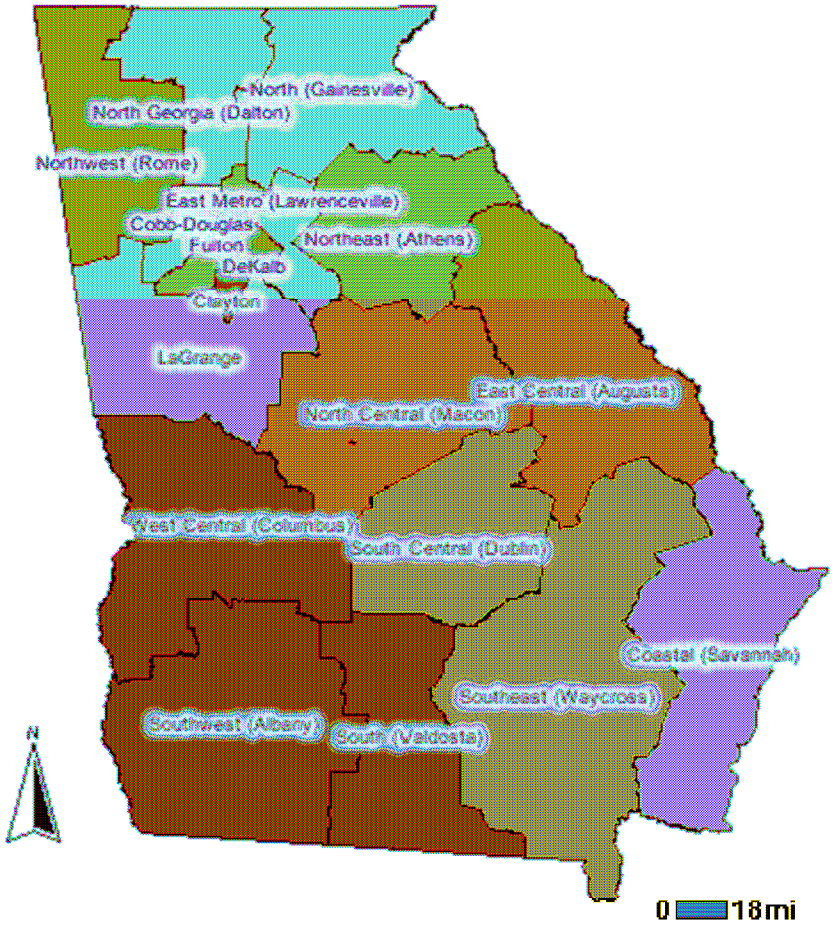
Percentage

6.6 - 6.7
6.8 - 8.0
8.2 - 9.0
9.5 - 9.6

OASIS Mapping Tool http://oasis.state.ga.us
Georgia Department of Public Health
Office of Health Indicators for Planning (OHIP)

Map Created: Sep 12, 2011
Note: This is a color map.
Data Classification Method: Quantiles

Figure 12 **Percent of Births, Very Low Birth Weight (less than 1500 grams) by GA Public Health District, 2008**



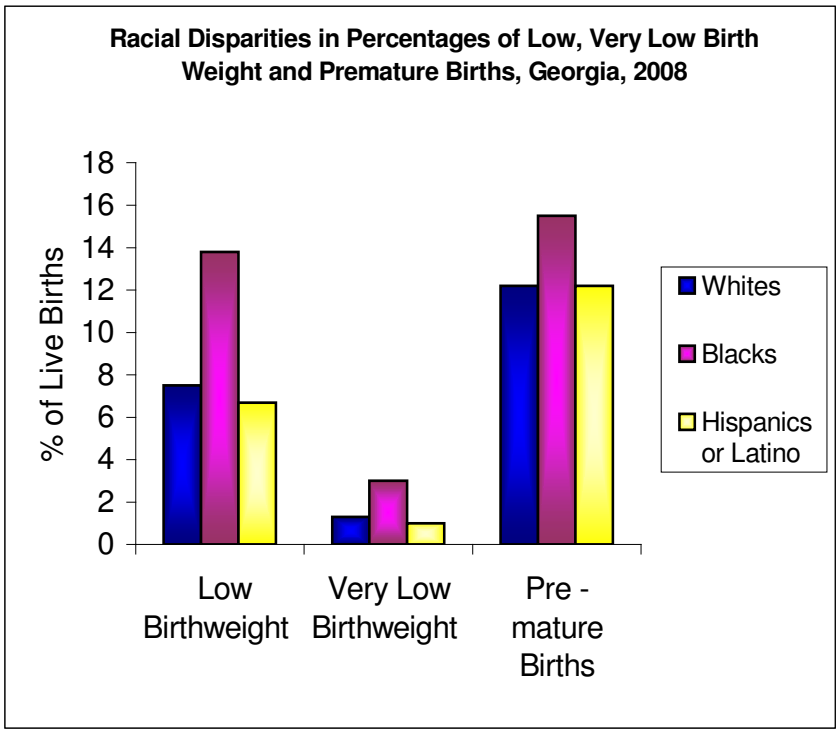
Percentage

1.2 - 1.6
1.7 - 2.0
2.1 - 2.2
2.3 - 2.7

OASIS Mapping Tool http://oasis.state.ga.us
Georgia Department of Public Health
Office of Health Indicators for Planning (OHIP)

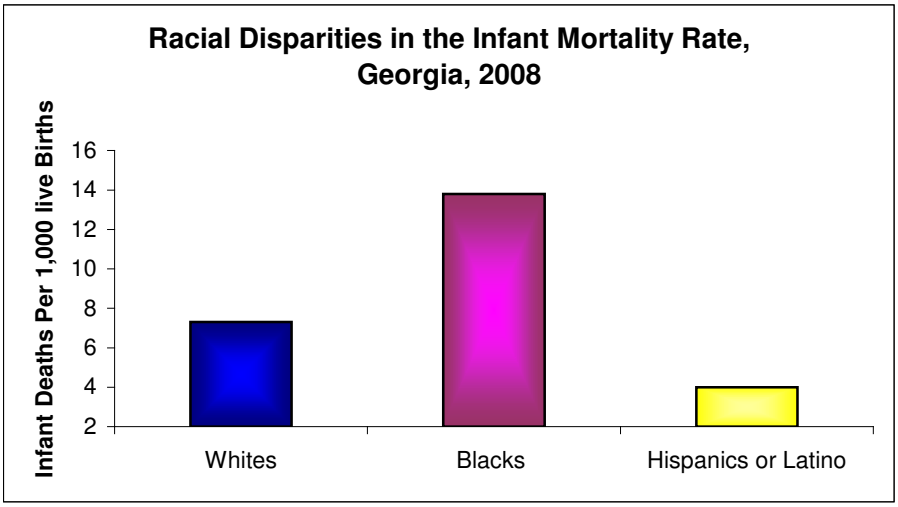
Map Created: Sep 12, 2011
Note: This is a color map.
Data Classification Method: Quantiles

Figure 13



Source: GA Department of Public Health OASIS

Figure 14



Source: GA Department of Public Health OASIS

Table A1

Preterm Births Ranking Across the States

Preterm Births (Percent) – 2008

Data Provided by: National KIDS COUNT Program

Rank			Scale: 10% - 18%
	United States	12%	
1	Vermont	10%	
2	New Hampshire	10%	
3	Idaho	10%	
4	Minnesota	10%	
5	Oregon	10%	
6	Alaska	10%	
6	Maine	10%	
8	Connecticut	10%	
9	California	11%	
10	Washington	11%	
11	Massachusetts	11%	
12	Utah	11%	
13	Wisconsin	11%	
13	North Dakota	11%	
15	Kansas	11%	
15	Wyoming	11%	
15	Rhode Island	11%	
18	Virginia	11%	
19	Colorado	11%	
20	Montana	12%	
20	Iowa	12%	
22	Pennsylvania	12%	
23	Nebraska	12%	
24	South Dakota	12%	
25	New York	12%	
26	New Mexico	12%	
26	Missouri	12%	
28	Indiana	12%	
29	New Jersey	13%	
30	Ohio	13%	
31	Illinois	13%	
31	Michigan	13%	
33	Hawaii	13%	
34	Delaware	13%	
34	North Carolina	13%	
34	Arizona	13%	
37	Maryland	13%	
38	Texas	13%	
39	Oklahoma	13%	
39	Georgia	13%	
41	Arkansas	14%	
41	Tennessee	14%	
41	Nevada	14%	
44	West Virginia	14%	
45	Florida	14%	
46	Kentucky	14%	
47	South Carolina	14%	
48	Louisiana	15%	
49	Alabama	16%	
50	Mississippi	18%	
	Virgin Islands	14%	
	Puerto Rico	19%	

Table A2

Very Low-birthweight Babies Ranking Across the States

Very Low-birthweight Babies (Percent) – 2008

Data Provided by: National KIDS COUNT Program

Rank			Scale: 1.0% - 2.1%
	United States	1.50%	
1	Utah	1.00%	
1	Oregon	1.00%	
1	Idaho	1.00%	
1	Maine	1.00%	
1	New Hampshire	1.00%	
1	Alaska	1.00%	
7	Montana	1.10%	
7	New Mexico	1.10%	
7	South Dakota	1.10%	
7	California	1.10%	
7	Wyoming	1.10%	
7	Washington	1.10%	
7	Vermont	1.10%	
14	Hawaii	1.20%	
14	Minnesota	1.20%	
14	Arizona	1.20%	
14	Wisconsin	1.20%	
14	Iowa	1.20%	
14	Nebraska	1.20%	
14	Nevada	1.20%	
21	Colorado	1.30%	
21	North Dakota	1.30%	
21	Kansas	1.30%	
21	Massachusetts	1.30%	
25	Texas	1.40%	
25	West Virginia	1.40%	
25	Rhode Island	1.40%	
25	Oklahoma	1.40%	
25	Indiana	1.40%	
25	Missouri	1.40%	
31	Kentucky	1.50%	
31	Illinois	1.50%	
31	Connecticut	1.50%	
31	Virginia	1.50%	
31	New York	1.50%	
36	Tennessee	1.60%	
36	Florida	1.60%	
36	Arkansas	1.60%	
36	New Jersey	1.60%	
36	Ohio	1.60%	
36	Pennsylvania	1.60%	
36	Michigan	1.60%	
43	North Carolina	1.70%	
44	Delaware	1.80%	
44	South Carolina	1.80%	
44	Georgia	1.80%	
47	Maryland	1.90%	
48	Alabama	2.10%	
48	Louisiana	2.10%	
48	Mississippi	2.10%	
	Puerto Rico	1.50%	
	Virgin Islands	1.70%	
	District of Columbia	2.50%	

Table A3

Low-birthweight Babies Ranking Across the States

Low-birthweight Babies (Percent) – 2008

Data Provided by: National KIDS COUNT Program

Rank			Scale: 6.0% - 11.8%
	United States	8.20%	
1	Alaska	6.00%	
2	Oregon	6.10%	
3	Washington	6.30%	
4	Minnesota	6.40%	
5	Idaho	6.50%	
5	New Hampshire	6.50%	
5	South Dakota	6.50%	
8	Iowa	6.60%	
9	Maine	6.70%	
10	North Dakota	6.80%	
10	California	6.80%	
10	Utah	6.80%	
13	Vermont	7.00%	
13	Wisconsin	7.00%	
13	Nebraska	7.00%	
16	Arizona	7.10%	
17	Kansas	7.20%	
18	Montana	7.40%	
19	Massachusetts	7.80%	
20	Rhode Island	7.90%	
21	Nevada	8.00%	
21	Connecticut	8.00%	
23	Hawaii	8.10%	
23	Missouri	8.10%	
25	New York	8.20%	
26	Oklahoma	8.30%	
26	Pennsylvania	8.30%	
26	Virginia	8.30%	
26	Indiana	8.30%	
26	Wyoming	8.30%	
31	Illinois	8.40%	
31	New Jersey	8.40%	
31	Texas	8.40%	
34	Delaware	8.50%	
34	New Mexico	8.50%	
36	Michigan	8.60%	
36	Ohio	8.60%	
38	Florida	8.80%	
39	Colorado	8.90%	
40	North Carolina	9.10%	
41	Kentucky	9.20%	
41	Maryland	9.20%	
41	Arkansas	9.20%	
41	Tennessee	9.20%	
45	West Virginia	9.50%	
46	Georgia	9.60%	
47	South Carolina	9.90%	
48	Alabama	10.60%	
49	Louisiana	10.80%	
50	Mississippi	11.80%	
	Virgin Islands	9.20%	
	Puerto Rico	12.50%	

Table A4

Infant Mortality Rate Across the States

Infant Mortality (Rate) – 2007

Data Provided by: National KIDS COUNT Program

Rank			Scale: 4.8 - 10.0
	United States	6.8	
1	Washington	4.8	
2	Massachusetts	4.9	
3	Utah	5.1	
3	Vermont	5.1	
5	New Jersey	5.2	
5	California	5.2	
7	New Hampshire	5.4	
8	Iowa	5.5	
8	Minnesota	5.5	
10	New York	5.6	
11	Oregon	5.8	
12	Colorado	6.1	
13	Texas	6.3	
13	Maine	6.3	
13	New Mexico	6.3	
16	South Dakota	6.4	
16	Nevada	6.4	
16	Montana	6.4	
19	Alaska	6.5	
19	Wisconsin	6.5	
19	Hawaii	6.5	
22	Connecticut	6.6	
23	Illinois	6.7	
23	Kentucky	6.7	
25	Idaho	6.8	
25	Nebraska	6.8	
27	Arizona	6.9	
28	Florida	7	
29	Wyoming	7.3	
30	Rhode Island	7.4	
31	West Virginia	7.5	
31	North Dakota	7.5	
31	Delaware	7.5	
31	Missouri	7.5	
35	Pennsylvania	7.6	
35	Indiana	7.6	
37	Ohio	7.7	
37	Arkansas	7.7	
39	Virginia	7.8	
40	Michigan	7.9	
40	Kansas	7.9	
42	Maryland	8	
42	Georgia	8	
44	Tennessee	8.3	
45	Oklahoma	8.5	
45	North Carolina	8.5	
47	South Carolina	8.6	
48	Louisiana	9.2	
49	Alabama	9.9	
50	Mississippi	10	
	Puerto Rico	8.4	
	District of Columbia	13.1	
	Virgin Islands	n.a.	

Table B1

Tables Data Source: Low, Very Low Birth Weight, Premature and Infant Mortality, by Race/Ethnicity and by Public Health District 2008 Georgia Department of Public Health, OASIS

All Races, All Mother's Ages								
Public Health District	Low Birth Weight		Very Low Birth Weight		Premature Births		Infant Mortality	
	Births	% LBW	Births	% VLBW	Births	% Births	Deaths	IMR
Georgia	14,014	9.6	2,697	1.8	19,530	13.3	1,177	8
Northwest Health District (Rome)	847	9.4	199	2.2	1,001	11.1	74	8.2
North Georgia Health District (Dalton)	511	7.8	76	1.2	769	11.8	36	5.5
North Health District (Gainesville)	666	7.8	102	1.2	1,123	13.1	52	6.1
Cobb/Douglas Health District	1,032	8.2	196	1.6	1,456	11.6	81	6.5
Fulton Health District	1,510	11	273	2	1,916	14	110	8
Clayton County Health District (Jonesboro)	561	11	135	2.6	711	13.9	44	8.6
East Metro Health District (Lawrenceville)	1,319	8	242	1.5	2,009	12.2	99	6
DeKalb Health District	1,193	10.4	246	2.1	1,542	13.4	104	9
LaGrange Health District	893	8.4	168	1.6	1,340	12.6	87	8.2
South Central Health District (Dublin)	226	11.7	39	2	277	14.3	10	5.2
North Central Health District (Macon)	840	11.1	157	2.1	1,068	14.1	83	11
East Central Health District (Augusta)	723	10.5	146	2.1	1,001	14.6	72	10.5
West Central Health District (Columbus)	656	11.7	151	2.7	949	16.9	67	11.9
South Health District (Valdosta)	472	11.8	93	2.3	612	15.3	34	8.5
Southwest Health District (Albany)	677	11.9	130	2.3	740	13	50	8.8
Southeast Health District (Waycross)	469	8.8	90	1.7	`	15.3	53	10
Coastal Health District (Savannah)	859	9.7	145	1.6	1,390	15.6	82	9.2
Northeast Health District (Athens)	560	8.6	109	1.7	811	12.4	39	6

Table B2

Tables Data Source: Low, Very Low Birth Weight, Premature and Infant Mortality, by Race/Ethnicity and by Public Health District 2008 Georgia Department of Public Health, OASIS

Whites								
Public Health District	Low Birth Weight		Very Low Birth Weight		Premature Births		Infant Mortality	
	Births	% LBW	Births	% VLBW	Births	% Births	Deaths	IMR
Georgia	5,211	7.5	912	1.3	8,434	12.2	503	7.3
Northwest Health District (Rome)	629	9	152	2.2	750	10.7	57	8.1
North Georgia Health District (Dalton)	342	8.1	48	1.1	505	12	32	7.6
North Health District (Gainesville)	499	7.2	77	1.1	909	13.1	44	6.3
Cobb/Douglas Health District	412	6.8	65	1.1	662	10.9	37	6.1
Fulton Health District	276	7.3	34	0.9	449	11.9	21	5.6
Clayton County Health District (Jonesboro)	68	8.7	20	2.6	95	12.2	10	12.9
East Metro Health District (Lawrenceville)	445	6.8	75	1.2	754	11.6	52	8
DeKalb Health District	199	8	42	1.7	273	10.9	25	10
LaGrange Health District	403	6.4	74	1.2	700	11.1	43	6.8
South Central Health District (Dublin)	96	8.9	16	1.5	132	12.3	4	*
North Central Health District (Macon)	290	7.8	32	0.9	500	13.5	23	6.2
East Central Health District (Augusta)	188	7	32	1.2	330	12.2	21	7.8
West Central Health District (Columbus)	157	7.2	30	1.4	347	15.9	22	10.1
South Health District (Valdosta)	189	8.6	28	1.3	296	13.5	12	5.5
Southwest Health District (Albany)	203	8.2	37	1.5	301	12.2	15	6.1
Southeast Health District (Waycross)	215	6.8	46	1.5	435	13.8	28	8.9
Coastal Health District (Savannah)	26	7.1	46	1.3	511	14.4	32	9
Northeast Health District (Athens)	319	7.5	58	1.4	485	11.4	25	5.9

Table B3

Tables Data Source: Low, Very Low Birth Weight, Premature and Infant Mortality, by Race/Ethnicity and by Public Health District 2008 Georgia Department of Public Health, OASIS

Blacks								
Public Health District	Low Birth Weight		Very Low Birth Weight		Premature Births		Infant Mortality	
	Births	% LBW	Births	% VLBW	Births	% Births	Deaths	IMR
Georgia	6,556	13.8	1,440	3	7,340	15.5	652	13.8
Northwest Health District (Rome)	129	14.8	29	3.3	111	12.7	17	19.5
North Georgia Health District (Dalton)	25	10.1	5	2	28	11.3	4	*
North Health District (Gainesville)	64	14.8	17	3.9	65	15	7	16.2
Cobb/Douglas Health District	397	11.5	94	2.7	455	13.2	43	12.5
Fulton Health District	929	14.4	193	3	1,010	15.6	87	13.5
Clayton County Health District (Jonesboro)	388	13.1	98	3.3	434	14.7	33	11.2
East Metro Health District (Lawrenceville)	478	12.1	102	2.6	564	14.2	40	10.1
DeKalb Health District	744	12.8	166	2.9	857	14.8	78	13.5
LaGrange Health District	390	13	79	2.6	473	15.8	42	14
South Central Health District (Dublin)	123	16.5	22	3	131	17.6	6	8.1
North Central Health District (Macon)	510	14.8	119	3.4	508	14.7	59	17.1
East Central Health District (Augusta)	478	14.5	106	3.2	562	17	50	15.2
West Central Health District (Columbus)	442	16	107	3.9	492	17.8	44	15.9
South Health District (Valdosta)	263	17.8	62	4.2	261	17.6	22	14.9
Southwest Health District (Albany)	433	15.5	86	3.1	384	13.7	33	11.8
Southeast Health District (Waycross)	192	13.6	37	2.6	257	18.2	23	16.3
Coastal Health District (Savannah)	397	13.5	83	2.8	541	18.4	50	17
Northeast Health District (Athens)	174	13.5	35	2.7	207	16.1	14	10.9

Table B4

Tables Data Source: Low, Very Low Birth Weight, Premature and Infant Mortality, by Race/Ethnicity and by Public Health District 2008 Georgia Department of Public Health, OASIS

Hispanics or Latino								
Public Health District	Low Birth Weight		Very Low Birth Weight		Premature Births		Infant Mortality	
	Births	% LBW	Births	% LBW	Births	% Births	Deaths	IMR
Georgia	1,363	6.7	211	1	2,486	12.2	81	4
Northwest Health District (Rome)	50	7.2	8	1.1	75	10.7	3	*
North Georgia Health District (Dalton)	72	5.5	2	*	132	10.1	9	6.9
North Health District (Gainesville)	117	6.5	20	1.1	256	14.1	9	5
Cobb/Douglas Health District	169	6.9	24	1	274	11.2	11	4.5
Fulton Health District	120	7.4	21	1.3	220	13.6	9	5.6
Clayton County Health District (Jonesboro)	71	6.3	16	1.4	128	11.3	2	*
East Metro Health District (Lawrenceville)	288	6.3	42	0.9	514	11.3	14	3.1
DeKalb Health District	118	7.8	21	1.4	195	13	9	6
LaGrange Health District	34	4.9	3	*	69	9.9	1	*
South Central Health District (Dublin)	7	7.5	1	*	4	*	1	*
North Central Health District (Macon)	29	7.8	2	*	44	11.9	0	0
East Central Health District (Augusta)	22	7.2	6	2	57	18.6	2	*
West Central Health District (Columbus)	79	8.7	11	1.2	131	14.4	2	*
South Health District (Valdosta)	30	7.9	7	1.8	63	16.6	1	*
Southwest Health District (Albany)	46	7.8	5	0.9	67	11.4	0	0
Southeast Health District (Waycross)	35	5.5	5	0.8	96	15	1	*
Coastal Health District (Savannah)	40	6.2	6	0.9	93	14.3	4	*
Northeast Health District (Athens)	36	5.4	11	1.7	68	10.2	3	*

Table C1

Leading Hospital Discharge Diagnoses, Infants < 1 Year of Age, Greorgia, 2008

	Principal Diagnosis	Northwest Health District (Rome)		North Georgia Health Distict (Dalton)		North Health District (Gainesville)	
		Discharges	Rate/1,000*	Discharges	Rate/1,000*	Discharges	Rate/1,000*
1	466 Acute Bronchitis and Bronchiolitis	160	21.5	116	23.0	188	26.2
2	769 Respiratory Distress Syndrome in Newborn	6	0.8	10	2.0	20	2.8
3	480.1 Pneumonia Due to Respiratory Syncytial Virus	3	0.4	3	0.6	11	1.5
4	783.41 Failure to thrive	9	1.2	3	0.6	6	0.8
5	771.81 Septicemia of Newborn	3	0.4	5	1.0	13	1.8
6	765.0 Disorders Relating to Extreme Immaturity	4	0.5	1	0.2	9	1.3
7	777.5 Necrotizing Enterocolitis in Fetus and Newborn	2	0.3	1	0.2	8	1.1
8	770.81 Primary Apnea of Newborn	8	1.1	7	1.4	3	0.4
9	779.3 Feeding Problems in Newborn	5	0.7	5	1.0	1	0.1
10	765.18 Disorders relating to other preterm infants 2000-2499 grams	3	0.4	1	0.2	2	0.3
11	770.7 Chronic Respiratory Disease Arising in the Perinatal Period (Bronchopulmonary Dysplasia)	1	0.1	1	0.2	5	0.7
12	779.0 Convulsions in newborn	6	0.8	5	1.0	3	0.4
13	765.15 Disorders Relating to Other Preterm Infants 1250-1499 grams	1	0.1	4	0.8	2	0.3
14	745.2 Tetralogy of Fallot	4	0.5	1	0.2	2	0.3
15	746.7 Hypoplastic left heart syndrome	6	0.8	~	~	1	0.1
16	765.16 Disorders relating to other preterm infants 1500-1749 grams	2	0.3	1	0.2	4	0.6
17	742.3 Congenital Hydrocephalus	3	0.4	~	~	3	0.4
18	775.5 Neonatal Eletrolyte Disturbance	3	0.4	2	0.4	2	0.3
19	783.3 Feeding Difficulties and Mismanagement	2	0.3	1	0.2	5	0.7
20	765.17 Disorders relating to other preterm infants 1750-1999 grams	4	0.5	1	0.2	~	~
21	768.7 Hypoxi-Ischemic Encephalopathy (HIE);	1	0.1	~	~	1	0.1
22	079.6 Respiratory Syncytial Virus (RSV)	1	0.1	~	~	4	0.6
23	772.14 Intraventricular hemorrhage grade IV	~	~	~	~	~	~
24	750.3 Congenital Tracheoesophageal Fistula Esophageal Atresia and Stenosis	1	0.1	~	~	1	0.1
25	742.0 Encephalocele	1	0.1	1	0.2	2	0.3
	Total Discharges (all discharges)	239.0	32.1	169.0	33.6	296.0	41.2

* Based on population < 1 from US Census for 2000 aggregated to Public Health District

Table C2

Leading Hospital Discharge Diagnoses, Infants < 1 Year of Age, Greorgia, 2008

	Principal Diagnosis	Cobb/Douglas Health District		Fulton Health District (Fulton)		Clayton County Health District (Jonesboro)	
		Discharges	Rate/1,000*	Discharges	Rate/1,000*	Discharges	Rate/1,000*
1	466 Acute Bronchitis and Bronchiolitis	133	13.0	89	7.4	43	10.1
2	769 Respiratory Distress Syndrome in Newborn	6	0.6	6	0.5	3	0.7
3	480.1 Pneumonia Due to Respiratory Syncytial Virus	4	0.4	7	0.6	1	0.2
4	783.41 Failure to thrive	4	0.4	14	1.2	6	1.4
5	771.81 Septicemia of Newborn	2	0.2	10	0.8	4	0.9
6	765.0 Disorders Relating to Extreme Immaturity	8	0.8	10	0.8	7	1.6
7	777.5 Necrotizing Enterocolitis in Fetus and Newborn	8	0.8	9	0.7	8	1.9
8	770.81 Primary Apnea of Newborn	7	0.7	2	0.2	2	0.5
9	779.3 Feeding Problems in Newborn	2	0.2	10	0.8	6	1.4
10	765.18 Disorders relating to other preterm infants 2000-2499 grams	3	0.3	1	0.1	2	0.5
11	770.7 Chronic Respiratory Disease Arising in the Perinatal Period (Bronchopulmonary Dysplasia)	6	0.6	7	0.6	4	0.9
12	779.0 Convulsions in newborn	8	0.8	3	0.2	1	0.2
13	765.15 Disorders Relating to Other Preterm Infants 1250-1499 grams	1	0.1	4	0.3	2	0.5
14	745.2 Tetralogy of Fallot	5	0.5	3	0.2	3	0.7
15	746.7 Hypoplastic left heart syndrome	2	0.2	5	0.4	~	~
16	765.16 Disorders relating to other preterm infants 1500-1749 grams	4	0.4	5	0.4	1	0.2
17	742.3 Congenital Hydrocephalus	4	0.4	5	0.4	2	0.5
18	775.5 Neonatal Eletrolyte Disturbance	2	0.2	1	0.1	~	~
19	783.3 Feeding Difficulties and Mismanagement	8	0.8	~	~	2	0.5
20	765.17 Disorders relating to other preterm infants 1750-1999 grams	1	0.1	1	0.1	~	~
21	768.7 Hypoxi-Ischemic Encephalopathy (HIE);	~	~	1	0.1	2	0.5
22	079.6 Respiratory Syncytial Virus (RSV)	1	0.1	3	0.2	~	~
23	772.14 Intraventricular hemorrhage grade IV	2	0.2	2	0.2	3	0.7
24	750.3 Congenital Tracheoesophageal Fistula Esophageal Atresia and Stenosis	1	0.1	4	0.3	~	~
25	742.0 Encephalocele	~	~	1	0.1	~	~
	Total Discharges (all discharges)	222.0	21.6	203.0	16.8	102.0	24.0

* Based on population < 1 from US Census for 2000 aggregated to Public Health District

Table C3

Leading Hospital Discharge Diagnoses, Infants < 1 Year of Age, Georgia, 2008

	Principal Diagnosis	East Metro Health District (Lawrenceville)		Dekalb Health District		LaGrange Health District	
		Discharges	Rate/1,000*	Discharges	Rate/1,000*	Discharges	Rate/1,000*
1	466 Acute Bronchitis and Bronchiolitis	125	11.0	89	9.2	140	16.6
2	769 Respiratory Distress Syndrome in Newborn	8	0.7	6	0.6	22	2.6
3	480.1 Pneumonia Due to Respiratory Syncytial Virus	7	0.6	3	0.3	3	0.4
4	783.41 Failure to thrive	12	1.1	11	1.1	11	1.3
5	771.81 Septicemia of Newborn	17	1.5	6	0.6	13	1.5
6	765.0 Disorders Relating to Extreme Immaturity	11	1.0	3	0.3	10	1.2
7	777.5 Necrotizing Enterocolitis in Fetus and Newborn	11	1.0	17	1.8	8	1.0
8	770.81 Primary Apnea of Newborn	7	0.6	6	0.6	7	0.8
9	779.3 Feeding Problems in Newborn	5	0.4	2	0.2	12	1.4
10	765.18 Disorders relating to other preterm infants 2000-2499 grams	4	0.4	~	~	4	0.5
11	770.7 Chronic Respiratory Disease Arising in the Perinatal Period (Bronchopulmonary Dysplasia)	5	0.4	7	0.7	2	0.2
12	779.0 Convulsions in newborn	5	0.4	2	0.2	3	0.4
13	765.15 Disorders Relating to Other Preterm Infants 1250-1499 grams	5	0.4	2	0.2	2	0.2
14	745.2 Tetralogy of Fallot	7	0.6	3	0.3	3	0.4
15	746.7 Hypoplastic left heart syndrome	4	0.4	3	0.3	4	0.5
16	765.16 Disorders relating to other preterm infants 1500-1749 grams	3	0.3	~	~	~	~
17	742.3 Congenital Hydrocephalus	5	0.4	4	0.4	3	0.4
18	775.5 Neonatal Eletrolyte Disturbance	8	0.7	4	0.4	2	0.2
19	783.3 Feeding Difficulties and Mismanagement	5	0.4	5	0.5	5	0.6
20	765.17 Disorders relating to other preterm infants 1750-1999 grams	1	0.1	~	~	1	0.1
21	768.7 Hypoxi-Ischemic Encephalopathy (HIE);	2	0.2	1	0.1	5	0.6
22	079.6 Respiratory Syncytial Virus (RSV)	1	0.1	3	0.3	2	0.2
23	772.14 Intraventricular hemorrhage grade IV	~	~	3	0.3	1	0.1
24	750.3 Congenital Tracheoesophageal Fistula Esophageal Atresia and Stenosis	1	0.1	1	0.1	~	~
25	742.0 Encephalocele	2	0.2	~	~	2	0.2
	Total Discharges (all discharges)	261.0	22.9	181.0	18.7	265.0	31.5

* Based on population < 1 from US Census for 2000 aggregated to Public Health District

Table C4

Leading Hospital Discharge Diagnoses, Infants < 1 Year of Age, Greorgia, 2008

	Principal Diagnosis	South Central Health District (Dublin)		North Central Health Distict (Macon)		East Central Health District (Augusta)	
		Discharges	Rate/1,000*	Discharges	Rate/1,000*	Discharges	Rate/1,000*
1	466 Acute Bronchitis and Bronchiolitis	129	76.4	125	19.9	159	25.8
2	769 Respiratory Distress Syndrome in Newborn	16	9.5	15	2.4	40	6.5
3	480.1 Pneumonia Due to Respiratory Syncytial Virus	3	1.8	1	0.2	13	2.1
4	783.41 Failure to thrive	3	1.8	5	0.8	8	1.3
5	771.81 Septicemia of Newborn	3	1.8	6	1.0	8	1.3
6	765.0 Disorders Relating to Extreme Immaturity	2	1.2	5	0.8	~	~
7	777.5 Necrotizing Enterocolitis in Fetus and Newborn	~	~	2	0.3	2	0.3
8	770.81 Primary Apnea of Newborn	3	1.8	4	0.6	1	0.2
9	779.3 Feeding Problems in Newborn	2	1.2	6	1.0	7	1.1
10	765.18 Disorders relating to other preterm infants 2000-2499 grams	9	5.3	7	1.1	2	0.3
11	770.7 Chronic Respiratory Disease Arising in the Perinatal Period (Bronchopulmonary Dysplasia)	~	~	1	0.2	5	0.8
12	779.0 Convulsions in newborn	1	0.6	1	0.2	4	0.7
13	765.15 Disorders Relating to Other Preterm Infants 1250-1499 grams	5	3.0	2	0.3	1	0.2
14	745.2 Tetralogy of Fallot	1	0.6	3	0.5	2	0.3
15	746.7 Hypoplastic left heart syndrome	~	~	~	~	3	0.5
16	765.16 Disorders relating to other preterm infants 1500-1749 grams	1	0.6	6	1.0	~	~
17	742.3 Congenital Hydrocephalus	~	~	4	0.6	1	0.2
18	775.5 Neonatal Eletrolyte Disturbance	~	~	2	0.3	3	0.5
19	783.3 Feeding Difficulties and Mismanagement	~	~	1	0.2	~	~
20	765.17 Disorders relating to other preterm infants 1750-1999 grams	4	2.4	2	0.3	1	0.2
21	768.7 Hypoxi-Ischemic Encephalopathy (HIE);	~	~	~	~	1	0.2
22	079.6 Respiratory Syncytial Virus (RSV)	~	~	1	0.2	~	~
23	772.14 Intraventricular hemorrhage grade IV	~	~	2	0.3	~	~
24	750.3 Congenital Tracheoesophageal Fistula Esophageal Atresia and Stenosis	~	~	1	0.2	1	0.2
25	742.0 Encephalocele	~	~	~	~	1	0.2
	Total Discharges (all discharges)	182.0	107.8	202.0	32.2	263.0	42.8

* Based on population < 1 from US Census for 2000 aggregated to Public Health District

Table C5

Leading Hospital Discharge Diagnoses, Infants < 1 Year of Age, Georgia, 2008

	Principal Diagnosis	West Central Health District (Columbus)		South Health District (Valdosta)		Southwest Health District (Albany)	
		Discharges	Rate/1,000*	Discharges	Rate/1,000*	Discharges	Rate/1,000*
1	466 Acute Bronchitis and Bronchiolitis	71	12.7	159	46.2	113	22.2
2	769 Respiratory Distress Syndrome in Newborn	22	3.9	34	9.9	39	7.7
3	480.1 Pneumonia Due to Respiratory Syncytial Virus	6	1.1	15	4.4	10	2.0
4	783.41 Failure to thrive	4	0.7	6	1.7	8	1.6
5	771.81 Septicemia of Newborn	4	0.7	6	1.7	5	1.0
6	765.0 Disorders Relating to Extreme Immaturity	6	1.1	4	1.2	7	1.4
7	777.5 Necrotizing Enterocolitis in Fetus and Newborn	6	1.1	2	0.6	2	0.4
8	770.81 Primary Apnea of Newborn	4	0.7	3	0.9	1	0.2
9	779.3 Feeding Problems in Newborn	4	0.7	2	0.6	1	0.2
10	765.18 Disorders relating to other preterm infants 2000-2499 grams	4	0.7	4	1.2	1	0.2
11	770.7 Chronic Respiratory Disease Arising in the Perinatal Period (Bronchopulmonary Dysplasia)	1	0.2	3	0.9	5	1.0
12	779.0 Convulsions in newborn	2	0.4	~	~	~	~
13	765.15 Disorders Relating to Other Preterm Infants 1250-1499 grams	3	0.5	6	1.7	1	0.2
14	745.2 Tetralogy of Fallot	2	0.4	3	0.9	2	0.4
15	746.7 Hypoplastic left heart syndrome	~	~	2	0.6	7	1.4
16	765.16 Disorders relating to other preterm infants 1500-1749 grams	2	0.4	5	1.5	~	~
17	742.3 Congenital Hydrocephalus	2	0.4	1	0.3	2	0.4
18	775.5 Neonatal Eletrolyte Disturbance	1	0.2	1	0.3	~	~
19	783.3 Feeding Difficulties and Mismanagement	~	~	1	0.3	~	~
20	765.17 Disorders relating to other preterm infants 1750-1999 grams	2	0.4	5	1.5	~	~
21	768.7 Hypoxi-Ischemic Encephalopathy (HIE);	2	0.4	1	0.3	2	0.4
22	079.6 Respiratory Syncytial Virus (RSV)	~	~	~	~	2	0.4
23	772.14 Intraventricular hemorrhage grade IV	~	~	~	~	1	0.2
24	750.3 Congenital Tracheoesophageal Fistula Esophageal Atresia and Stenosis	~	~	1	0.3	1	0.2
25	742.0 Encephalocele	~	~	~	~	~	~
	Total Discharges (all discharges)	148.0	26.4	264.0	76.8	210.0	41.2

* Based on population < 1 from US Census for 2000 aggregated to Public Health District

Table C6

Leading Hospital Discharge Diagnoses, Infants < 1 Year of Age, Georgia, 2008

	Principal Diagnosis	Coastal Health District (Savannah)		Southeast Health District (Waycross)		Northeast Health District (Athens)	
		Discharges	Rate/1,000*	Discharges	Rate/1,000*	Discharges	Rate/1,000*
1	466 Acute Bronchitis and Bronchiolitis	140	17.9	128	29.4	172	33.8
2	769 Respiratory Distress Syndrome in Newborn	21	2.7	41	9.4	9	1.8
3	480.1 Pneumonia Due to Respiratory Syncytial Virus	33	4.2	5	1.1	17	3.3
4	783.41 Failure to thrive	12	1.5	14	3.2	9	1.8
5	771.81 Septicemia of Newborn	17	2.2	9	2.1	8	1.6
6	765.0 Disorders Relating to Extreme Immaturity	2	0.3	5	1.1	11	2.2
7	777.5 Necrotizing Enterocolitis in Fetus and Newborn	1	0.1	1	0.2	1	0.2
8	770.81 Primary Apnea of Newborn	11	1.4	7	1.6	5	1.0
9	779.3 Feeding Problems in Newborn	6	0.8	5	1.1	6	1.2
10	765.18 Disorders relating to other preterm infants 2000-2499 grams	5	0.6	11	2.5	3	0.6
11	770.7 Chronic Respiratory Disease Arising in the Perinatal Period (Bronchopulmonary Dysplasia)	1	0.1	1	0.2	1	0.2
12	779.0 Convulsions in newborn	3	0.4	1	0.2	2	0.4
13	765.15 Disorders Relating to Other Preterm Infants 1250-1499 grams	3	0.4	3	0.7	1	0.2
14	745.2 Tetralogy of Fallot	2	0.3	~	~	1	0.2
15	746.7 Hypoplastic left heart syndrome	5	0.6	3	0.7	2	0.4
16	765.16 Disorders relating to other preterm infants 1500-1749 grams	3	0.4	5	1.1	2	0.4
17	742.3 Congenital Hydrocephalus	1	0.1	1	0.2	2	0.4
18	775.5 Neonatal Eletrolyte Disturbance	5	0.6	3	0.7	3	0.6
19	783.3 Feeding Difficulties and Mismanagement	1	0.1	1	0.2	2	0.4
20	765.17 Disorders relating to other preterm infants 1750-1999 grams	3	0.4	2	0.5	~	~
21	768.7 Hypoxi-Ischemic Encephalopathy (HIE);	~	~	1	0.2	1	0.2
22	079.6 Respiratory Syncytial Virus (RSV)	~	~	1	0.2	~	~
23	772.14 Intraventricular hemorrhage grade IV	~	~	~	~	~	~
24	750.3 Congenital Tracheoesophageal Fistula Esophageal Atresia and Stenosis	~	~	~	~	~	~
25	742.0 Encephalocele	~	~	1	0.2	1	0.2
	Total Discharges (all discharges)	275.0	35.2	249.0	57.2	259.0	50.9

* Based on population < 1 from US Census for 2000 aggregated to Public Health District

Table C7

Leading Discharge Diagnoses, Children < 1 Year of Age, Georgia, 2008

	Principal Diagnosis	Total Georgia	
		Discharges	Rate/1,000*
1	466 Acute Bronchitis and Bronchiolitis	2279	18.8
2	769 Respiratory Distress Syndrome in Newborn	324	2.7
3	480.1 Pneumonia Due to Respiratory Syncytial Virus	145	1.2
4	783.41 Failure to thrive	145	1.2
5	771.81 Septicemia of Newborn	139	1.1
6	765.0 Disorders Relating to Extreme Immaturity	105	0.9
7	777.5 Necrotizing Enterocolitis in Fetus and Newborn	89	0.7
8	770.81 Primary Apnea of Newborn	88	0.7
9	779.3 Feeding Problems in Newborn	87	0.7
10	765.18 Disorders relating to other preterm infants 2000-2499 grams	66	0.5
11	770.7 Chronic Respiratory Disease Arising in the Perinatal Period (Bronchopulmonary Dysplasia)	56	0.5
12	779.0 Convulsions in newborn	50	0.4
13	765.15 Disorders Relating to Other Preterm Infants 1250-1499 grams	48	0.4
14	745.2 Tetralogy of Fallot	47	0.4
15	746.7 Hypoplastic left heart syndrome	47	0.4
16	765.16 Disorders relating to other preterm infants 1500-1749 grams	44	0.4
17	742.3 Congenital Hydrocephalus	43	0.4
18	775.5 Neonatal Eletrolyte Disturbance	42	0.3
19	783.3 Feeding Difficulties and Mismanagement	39	0.3
20	765.17 Disorders relating to other preterm infants 1750-1999 grams	28	0.2
21	768.7 Hypoxi-Ischemic Encephalopathy (HIE);	21	0.2
22	079.6 Respiratory Syncytial Virus (RSV)	19	0.2
23	772.14 Intraventricular hemorrhage grade IV	14	0.1
24	750.3 Congenital Tracheoesophageal Fistula Esophageal Atresia and Stenosis	13	0.1
25	742.0 Encephalocele	12	0.1

Total hospital discharges, for infants under 1 year of age.

* Based on population < 1 from US Census for 2000 aggregated to Public Health District

Table D

First Care Diagnosis List 2011	
1	466 Acute Bronchitis and Bronchiolitis
2	769 Respiratory Distress Syndrome in Newborn
3	480.1 Pneumonia Due to Respiratory Syncytial Virus
4	783.41 Failure to thrive
5	771.81 Septicemia of Newborn
6	765.0 Disorders Relating to Extreme Immaturity
7	777.5 Necrotizing Enterocolitis in Fetus and Newborn
8	770.81 Primary Apnea of Newborn
9	779.3 Feeding Problems in Newborn
10	765.18 Disorders relating to other preterm infants 2000-2499 grams
11	770.7 Chronic Respiratory Disease Arising in the Perinatal Period (Bronchopulmonary Dysplasia)
12	779.0 Convulsions in newborn
13	765.15 Disorders Relating to Other Preterm Infants 1250-1499 grams
14	745.2 Tetralogy of Fallot
15	746.7 Hypoplastic left heart syndrome
16	765.16 Disorders relating to other preterm infants 1500-1749 grams
17	742.3 Congenital Hydrocephalus
18	775.5 Neonatal Eletrolyte Disturbance
19	783.3 Feeding Difficulties and Mismanagement
20	765.17 Disorders relating to other preterm infants 1750-1999 grams
21	768.7 Hypoxi-Ischemic Encephalopathy (HIE);
22	079.6 Respiratory Syncytial Virus (RSV)
23	772.14 Intraventricular hemorrhage grade IV
24	750.3 Congenital Tracheoesophageal Fistula Esophageal Atresia and Stenosis
25	742.0 Encephalocele
26	776.6 Anemia of Prematurity
27	767.0 Subdural and Cerebral Hemorrhage due to Birth Trauma
28	772.13 Intraventricular hemorrhage grade III
29	765.23 25-26 Completed Weeks Gestation
30	758.0 Downs syndrome
31	765.24 27-28 Completed Weeks Gestation
32	765.26 31-32 Completed Weeks Gestation
33	749.10 Cleft lip unspecified
34	765.25 29-30 Completed Weeks Gestation
35	768.5 Severe Birth Asphyxia
36	779.7 Preventricular Leukomalacia