
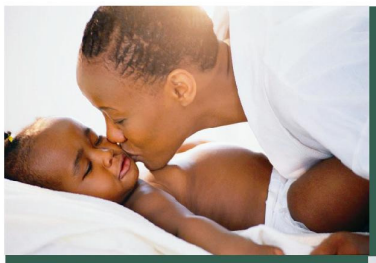


Maternal and Infant Health Monthly Surveillance Report

Hamilton County

April 2011
Quarterly Report

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Introduction

The series of Maternal and Infant Health Monthly Surveillance Reports is part of a county-wide initiative to improve maternal and infant health and to reduce infant mortality. In order to take effective actions to improve the health and safety of infants in the community, it is essential to identify, describe and monitor the problems and the populations at risk. This report characterizes the current status of infant mortality and select risk factors in Hamilton County.

Infant Mortality Surveillance

- **Number of infant deaths by month**
- **Current monthly infant mortality rate**
- **Current monthly neonatal mortality rate**
- **Current monthly preterm birth rate**
- **Current two year IMR moving average**
- **Comparison of "Filed" and "Unfiled" data**

The data source for this report series has been enhanced to improve the monthy surveillance process. The Ohio Department of Health (ODH) is now providing additional mortality data to Hamilton County Public Health on a monthly basis that will be used improve the timeliness and accuracy of monthly surveillance. These provisional data are numbers only and do not include any additional information from birth or death certificates (**Appendix A**). The data included in this report were obtained from ODH on May 11, 2011.

Infant Mortality Surveillance

Public health surveillance is the ongoing systematic collection, analysis, interpretation and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health.[1] The Maternal and Infant Health Surveillance System is designed to better understand infant morbidity and mortality in our community, monitor infant deaths and evaluate whether collective actions to prevent infant death are effective. The surveillance charts contained within this report are tools that are used to monitor infant mortality and select risk factors in our community.

Please read the General Guidelines for Using Surveillance Charts in the **Appendix B**.

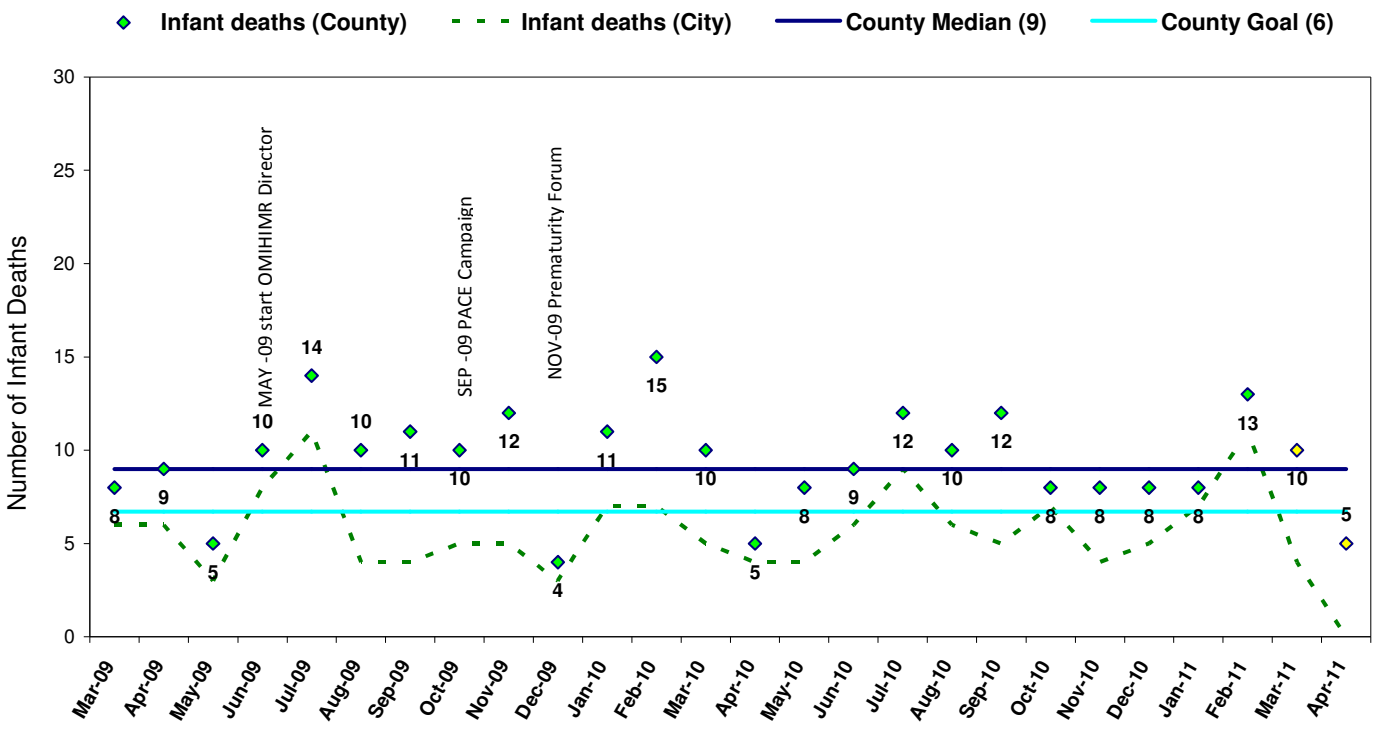
[1] Centers for Disease Control and Prevention. *Updated Guidelines for Evaluating Public Health Surveillance Systems: Recommendations from the Guidelines Working Group*, MMWR, July 27, 2001, Vol.50 No. RR—13

Number of Infant Deaths

There were 5 infant deaths recorded in Hamilton County during April as of May 11, 2011.

One measure of infant mortality is the number of deaths per month. Figure 1 below shows the count of infant deaths in Hamilton County and Cincinnati by month over the past two years. Infant mortality (N=5 provisional deaths) reported for April was below the two-year median of nine deaths (Figure 1). Provisional data for 2011 indicated that 61% of infant deaths have occurred to residents of Cincinnati (Figure 1). Please see **Appendix A** on page 10 to learn more about the provisional death data.

Figure 1. Number of Infant Deaths, Hamilton County March 2009 – April 2011*



NOTE: The county median is calculated using data from March 2009 – February 2011.

* Data for 2010-2011 are provisional; ODH reconciles (i.e., finalizes) data by fall of the subsequent year. Yellow points are more likely to change in future reports.

** Data for the City of Cincinnati should be interpreted with caution. Records in 2010-2011 have not been geo-coded and city assignment is based on provisional methods; data are subject to change.

Data Source: Ohio Department of Health Vital Statistics

Infant Mortality Rates

Another method used to monitor infant mortality is examination of the number of infant deaths in relation to the total number of births. An increase in the number of infant deaths may not be surprising if there is also an increase in the overall number of babies born. To evaluate infant deaths with regard to the number of births, the Infant Mortality Rate (IMR) is calculated. The monthly IMR is the number of infants less than one year who died divided by the number of live births during the month per 1,000 live births. The Neonatal Mortality Rate (NIMR) is a specific IMR for neonates (infants younger than 28 days) who died per 1,000 live births.

The IMRs for March and April are estimated at 11.4 and 5.4, respectively. The March rate was at the two-year average of 10.3 deaths per 1,000 live births.

The IMRs for March and April are currently estimated at 11.4 and 5.4, respectively (Figure 2). The March IMR was at the two-year average (10.3). The IMRs were calculated based on 878 births recorded in March and an estimated 927 births for April. See subsequent reports for improved statistical validity of these estimates (**Appendix A**).

The March and April NIMRs were estimated as 8.0 and 3.2, respectively (Figure 3). These rates are provisional and subject to change. Three of the five deaths in April were classified as neonatal deaths. Neonatal deaths have comprised 69% of the infant deaths recorded in 2011.

Figure 2. Infant Mortality Rate Surveillance Chart, Hamilton County Mar 2009-April 2011*

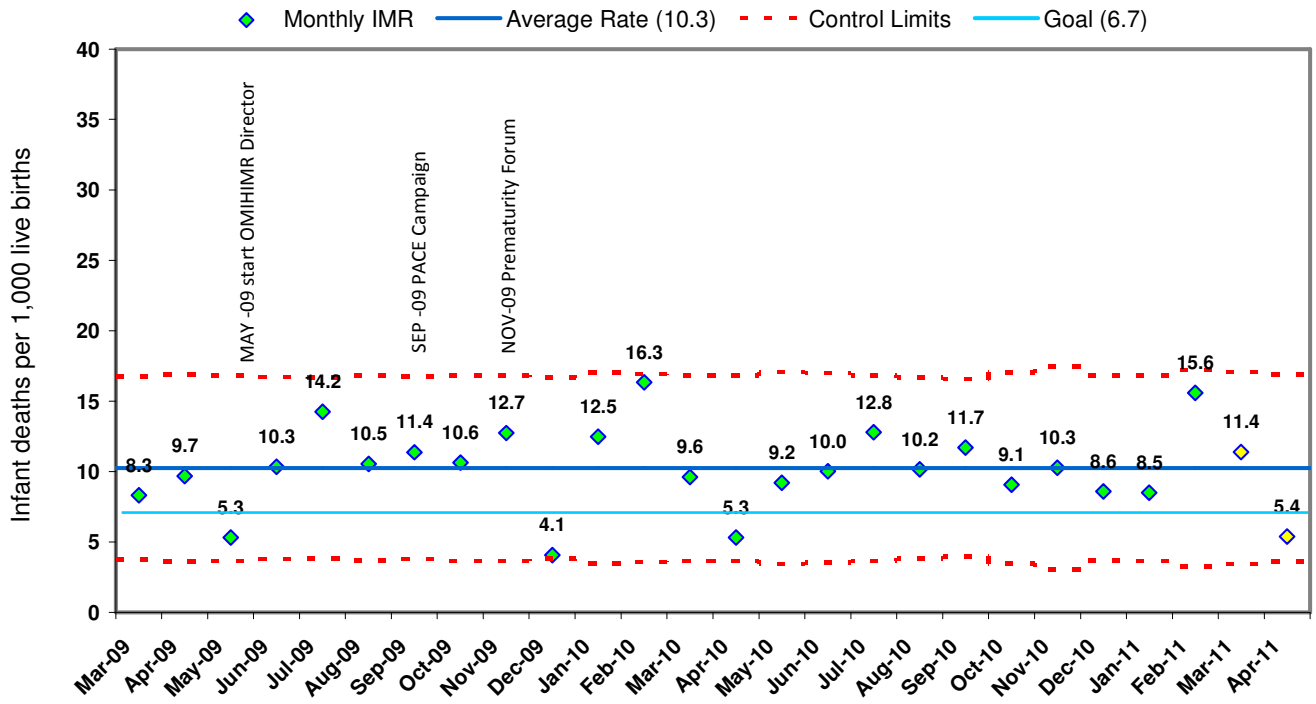
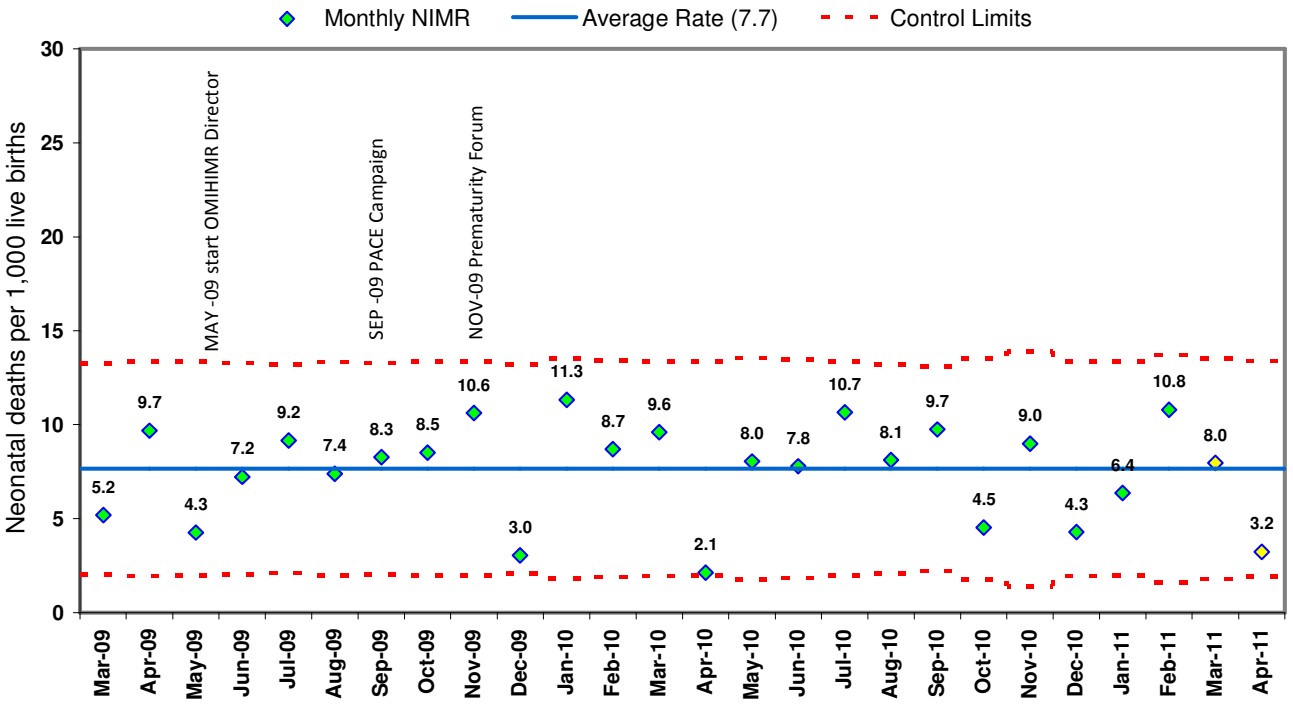


Figure 3. Neonatal Mortality Rate Surveillance Chart, Hamilton County Mar 2009-April 2011*



NOTE: The mean is calculated using two years of data from March 2009–Feb 2011. Yellow points are more likely to change in future reports. The current month's mortality rates are calculated with an estimated denominator. The denominator is an average of the number of births form the preceding 24 months.

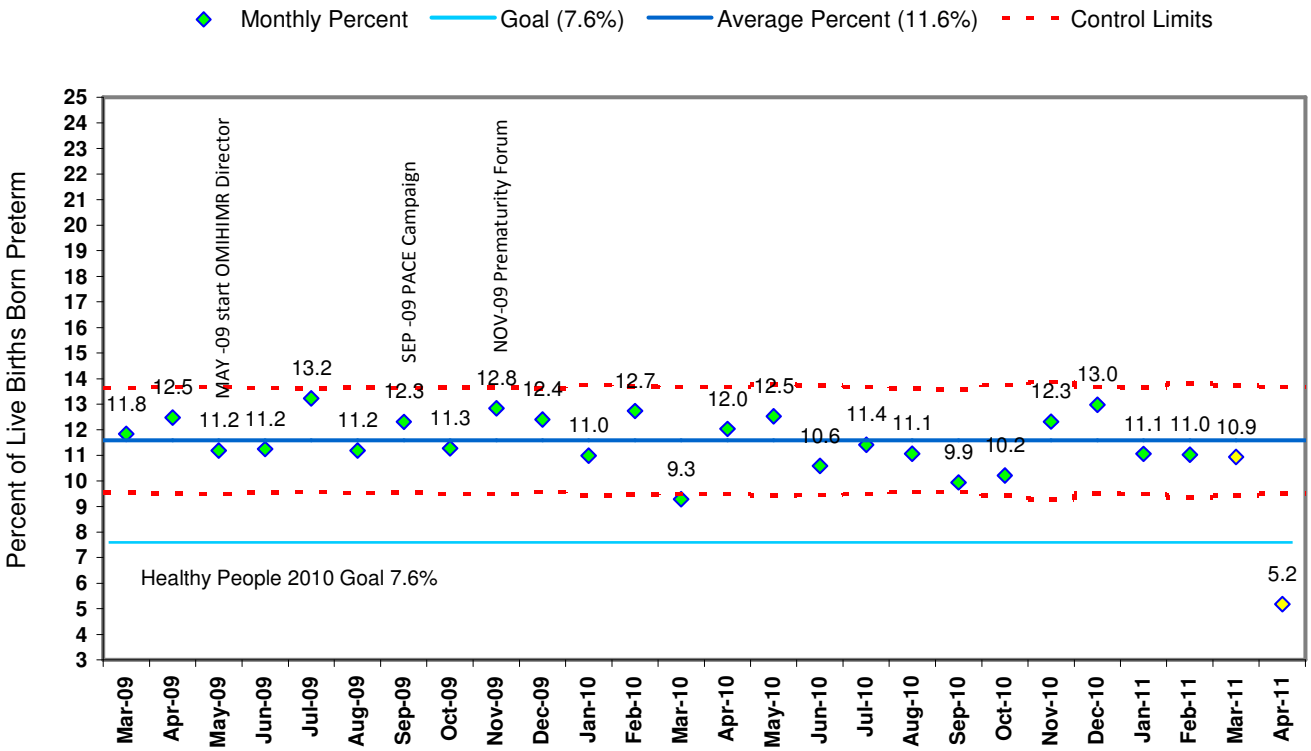
- Data for 2010-2011 are provisional
- Data Source: Ohio Department of Health Vital Statistics

Preterm Birth Rates

The preterm birth rate is the percentage of infants born before 37 weeks gestation. Pre-term birth is a significant risk factor of infant mortality and many other adverse health outcomes. The preterm birth rate in March (10.9%) was below the two-year average of 11.6%. The provisional rate for April (5.2%) was below the two-year average (Figure 4).

The preterm birth rates have been lower than the two-year average of 11.6% for the past four months.

Figure 4. Preterm Birth Rate Surveillance Chart, Hamilton County Mar 2009 – April 2011*

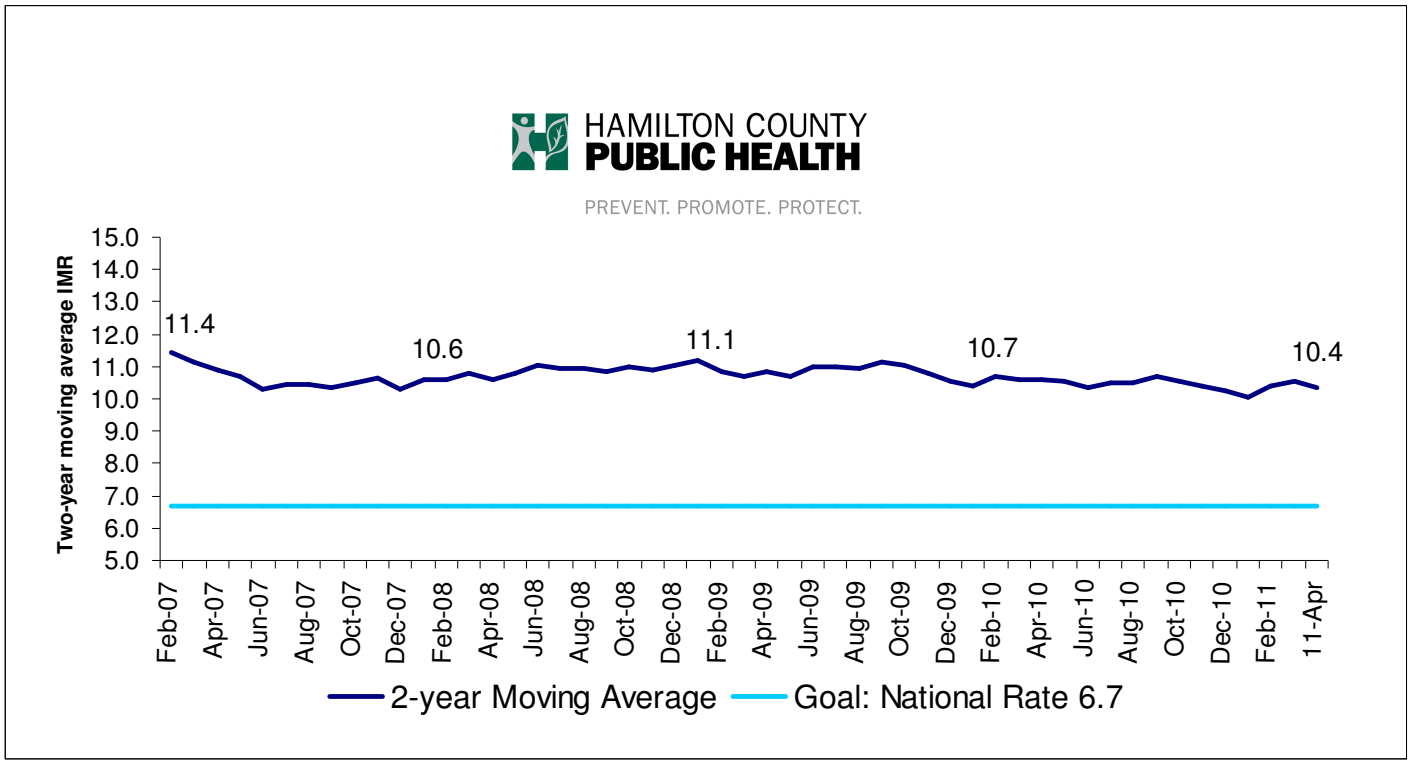


NOTE: The mean is calculated using two years of data from March 2009– February 2011. Yellow points are more likely to change in future reports.
*Data for 2010-2011 are provisional
Data Source: Ohio Department of Health Vital Statistics

Two Year Moving Average

Reviewing monthly rates is one approach used to determine whether there has been a change over time. However, monthly rates have a tendency to fluctuate and may disguise emerging trends. An alternative measure is the un-weighted, monthly moving average, which can provide a more stable picture of evolving trends. In Figure 5, the infant mortality rate for each month is the 24 month average of months immediately prior to and including the current month. The two-year moving average decreased from February 2007 (11.4) to April 2011(10.4) (Figure 5). The data for 2011 indicate that the two-year moving average has ranged from 10.4 -10.5 for the current year (Figure 5). Please note that the moving average is subject to change based on new data, which may ultimately affect current trends. Multiple approaches are required to measure the impact of program efforts on infant mortality.

Figure 5. Two Year Moving Average Infant Mortality Rate by Month, Hamilton County February 2007- April 2011*



NOTE: The infant mortality rate for each month is the average of twenty-four months immediately prior to and including that month.
NOTE: Data for 2010-2011 are provisional
Data Source: Ohio Department of Health Vital Statistics

Factors Related to Maternal and Infant Health

In an effort to understand the local factors related to maternal and infant health, it is useful to examine maternal risk factors in terms of mothers who experienced an infant death and those who did not. Table 1 below shows maternal risk characteristics for women who had live births in Hamilton County, 2010 and 2011.

Table 1 illustrates that maternal smoking and chlamydia infection among other modifiable risk factors may be associated with the risk for adverse birth outcomes in Hamilton County. In 2010 and 2011, mothers who smoked three months prior to the pregnancy and/or during pregnancy and those with a chlamydia infection present during the pregnancy represented a disproportionate amount of the deaths as compared to the births. As indicated in table 1, mothers with a chlamydia infection present during the pregnancy were twice as likely as mothers without chlamydia to experience an infant death.

Table 1. Maternal Health, Hamilton County, 2010-2011

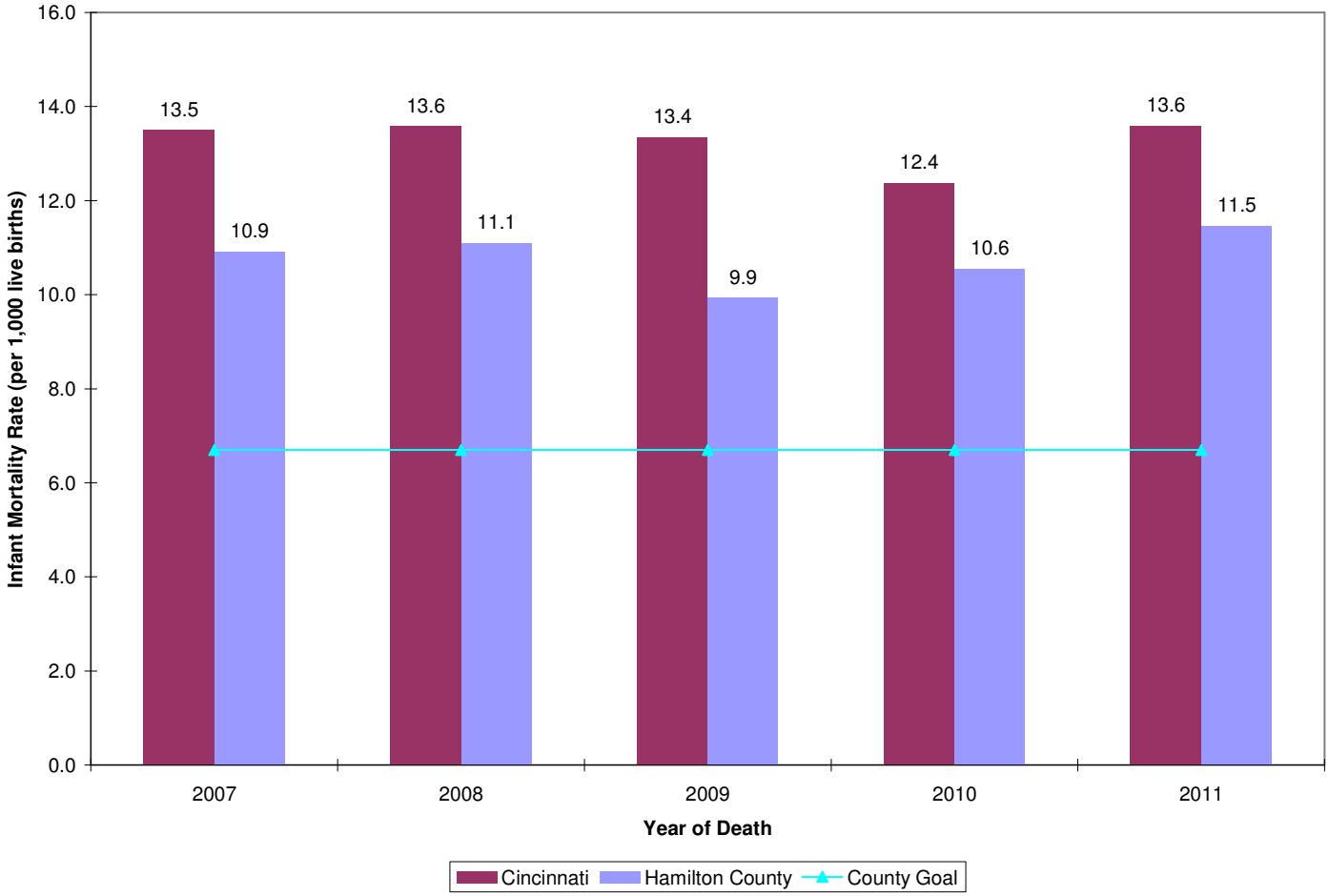
Maternal Health				
	Hamilton County 2010		Hamilton County 2011	
Measure	Births N=10988	Deaths N=102[1]	Births N=3230	Deaths N=18[2]
BMI [3]				
<18.5 Underweight	3.4%	5.1%	4.5%	6.7%
18.5-24.9 Normal	46.4%	43.0%	46.3%	53.3%
25-29.9 Overweight	24.8%	25.3%	24.2%	13.3%
30+ Obese	25.4%	26.6%	25.0%	26.7%
Hypertension				
Pre-pregnancy	2.7%	0%	3.3%	11.1%
Gestational	6.0%	9.8%	7.0%	5.6%
Eclampsia	1.4%	2.9%	2.2%	5.6%
Diabetes				
Pre-pregnancy	0.9%	2.0%	1.2%	5.6%
Gestational	7.0%	2.9%	6.6%	0%
Smoking				
Before Pregnancy	19.2%	26.5%	13.8%	22.2%
During Pregnancy	13.7%	22.5%	15.2%	11.1%
Infections				
Chlamydia	5.5%	18.7%	6.1%	11.1%
Gonorrhea	1.5%	3.9%	1.5%	5.6%
Syphilis	0.3%	0%	0.4%	0%
HSV	4.0%	3.9%	4.6%	0%
Age				
<15 years	0.1%	0%	0.1%	0%
15-19 years	9.6%	16.7%	8.8%	11.1%
20-24 years	24.4%	31.4%	25.0%	27.8%
25-29 years	29.2%	24.5%	29.0%	33.3%
30-34 years	24.1%	19.6%	25.1%	22.2%
35-39 years	10.2%	6.9%	9.7%	5.6%
40-44 years	2.1%	1.0%	2.0%	0%
45+ years	0.1%	0%	0.2%	0%
Education				
Less than High School Diploma	17.6%	25.5%	17.4%	16.7%
Diploma/GED	18.3%	25.5%	18.9%	22.2%
Some College or greater	60.0%	43.1%	61.6%	50%
Unknown	4.1%	5.9%	2.1%	11.1%
PROM	3.7%	24.5%	4.2%	33.3%
Chorioamnionitis	1.6%	14.7%	2.0%	11.1%

Prematurity is one of the most significant factors in infant health. As displayed in Table 2, 73.6% and 77.8% of the infant deaths in 2010 and 2011, respectively, have occurred to infants who were born prior to 37 weeks gestation. In 2010 and 2011, at least 50% of infant deaths occurred to babies with a birth weight of less than 1000 grams. Annual infant mortality rates of the Hamilton County and city of Cincinnati are displayed below. The infant mortality rate for the city of Cincinnati has remained higher than the total county's rate since 2007 (Figure 6).

Table 2. Infant Health, Hamilton County, 2010-2011

Infant Health				
	Hamilton County 2010		Hamilton County 2011	
Measure	Births= 10988	Deaths= 102[1]	Births =3230	Deaths= 18[2]
Birth weight[4]				
ELBW	1.1%	55.9%	1.1%	50%
VLBW	1.0%	7.8%	1.0%	0%
LBW	7.4%	7.8%	7.9%	22.2%
>/=2500 grams	87.6%	25.9%	89.4%	16.7%
Unknown	2.9%	2.9%	0.7%	11.1%
Gestational Age[5]				
Very Preterm	2.2%	62.8%	2.6%	66.7%
Moderately Preterm	9.1%	10.8%	8.0%	11.1%
Full-term	85.7%	26.5%	88.6%	22.2%
Unknown	3.1%	0%	0.8%	0%

Figure 6 Infant Mortality Rates, Hamilton County and City of Cincinnati, 2007-2011



Cause of Infant Death

Hamilton County Public Health utilizes the cause of death from the ODH Vital Statistics files. The cause of death is based on specific ICD-10 codes assigned by the Centers for Disease Control and Prevention. The cause of death is not available for every infant due to incompleteness of the data file for 2010. With exception of the 'Other, unclassified' category, for the two years presented in table 2, the leading causes of death for infants in Hamilton County were disorders related to short gestation and low birth weight, followed by congenital malformations, deformations, and chromosomal abnormalities. The 'Other, unclassified' category includes infants who died due to metabolic/endocrine disorders, other and unspecified disease of the respiratory and digestive systems and symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified.

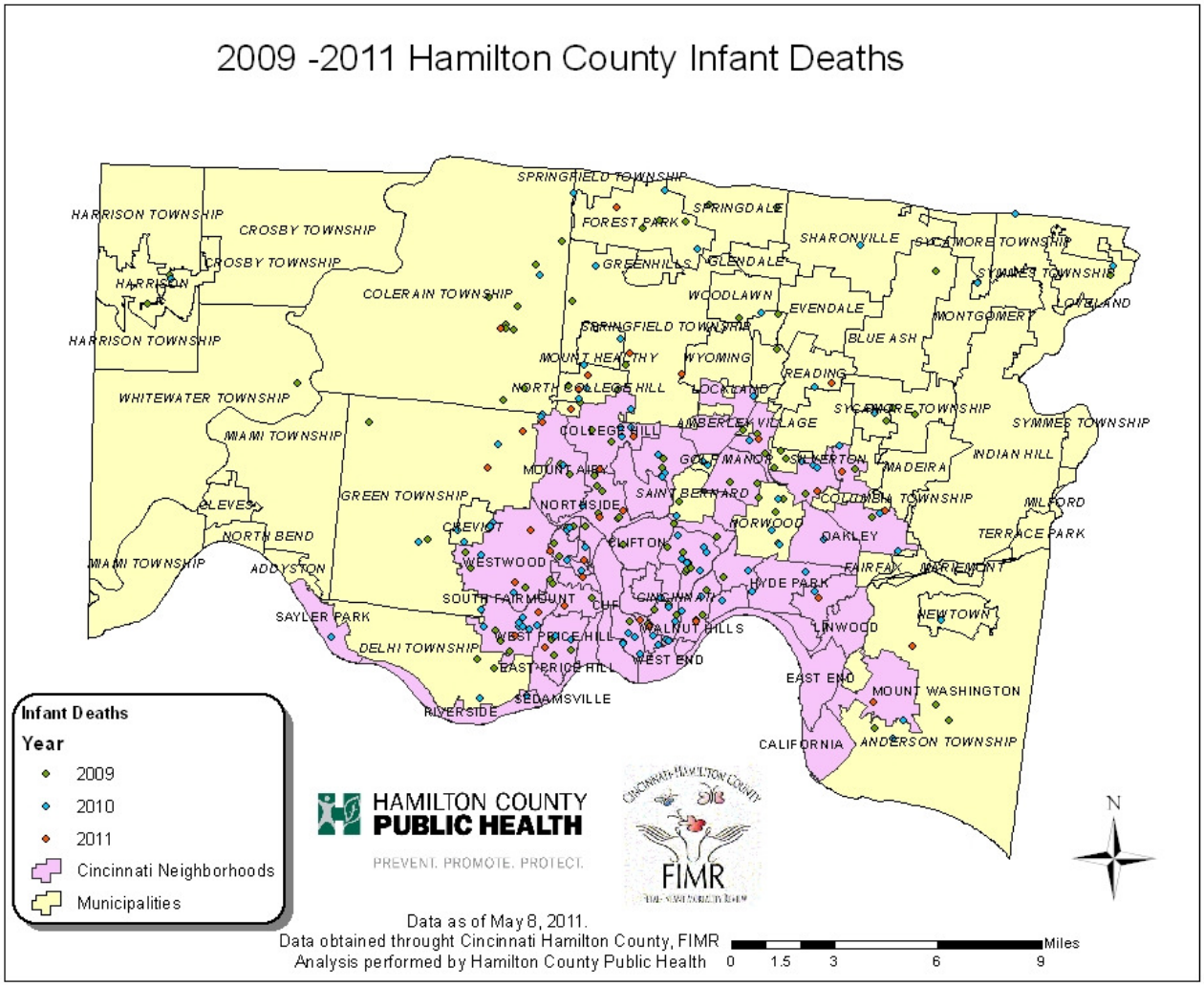
Table 2. Cause of Infant Death, Hamilton County 2009-2010

Cause of Infant Death	2009	2010[6]
Extremely low birth weight or extreme immaturity, Other low birth weight or preterm	26	25
Congenital malformations, deformations and chromosomal, abnormalities	19	16
Newborn affected by incompetent cervix, premature rupture of membranes, multiple pregnancy, or other maternal complications of pregnancy	6	11
Newborn affected by other maternal conditions which may be unrelated to present pregnancy	0	10
Newborn affected by complications involving placenta, complications involving cord, chorioamnionitis, other and unspecified abnormalities of membranes	6	0
Sudden Infant Death Syndrome	6	3
Accidents	6	1
Necrotizing entercolitis of newborn	5	6
Respiratory distress of newborn	4	3
Interstitial emphysema and related conditions origination in the perinatal period	4	0
Neonatal Hemorrhage	3	0
Bacterial sepsis of newborn	3	0
Assault (homicide) by hanging, strangulation and suffocation, Assault (homicide) by discharge of firearms	2	0
Septicemia	1	0
Anoxic brain damage, not elsewhere classified	1	0
Diseases of the circulatory system	1	1
Congenital pneumonia	1	0
Atelectasis	1	0
Newborn affected by other complications of labor and delivery	1	0
Diarrhea and gastroenteritis of infectious origin	0	1
Renal failure and other disorders of kidney	0	1
Pulmonary hemorrhage originating in the perinatal period	0	1
Other, unclassified	17	24
Total	113	103

Jurisdiction of Death

In the years displayed in Figure 7 (2009-2011), a high percentage of the infant deaths have occurred to city of Cincinnati residents. The percentage of deaths for the city of Cincinnati was 61%, 59%, and 59% for 2009, 2010, and 2011, respectively. The map in Figure 7 illustrates that infant deaths are clustered in the similar geographic areas each year.

Figure 7. Hamilton County Infant Deaths, 2009-2011



Appendix A- Data Limitations

There are multiple datasets that can be used to support surveillance activities associated with infant mortality. Two primary data sources are used to supply the data for monthly Maternal and Infant Health Surveillance Report (http://www.hamiltoncountyhealth.org/en/resource_library/reports.html). Both of these data sources are considered provisional until the Ohio Department of Health (ODH) completes data reconciliation processes each year. Provisional Data Source A (PDS-A) contains records that correspond to filed certificates and are linkable (i.e., birth to death records), whereas Provisional Data Source B (PDS-B) contains records that correspond to both filed and unfiled/pending certificates and are not linkable. The former (PDS-A) is used for more in-depth analysis of risk factors, but suffers from incompleteness due to missing unfiled/pending certificates. The latter (PDS-B) is used to collect death data more expeditiously, but provides only count data, precluding more in-depth analysis of prenatal and perinatal risk factors. Data from both PDS-A and PDS-B become more accurate as the length of time increases from event to report. Annually, ODH releases a reconciled dataset that contains final cause of death information and geographic information.

PDS-B is used in this report to provide the count statistics in each section except infant deaths within the city of Cincinnati (Figure 1) and preterm births (Figure 4). Table 1 displays the discrepancy between the two infant mortality data sources available from ODH. As of May 11, 2011, all 2010 death certificates had been filed at the state level and both data sources corresponded. There were six (16%) infant deaths in 2011 that were not yet filed at the time of this report (Table 1). Thus, the number of infant deaths reported was higher in PDS-B than in PDS-A. Please note that delayed certificates directly impact data quality and therefore, the integrity of findings shared in this report.

Table 1. Infant Mortality Data Source Assessment, Hamilton County 2009 - 2011

Data Source	2009	2010	2011
	No. Infants < 1 yr.	No. Infants < 1 yr.	No. Infants < 1 yr.
PDS-A	113	116	31
PDS-B	111	116	37
Discrepancy	2	0	6

Appendix B

General Guidelines for Using Surveillance Charts

The Hamilton County Infant Mortality Surveillance System, part of the Office of Maternal and Infant Health and Infant Mortality Reduction, uses **surveillance charts** to monitor infant mortality rates and preterm birth rates. These charts provide a method for monitoring the status of infant health over time and provide timely feedback on the effectiveness of local efforts to reduce infant deaths and preterm births.

Several tools are included in the surveillance charts that help facilitate interpretation: (1) a baseline - the center line [solid] which is the average number of deaths or births per month over the preceding two years, (2) a goal line which shows the goal that has been established by the community and (3) upper and lower control limits [dashed] that allow users to detect unusual events. Annotations indicate when certain interventions began or special changes occurred.

Here are some types of unexpected events that could be detected within surveillance charts:

* A single point outside of the control limit
* A run of eight or more consecutive points below or above the center line
* Six consecutive decreasing or increasing points
* Two out of three consecutive points near a control limit

Appendix C –Technical Notes

[1]In 2010, there were 116 infant deaths in Hamilton County. However, in order to examine maternal characteristics and certain infant characteristics related to birth (such as congenital malformations or gestational age) it was necessary to use linked birth-death datasets. The linked birth-death dataset containing 102 infant deaths from 2010 which were able to be linked to birth records from 2009 and 2010 was used to perform analysis.

[2]As of May 11, 2011 there have been 37 infant deaths in Hamilton County. However, in order to examine maternal characteristics and certain infant characteristics related to birth (such as congenital malformations or gestational age) it was necessary to use linked birth-death datasets. The linked birth-death dataset containing 18 infant deaths from 2011which were able to be linked to birth records from 2010 and 2011 was used to perform analysis.

[3]BMI was calculated only on women greater than 19 years of age, and those with applicable heights and pre-pregnancy weights. Not all mother met this criteria. N=9368

[4]Infant birth weight was categorized into 5 groups. ELBW refers to infants with a birth weight less than 1000 grams, VLBW is defined as 1001-1499 grams, LBW is defined as 1500-2499 grams.

[5]Very preterm is defined as less than 32 weeks gestation. Moderately Preterm is defined as 32 to 36 weeks gestation, and full term is defined as 37 weeks gestation or greater.

[6]Cause of death data for 2010 are provisional

This report was prepared for the Office of Maternal and Infant Health and Infant Mortality Reduction, now known as the Women and Infant Vitality Network.

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