# 2008-2012 Infant Mortality Birth Cohort Study

# Allegheny County, PA

**Authored by Michael Balke, MPH**

**Edited by John Kokenda**

**Allegheny County Health Department**

**Maternal & Child Health**

**Bureau of Assessment, Statistics, and Epidemiology**

## Legal Disclaimer

*This data is provided by the Allegheny County Health Department, Office of Epidemiology and Biostatistics through a cooperative agreement with the Pennsylvania Department of Health which requires the following disclaimer: "These data were supplied by the State Health Data Center, Pennsylvania Department of Health, Harrisburg, Pennsylvania. The Pennsylvania Department of Health specifically disclaims responsibility for any analyses, interpretations or conclusions."*

# Table of Contents

# Introduction

Infant mortality remains a serious public health issue both here in the United States and around the world. Numerous environmental, social, and health risks are closely tied with the rate of infant mortality and the measure is used globally as an indicator of maternal and child health status, as well as general population wellbeing. A higher mortality rate often indicates an overall less healthy population with increased levels of adverse social and environmental determinants.

Historically, Allegheny County, PA (AC) has had one of the highest infant mortality rates of any county in the United States. However, recent AC vital statistics data shows large reductions in both overall and race-specific infant mortality. This welcomed improvement offers a unique opportunity to perform a detailed assessment of infant mortality in the county. The improved understanding of infant mortality in AC afforded by this study will lead to new policies and strategies to further reduce infant mortality and ensure every infant born in AC sees a happy and healthy first birthday.

## About the Study

The infant mortality rate (IMR) is the standardized measure for describing and comparing infant mortality between populations and geographic regions. IMR is defined as the number of deaths under 1 year of age per 1,000 live births. Having a common denominator of 1,000 births allows for an accurate comparison of rates between different populations.

There are two ways to study infant mortality: by death cohort and by birth cohort. Typically a 5-year study period is used for either method. Under the death cohort method, the total number of infant deaths which occurred during the study period is divided by the total number of births which occurred during the study period. This method may include deaths of infants born prior to the study period in the numerator. The birth cohort method only includes deaths of infants born during the study period. The total deaths are then divided by the total number of births which occurred during the study period. The birth cohort model permits the linking of birth and death records. This linking allows for detailed analysis of pregnancy and immediate post-birth conditions that may have contributed to an infant death.

For the purpose of this birth cohort study, only births that occurred to mothers with an AC residency listed on the infant's birth certificate between 2008 and 2012 were included in the analysis. The race of the infant was determined using the mother's self-reported race found on the birth certificate. The vast majority of births in AC between 2008 and 2012 were to white and black mothers. The low number of births to mothers of other races and ethnicities may produce inaccurate and misleading rates and statistics. Therefore white and black infant deaths are the focus of this study. The decision to focus on white and black births and deaths was made to maintain the integrity and validity of the rates being presented. Overall infant mortality rates include all races and ethnicities.

## Area of Study

AC is comprised of 130 municipalities, with the largest, the City of Pittsburgh, being comprised of 90 neighborhoods. Four hundred thirty four infant deaths occurred within AC between 2008 and 2012. The majority of infant deaths occurred within the City of Pittsburgh (143), with the neighborhoods of Carrick, East Liberty, Marshall-Shadeland, Beltzhoover, and East Hills having the most infant deaths. Aside from the City of Pittsburgh, the municipalities of Penn Hills, McKeesport, Wilkinsburg, McKees Rocks, and Monroeville saw the largest number of infant deaths.

## Infant Mortality Overview

Over 65,310 births occurred in AC between 2008 and 2012, of which 434 infants died. The overall five year IMR for AC was 6.65 infant deaths per 1,000 live births (Table 1). This overall IMR is just above the national Healthy People 2020 IMR goal of 6.0 deaths per 1,000 live births. Additionally, the current overall IMR is a slight reduction from the previous 5-year overall IMR of 7.4 between 2003 and 2007.

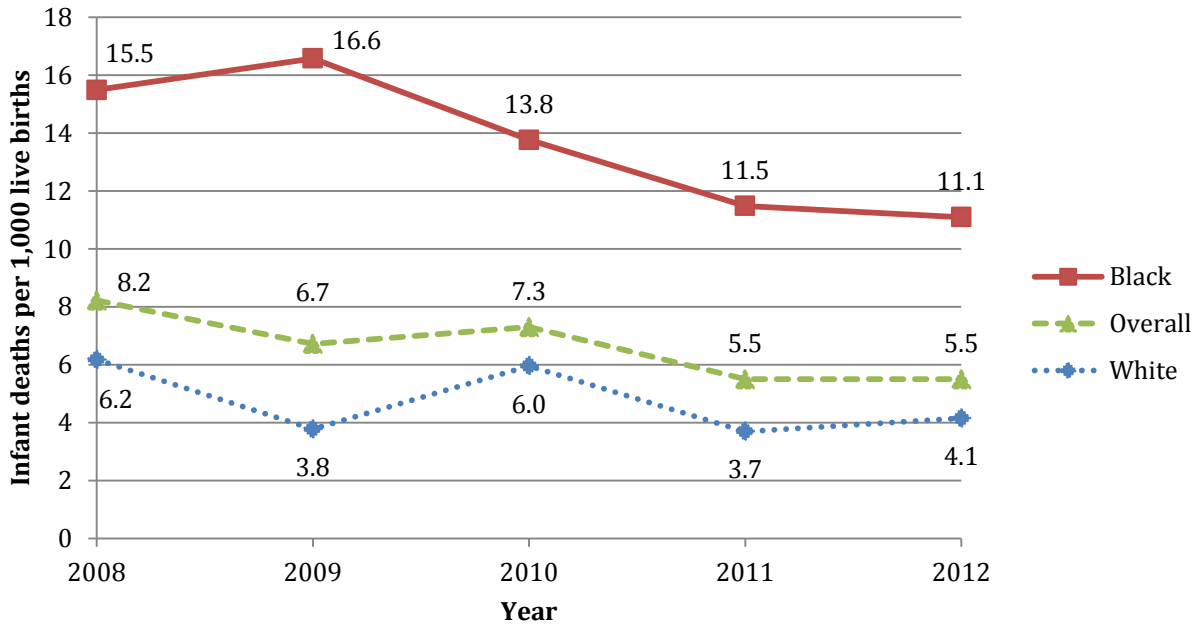
Despite the reduction in overall IMR, a large racial disparity between whites and blacks still remains. Whites had an average IMR of 4.75, while blacks had an average IMR of 13.73 between 2008 and 2012 (Table 1). The rate of black infant mortality was 2.89 times the rate of white infant mortality. Despite this disparity, the black IMR saw a nearly constant decrease during this period to a low of 11.10 in 2012 (Figure 1). A reduction in overall infant mortality was also seen across 2008 and 2012. White IMR remained comparatively low across the period.

The neonatal period refers to the first 28 days of life. Nearly 72% of the 434 deaths that occurred in AC between 2008 and 2012 were during the neonatal period. Table 1 shows males had slightly higher IMRs for the neonatal and post neonatal periods compared to females. Rates of neonatal and post-neonatal mortality were much higher for blacks compared to whites.

**Table 1: IMR per 1,000 live births**

| | All Infants | Neonatal | Post-Neonatal |
|---|---|---|---|
| **Overall** | 6.65 | 4.78 | 1.87 |
| Males | 7.04 | 4.94 | 2.10 |
| Females | 6.24 | 4.61 | 1.63 |
| | | | |
| **White** | 4.75 | 3.46 | 1.29 |
| Males | 5.42 | 3.68 | 1.74 |
| Females | 4.05 | 3.23 | 0.82 |
| | | | |
| **Black** | 13.73 | 9.60 | 4.13 |
| Males | 13.46 | 9.95 | 3.51 |
| Females | 14.01 | 9.24 | 4.77 |

**Figure 1: Infant Mortality by Race, 2008-2012**



## Survivability

There is a large racial disparity between blacks and whites for the number of infants surviving in the first 24 hours post-birth. Of the 225 white infants that died, 58% survived past first 24 hours of life compared to 48% of 183 black infants that died (Table 2). Interestingly, the racial disparity disappears after the first 24 hours. While it appears that white infants have better outcomes immediately after birth, this does not carry through past the first week of life. Survivability remains very similar for white and black infants for the remaining time periods studied, with blacks having generally higher percentages of surviving infants as length of survival increases. Only 8 of the 434 infants that died survived more than 3 months and no infant of any race survived more than 10 months.

**Table 2: Percent of Infants Surviving at Post-Birth Time Point**

| Length of Survival | White | Black | Overall |
|---|---|---|---|
| More than 24 Hours | 57.8% | 48.1% | 52.8% |
| More than First week | 40.9% | 41.5% | 40.8% |
| More than 2 Weeks | 35.1% | 35.5% | 34.6% |
| More than 3 Weeks | 30.2% | 32.2% | 30.6% |
| More than 4 Weeks | 27.1% | 30.1% | 28.1% |
| More than 1 Month | 17.3% | 19.7% | 17.7% |
| More than 2 Months | 11.1% | 12.6% | 11.5% |
| More than 3 Months | 2.2% | 1.6% | 1.8% |

## Excess Black Mortality

The high black IMR in AC is a troubling problem, particularly in light of such a low white IMR. The white IMR of 4.75 is an achievable mortality rate in AC. Using this white IMR, the burden of excess black infant mortality can be measured. The goal of this analysis is to calculate the expected number of black infant deaths if the AC black IMR was the same as the AC white IMR. By subtracting the expected number of black AC infant deaths from the observed number of black AC infant deaths, excess deaths can be quantified. The standardization found there were 120 excess black infant deaths between 2008 and 2012 (Table 3). In simple terms, 120 fewer black infants would have been expected to die between 2008 and 2012 if AC blacks had the same IMR as AC whites.

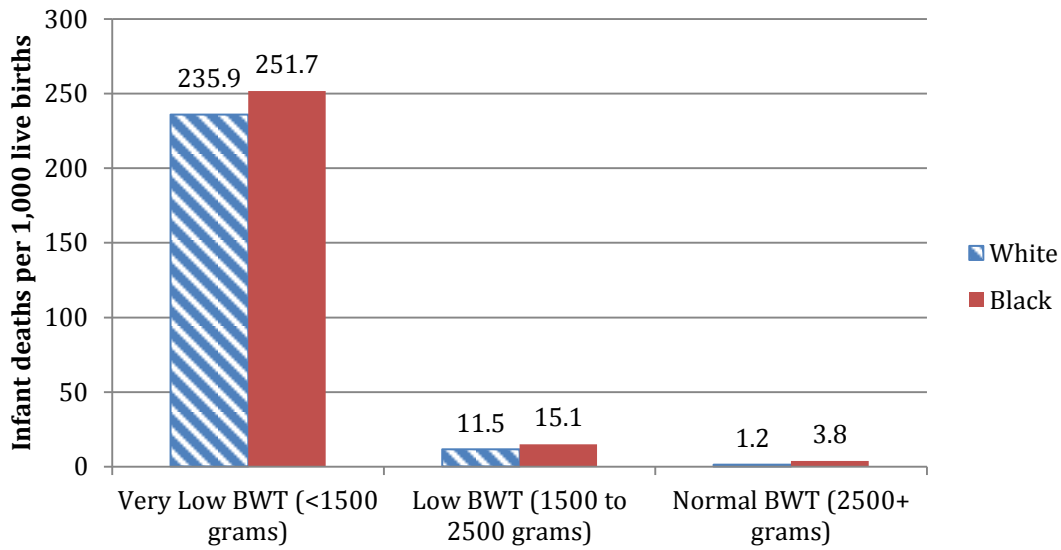
**Table 3: Excess Black Deaths**

| Year | Black Observed | Black Expected | Excess Black Deaths (Δ) |
|---|---|---|---|
| 2008 | 43 | 17 | 26 |
| 2009 | 45 | 10 | 35 |
| 2010 | 36 | 16 | 20 |
| 2011 | 30 | 10 | 20 |
| 2012 | 29 | 11 | 18 |
| **Total** | **183** | **63** | **120** |

## Birthweight

Birthweight is a powerful predictor of infant health and risk of premature death. The CDC uses three categories for infant birth weight. An infant born with a birthweight less than 1,500 grams is considered a very low birthweight (VLBWT) infant, infants born between 1,500 and 2,499 grams are classified as low birthweight (LBWT), and infants born at 2,500 grams or greater are considered normal birthweight (NBWT). Nearly 92% of infants born in AC between 2008 and 2012 had a NBWT. LBWT births accounted for 6.6% of births and VLBWT births accounted for 1.5% of total births. Over 13.8% of black births were either LBWT or VLBWT births, compared to 6.6% of white births.

**Figure 2: IMR by Birthweight Category, 2008-2012**




The majority of infant deaths for both blacks and whites occurred in the VLBWT category leading to extraordinarily large rates. Figure 2 shows the white VLWBT IMR is nearly 235.9 deaths per 1,000 live births, while blacks saw a VLBWT IMR of 251.7 deaths per 1,000 live births. A large drop in IMR occurs as birthweight increases for both races. However, a racial disparity is seen across all birthweight categories, with blacks having a higher IMR regardless of birthweight.

Infant mortality was higher for both black males and females compared to white males and females for all birthweight categories (Table 4). Interestingly, the NBWT IMR was higher for white males compared to white females. The opposite is found for black infants were the black male NBWT IMR was lower compared to black female infants. The black female NBWT IMR is 5 times the white female IMR, while the black male IMR is only 2.23 times higher compared to white male infants.

**Table 4: IMR by Birthweight Category, Race, and Gender, 2008-2012**

| Birthweight Category | Infant Deaths per 1,000 live births | | | | | |
|---|---|---|---|---|---|---|
| | White | | Black | | Overall | |
| | Male | Female | Male | Female | Male | Female |
| Very Low BWT (<1500 grams) | 246.21 | 224.90 | 260.27 | 242.99 | 258.32 | 237.22 |
| Low BWT (1500 to 2499 grams) | 13.28 | 9.80 | 16.92 | 13.42 | 13.62 | 10.80 |
| Normal BWT (>=2500 grams) | 1.51 | 0.83 | 3.37 | 4.17 | 1.83 | 1.41 |

## Birthweight Continued

Comparing rates of VLBWT births shows a large racial disparity between blacks and whites (Figure 3). However, the black VLBWT rate of birth decreased substantially beginning in 2009, closing the racial disparity gap significantly. This has led to a decrease in overall occurrence of VLBWT births.

**Figure 3: Very Low BWT (<1,500 g) Birth Rate, 2008-12**

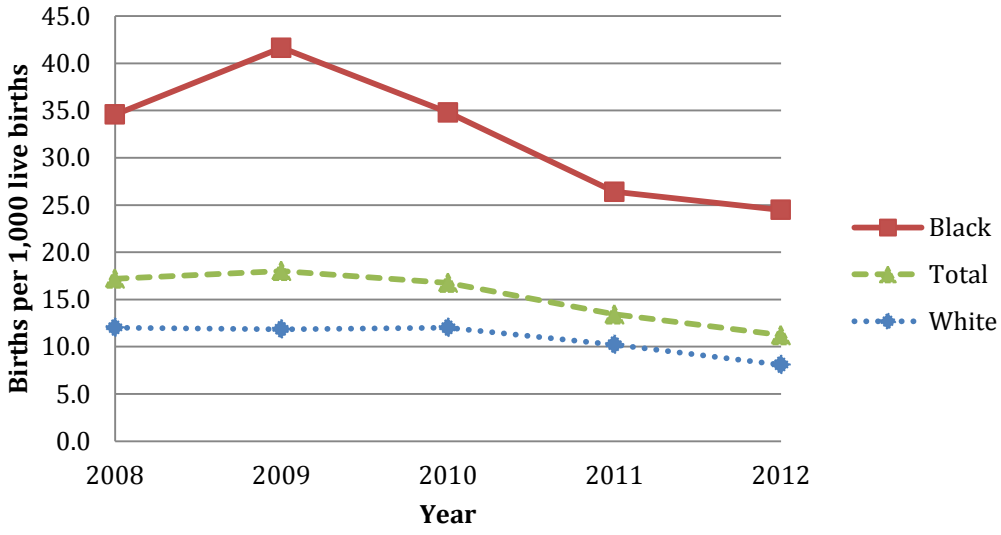
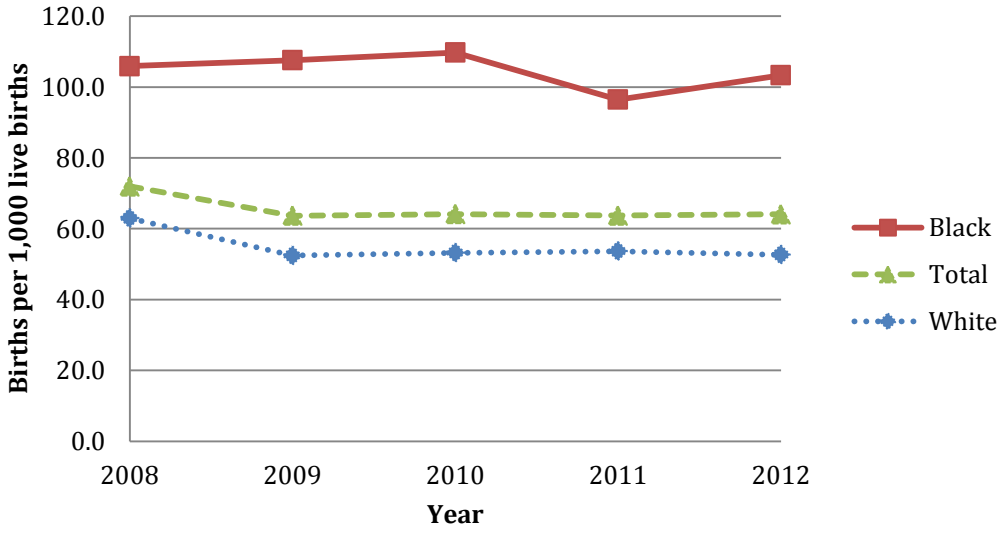



Figure 4 shows a large racial disparity exists for the rate of LBWT births between blacks and whites as well. Both racial and overall rates of LBWT births have remained largely stagnant between 2008 and 2012.

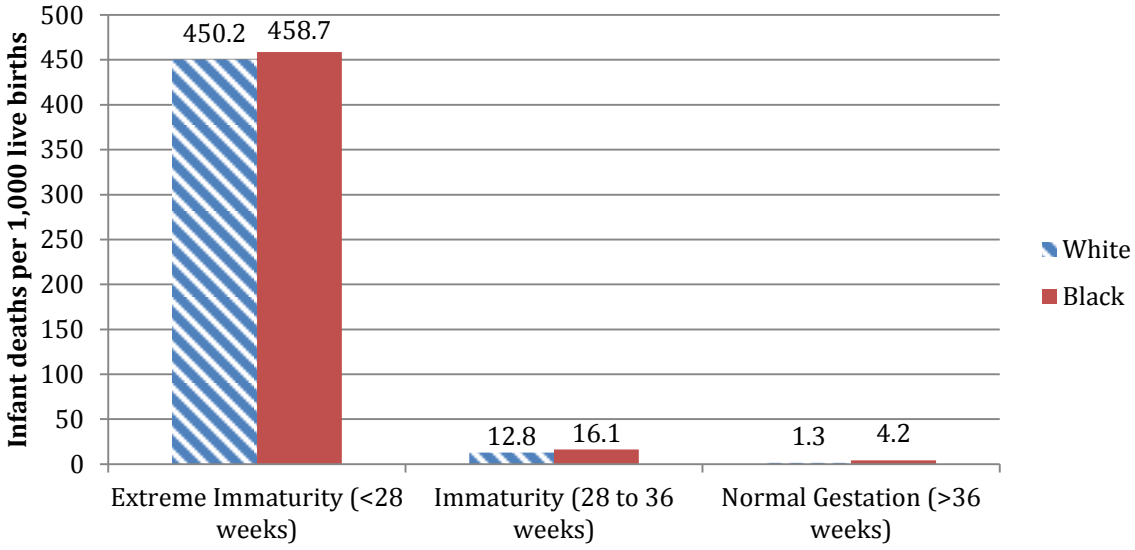
**Figure 4: Low BWT (1,500-2,500 g) Birth Rate, 2008-12**



## Gestational Age

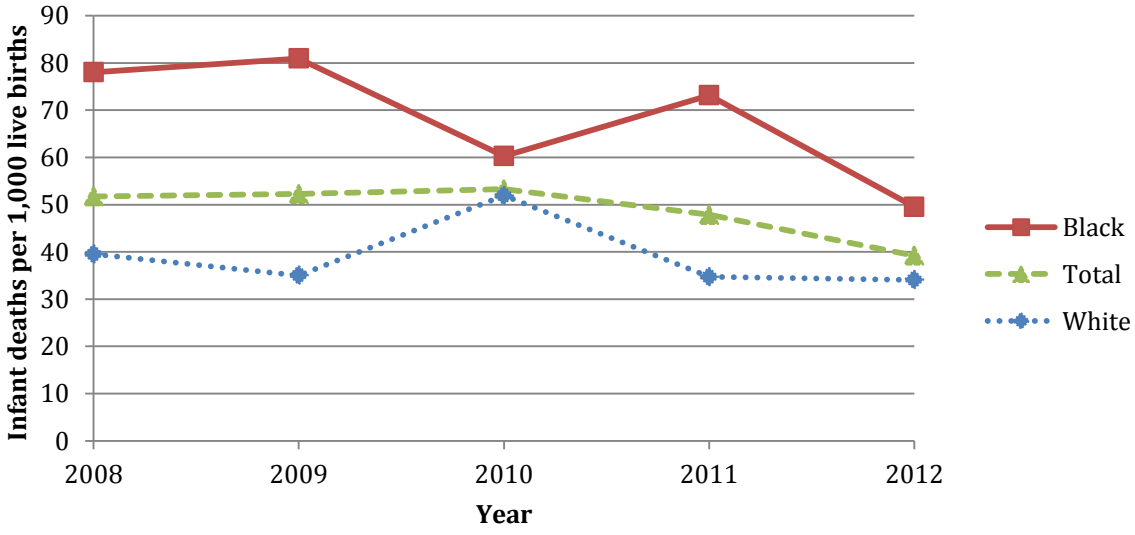
Low birthweight and short gestational age often go hand-in-hand. A preterm infant is often born with a lower birthweight. Three gestational age categories are used to classify preterm births. An infant born after 36 weeks of gestation is considered a normal gestational age, an infant born between 28 and 36 weeks of gestation is classified as immature, and an infant born with less than 28 weeks of gestation is considered extremely immature.

**Figure 5: IMR by Preterm Category, 2008-2012**




Blacks have a higher IMR compared to whites for each gestational age category (Figure 5). However, Figure 6 shows the black preterm mortality rate has generally decreased over the 2008-2012 period. This rate decrease is not seen for whites, whose rate has remained generally stagnant over the five years under study.

**Figure 6: Preterm Mortality (<37 Wks) per 1,000 live births**

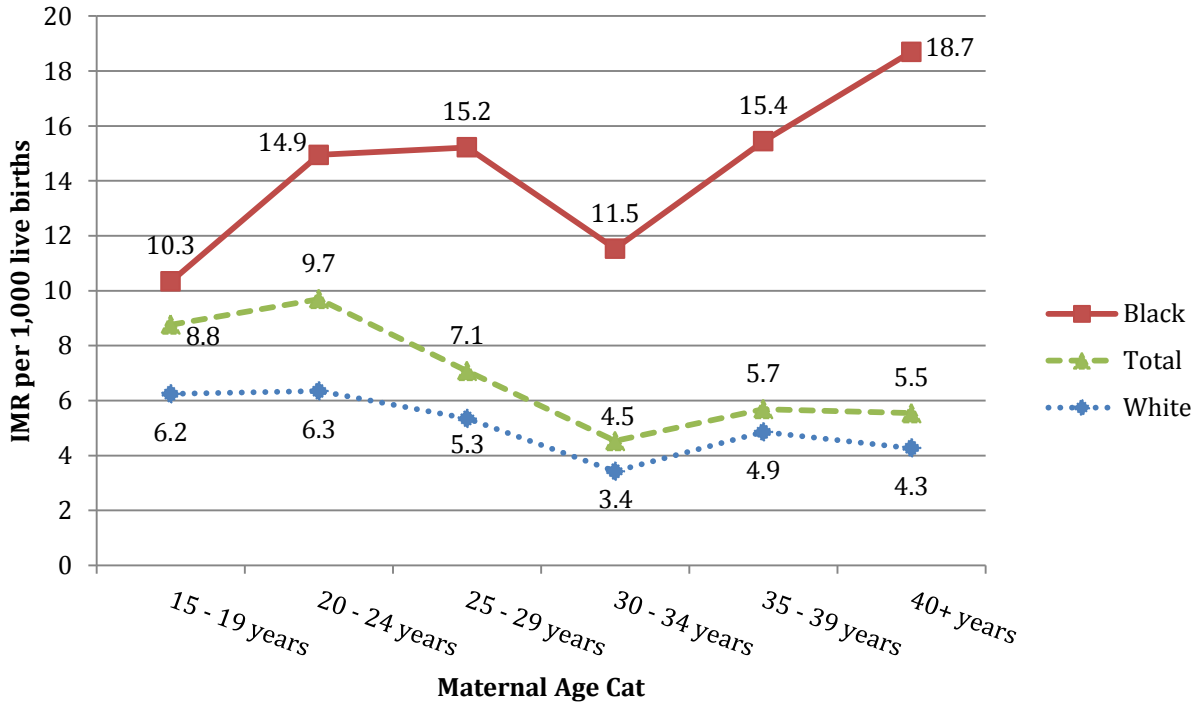


## Maternal Age

The age of the mother at the time of birth has long been thought to be associated with infant mortality, with younger mothers having an increased risk of poor birth outcomes. However, the research is not definitive. Maternal age data in AC shows that younger and older white mothers are at increased risk of having an infant death (Figure 7). This is in contrast to black mothers, where the risk of infant mortality is lower for young and middle age black mothers and highest for older black mothers.

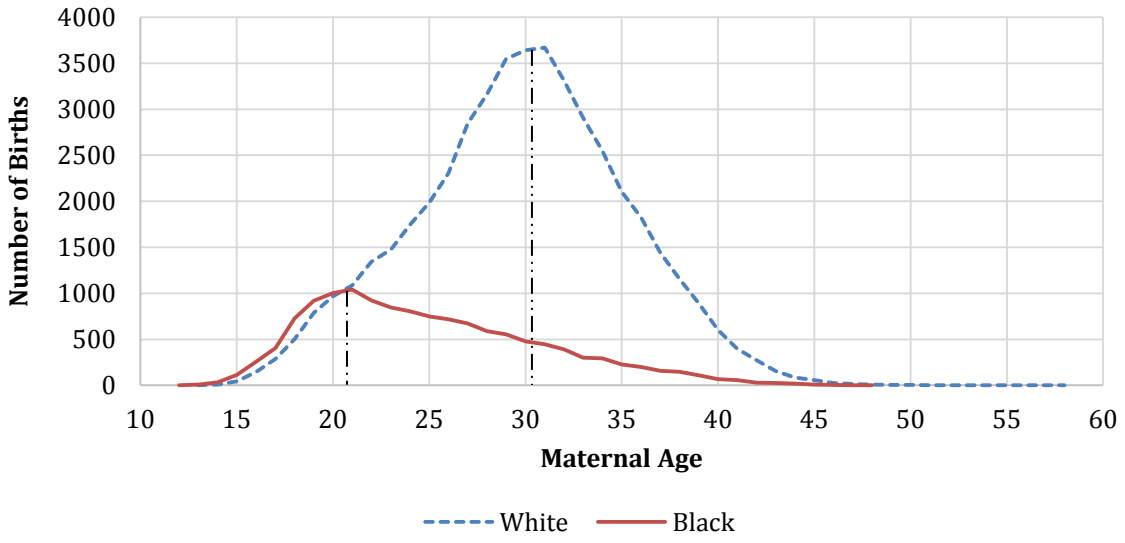
The higher rates for older black mothers may be inflated by a smaller number of total births to these mothers. Yet, a large reduction in total births to older white mothers also occurs with little increase in IMR. This indicates that increasing age may be associated with a higher IMR for black mothers.

**Figure 7: IMR by Maternal Age Category, 2008-2012**



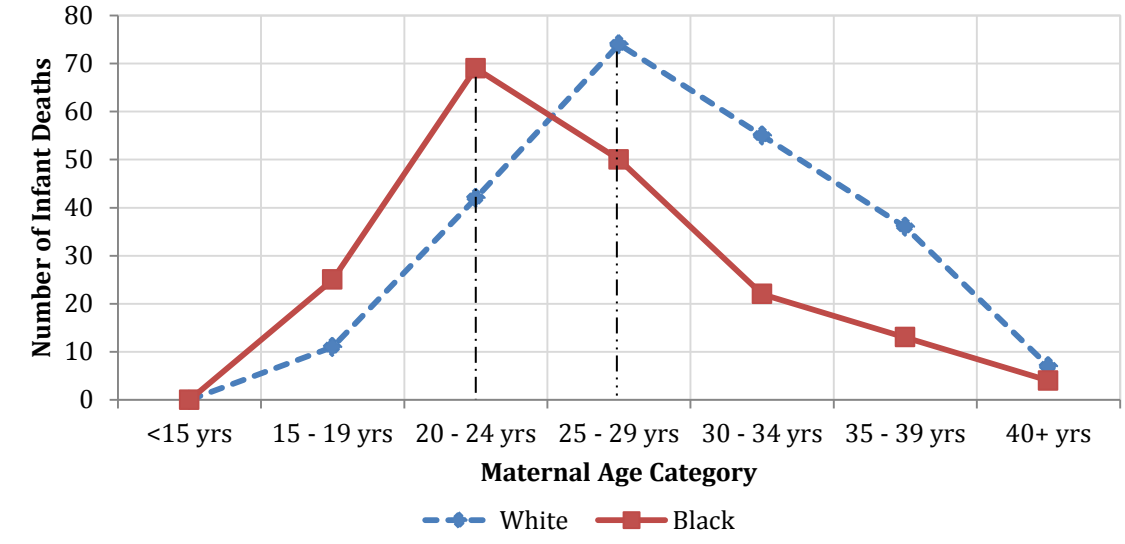

There is an interesting difference in the frequency of births by maternal age by race in AC. Figure 8 shows the peak occurrence of black births occurs around age 20 and very gradually tappers off as maternal age increases. This is in contrast to white births which tend to peak around the maternal age of 30 years. Additionally there is no gradual tapering off of births as is seen in the black population. White births have a normal distribution with 15 years of increase and decrease in frequency of births on both sides of peak.

**Figure 8: Births by Maternal Age Category, 2008-12**




Five-year maternal age categories were used to determine timing of infant deaths by maternal age due to the limited number of infant deaths. Similar to what is seen with births and maternal age, there is a difference in the timing of infant deaths by maternal age. The peak of infant deaths occurs in the late 20's for white mothers and early 20's for black mothers (Figure 9). Despite white and black mothers having nearly equal rates of birth under the age of 20, more black infants are dying to mothers under age 20 than white mothers.

**Figure 9: Infant Deaths by Maternal Age Category, 2008-12**



## Maternal Education Status

The IMR analysis by maternal education status displayed in Table 5 shows whites have a lower IMR across all education categories. White IMR tends to decrease as education status of the mother increases. Large fluctuations in black IMR occur across all levels of education. Overall rates are highest for mothers who completed some or all of high school. Interestingly, mothers with less than 8th grade education experience one of the lowest IMRs.

Logistic models adjusted for race show that mothers with some high school education, a high school/GED diploma, and some college, but no degree have a statistically significant higher odds of experiencing an infant death compared to mothers with a bachelor's education (Table 6). The odds of infant death is nearly identical and insignificant for mothers with less than an 8th grade education, an associate degree, master's degree, or professional degree compared to mothers with a bachelor's degree.

**Table 5: IMR by Maternal Education Level, 2008-2012**

| Education Category | IMR per 1,000 live births | | |
|---|---|---|---|
| | White | Black | Overall |
| <8th grade | 7.5 | 7.2 | 5.2 |
| 9th - 12th, no diploma | 8.5 | 13.2 | 10.8 |
| High school/GED | 7.5 | 15.2 | 10.1 |
| Some college, no degree | 4.6 | 12.4 | 7.0 |
| Associate Degree | 3.4 | 7.6 | 4.4 |
| Bachelor's Degree | 3.4 | 8.4 | 3.7 |
| Master's Degree | 3.4 | 14.2 | 3.9 |
| Doctorate/Professional | 3 | 10.8 | 3.6 |

**Table 6: Odds of Infant Death by Maternal Education Adj. for Race**

| Education Category vs Bachelor's Degree | Odds of death | 95% C.I. | |
|---|---|---|---|
| <8th grade | 1.04 | 0.25 | 4.30 |
| 9th - 12th, no diploma | **1.93** | 1.31 | 2.85 |
| High school/GED | **2.01** | 1.47 | 2.75 |
| Some college, no degree | **1.48** | 1.06 | 2.08 |
| Associate Degree | 0.99 | 0.63 | 1.56 |
| Master's Degree | 1.09 | 0.73 | 1.64 |
| Doctorate/Professional | 1.02 | 0.54 | 1.93 |

## Prenatal Care

Initiating prenatal care early during pregnancy is critical for ensuring the health and wellbeing of the developing fetus and mother. These visits offer medical professionals an opportunity to detect development issues and other health threats. Early prenatal care is defined as beginning care during the first or second trimester (weeks 1 through 28 of gestation). Late prenatal care is defined as beginning care during the third trimester (over 28 weeks of gestation). Fortunately, Table 7 shows the vast majority of AC mothers began prenatal care early (97.0%). The percent of white mothers who received early prenatal care was just slightly higher than black mothers (97.5% vs 95.5%). Over 18.5% of the infant deaths and nearly a quarter of black infant deaths received late or no prenatal care (Table 8).

**Table 7: Percent of Births by Prenatal Care Initiation, 2008-12**

| Prenatal Care Initiation | White | Black | Overall |
|---|---|---|---|
| Early | 97.5% | 95.5% | 97.0% |
| Late or None | 2.5% | 4.5% | 3.0% |

**Table 8: Percent of Infant Deaths by Prenatal Care Initiation, 2008-12**

| Prenatal Care Initiation | White | Black | Overall |
|---|---|---|---|
| Early | 86.7% | 75.8% | 81.5% |
| Late or None | 13.3% | 24.2% | 18.5% |

## Maternal Smoking

Maternal smoking during pregnancy has repeatedly been shown to increase the risk of poor birth outcomes. Accurately assessing maternal smoking rates from birth certificate is difficult due to the data being self-reported. Usage of e-cigarettes and other forms of tobacco are not collected. Therefore the smoking rates being reported may be an underestimate of the real smoking rates in AC.

**Table 9: Maternal Smoking Percentages**

| | White | Black | Total |
|---|---|---|---|
| Smoked 3 Mo. Before Pregnancy | 18.0% | 22.2% | 18.0% |
| Smoked During Pregnancy | 14.9% | 20.4% | 15.3% |
| Smoked Before/During Pregnancy | 18.2% | 22.9% | 18.3% |
| Never Smoked | 81.8% | 77.1% | 81.7% |

Even with the possibility of underestimation, maternal smoking rates remain very high in AC, with 15% of mother's reporting smoking at least one cigarette during pregnancy (Table 9). Maternal smoking rates were higher for blacks compared to whites for all measures. Nearly 23% of black mothers reported smoking before and/or after becoming pregnant, compared to 18% for white mothers.

The IMR for maternal smokers before and during pregnancy is higher for all races. Black and white infant mortality for smokers jumps 2-3 infant deaths per 1,000 live births from the non-smoking IMR (Table 10). This leads to a 50% higher overall risk of infant death for mothers who smoke before or during pregnancy compared to non-smokers.

**Table 10: Maternal Smoking IMR, per 1,000**

| | White | Black | Overall |
|---|---|---|---|
| **Smoked 3 Mo. Before Pregnancy** | | | |
| Yes | 6.74 | 15.63 | 8.88 |
| No | 4.21 | 12.57 | 5.87 |
| **Smoked During Pregnancy** | | | |
| Yes | 7.60 | 15.89 | 9.77 |
| No | 4.14 | 12.72 | 5.82 |
| **Smoked Before/During Pregnancy** | | | |
| Yes | 6.89 | 15.42 | 8.96 |
| No | 4.17 | 12.65 | 5.85 |

## Multiple Births (Plurality)

The majority of births recorded between 2008 and 2012 in AC were single births (96.26%). However, multiple births were still prevalent. Over 3.60% of births were twin births. There were 25 sets of triplets and 2 sets of quadruplets. Table 11 lists the IMR by race and plurality. IMR substantially increased as plurality increased. Eight of the 75 infants born as triplets and 2 of the 8 infants born as quadruplets died. Whites were more likely to have a multiple birth, while black infants born in a multiple birth were more likely to die.

**Table 11: Plurality Cat IMR, per 1,000**

| Plurality | IMR per 1,000 live births | | |
|---|---|---|---|
| | White | Black | Overall |
| 1 | 3.86 | 12.67 | 5.76 |
| 2 | 22.17 | 43.38 | 26.39 |
| 3 | 106.67 | 0.00 | 91.95 |
| 4 | 250.00 | 0.00 | 250.00 |

## Socioeconomic Factors

High infant mortality rates have been shown to be associated with poor social and economic conditions and determinants. Unfortunately, the birth certificate does not include data on typical economic and social status variables, such as household income and occupation. Woman, Infant, and Children (WIC) program enrollment and the type of insurance used to pay for the delivery are used as proxy measures for socioeconomic status of the other mother. While these variables are not perfect, they will give a general sense of IMR between different risk groups. It should be noted WIC is an optional government program made available to mothers living in a low-income household.

Analysis of insurance status by WIC status shows an interesting interaction between the two proxy socioeconomic status variables. There is no significant difference in IMR between those with and without WIC for mothers with private insurance. IMR does increase slightly from 4.27 for those with WIC and private insurance to 5.97 for mothers with WIC and Medicaid (Table 12). This slight jump is expected, as WIC status and Medicaid indicates the lowest socioeconomic bracket. The highest risk group is those on Medicaid and who do not have WIC. The IMR for this group is 3.16 times higher than the Medicaid/WIC group and 4.04 times higher than the Private/No WIC group. It should be noted the absence of WIC is not the cause of the higher IMR. Instead, having Medicaid and no WIC is an indicator for higher risk. The Medicaid/No WIC group is a group that needs to be targeted with future IMR interventions.

**Table 12: Insurance by WIC Status IMR per 1,000 live births**

| Insurance Type | WIC Status | |
|---|---|---|
| | Yes | No |
| Private | 4.27 | 4.67 |
| Medicaid | 5.97 | **18.88** |

Using multivariate logistic regression allows for the adjustment of factors that may be causing the increased IMR for the Medicaid/No WIC group. Adjusted odds of death are listed in Table 13. Upon adjusting for race and maternal age at time of birth, a large and significant increase in odds of infant death is seen for the Medicaid/No WIC group compared to other socioeconomic groups. The odds of an infant death for the Medicaid/No WIC group are 2.74 times higher than those in the Private/No WIC group when removing the influence of race and maternal age. Additionally, the odds of an infant death for the Medicaid/No WIC group are 3.38 times higher than the Medicaid/WIC group when doing the same adjustment. The odds of an infant death are lower, yet statistically non-significant for Private/WIC and Medicaid/WIC compared to Private/No WIC.

**Table 13: Odds of Infant Death for Insurance/WIC Categories Adjusted for Race and Maternal Age**

| Insurance/WIC Category | Odds of Death | 95% Wald Confidence Limits | |
|---|---|---|---|
| Private/WIC vs Private/No WIC | 0.65 | 0.42 | 1.00 |
| Medicaid/WIC vs Private/No WIC | 0.79 | 0.56 | 1.09 |
| Medicaid/No WIC vs Private/No WIC | **2.74** | 2.06 | 3.63 |
| | | | |
| Medicaid/No WIC vs Medicaid/WIC | **3.38** | 2.50 | 4.56 |

## Causes of Infant Death

It is important to understand the major and specific causes of death that account more the majority of infant mortality in order to target interventions and determine access to care disparities that may be occurring. The data shows the majority of deaths are due to certain conditions originating in the perinatal period, specifically premature and low birthweight births with an ICD-10 code of P07 (Table 14 & 15). A large racial disparity exists for infant deaths due to disorders related to short gestation and low birth weight, with blacks having an IMR over 4 times that of whites (Table 15). Sudden Infant Death Syndrome (SIDS, ICD-10 code R95) was also listed as the cause of a large proportion of infant deaths in the study (Table 15). A similar racial disparity is also seen for SIDS, with blacks having a SIDS IMR 4.6 times that of whites.

**Table 14: IMR by Major Cause of Death per 1,000 live births**

| Major Cause Description | White | Black | Overall |
|---|---|---|---|
| Certain infectious and parasitic diseases | 0.1 | 0.4 | 0.2 |
| Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | 0.0 | 0.0 | 0.0 |
| Endocrine, nutritional and metabolic diseases | 0.0 | 0.1 | 0.0 |
| Diseases of the nervous system | 0.1 | 0.0 | 0.1 |
| Diseases of the circulatory system | 0.1 | 0.2 | 0.1 |
| Diseases of the respiratory system | 0.1 | 0.4 | 0.2 |
| Diseases of the digestive system | 0.0 | 0.1 | 0.1 |
| Diseases of the genitourinary system | 0.0 | 0.1 | 0.0 |
| Certain conditions originating in the perinatal period | 2.8 | 8.7 | 4.0 |
| Congenital malformations, deformations and chromosomal abnormalities | 0.9 | 1.0 | 0.9 |
| Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified | 0.5 | 2.7 | 0.9 |
| External causes of morbidity and mortality - Unintentional | 0.1 | 0.2 | 0.1 |
| External causes of morbidity and mortality - Assault / Undetermined | 0.0 | 0.0 | 0.0 |

**Table 15: IMR by Specific ICD-10 Cause per 1,000 live births**

| ICD-10 Code | Specific ICD-10 Description | White | Black | Overall |
|---|---|---|---|---|
| J98.x | Other respiratory disorders | 0.1 | 0.1 | 0.1 |
| P01.x | Fetus and newborn affected by maternal complications of pregnancy | 0.2 | 1.2 | 0.4 |
| P02.x | Fetus and newborn affected by complications of placenta, cord and membranes | 0.4 | 1.1 | 0.5 |
| P07.x | Disorders related to short gestation and low birth weight | 0.9 | 4.1 | 1.7 |
| P26.x | Pulmonary haemorrhage originating in the perinatal period | 0.2 | 0.1 | 0.2 |
| P36.x | Bacterial sepsis of newborn | 0.2 | 0.4 | 0.2 |
| Q91.x | Edwards syndrome and Patau syndrome | 0.2 | 0.1 | 0.1 |
| R95 | Sudden infant death syndrome | 0.5 | 2.3 | 0.8 |
| R99 | Other ill-defined and unspecified causes of mortality | 0.0 | 0.5 | 0.1 |

The cause data also offers an opportunity to calculate the excess burden of black deaths compared to whites. The expected number of black deaths is calculated using the white IMR and listed in Tables 16 and 17. Over 79 excess black deaths occurred due to conditions originating during the perinatal period. More specifically, 42 deaths were due to disorders related to short gestation and low birth weight (P07.x) and 14 were due to the fetus or newborn being affected by maternal complications of pregnancy (P02.x). SIDS was also an important cause of excess black infant mortality, with 24 extra black deaths to what would have been expected with a similar IMR to whites.

**Table 16: Excess Black Mortality by Major Cause of Death**

| Major Cause Description | Observed Black Deaths | Expected Black Deaths | Excess Black Deaths (Δ) |
|---|---|---|---|
| Certain infectious and parasitic diseases | 5 | 1 | 4 |
| Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | 0 | 0 | 0 |
| Endocrine, nutritional and metabolic diseases | 1 | 0 | 1 |
| Diseases of the nervous system | | 1 | -1 |
| Diseases of the circulatory system | 3 | 1 | 2 |
| Diseases of the respiratory system | 5 | 2 | 3 |
| Diseases of the digestive system | 1 | 1 | 0 |
| Diseases of the genitourinary system | 1 | 0 | 1 |
| Certain conditions originating in the perinatal period | 116 | 37 | 79 |
| Congenital malformations, deformations and chromosomal abnormalities | 13 | 12 | 1 |
| Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified | 36 | 7 | 29 |
| External causes of morbidity and mortality - Unintentional | 2 | 1 | 1 |
| External causes of morbidity and mortality - Assault / Undetermined | 0 | 1 | -1 |

**Table 17: Excess Black Mortality by Specific ICD-10 Cause of Death**

| ICD-10 Code | Specific ICD-10 Description | Observed Black Deaths | Expected Black Deaths | Excess Black Deaths (Δ) |
|---|---|---|---|---|
| J98.x | Other respiratory disorders | 1 | 1 | 0 |
| P01.x | Fetus and newborn affected by maternal complications of pregnancy | 16 | 2 | 14 |
| P02.x | Fetus and newborn affected by complications of placenta, cord and membranes | 14 | 5 | 9 |
| P07.x | Disorders related to short gestation and low birth weight | 55 | 13 | 42 |
| P26.x | Pulmonary haemorrhage originating in the perinatal period | 1 | 3 | -2 |
| P36.x | Bacterial sepsis of newborn | 5 | 3 | 2 |
| Q91.x | Edwards syndrome and Patau syndrome | 1 | 2 | -1 |
| R95 | Sudden infant death syndrome | 30 | 6 | 24 |
| R99 | Other ill-defined and unspecified causes of mortality | 6 | 0 | 6 |

## Municipalities and Neighborhoods with Elevated IMRs

Determining the location of where high rates of infant mortality and racial disparities are occurring is an important step for developing and targeting interventions. The municipalities and neighborhoods listed in Table 18 and 19 had at least 5 infant deaths and showed elevated rates and/or a large racial disparity between 2008 and 2012. It should be noted this is a limited list of areas within the County that appear to be doing worse with regards to infant mortality than other areas. Numerous additional municipalities and neighborhoods showed elevated rates. However, small numbers of infant deaths in those municipalities or neighborhoods may cause the calculated rates to be unreliable or misleading. Therefore they are being omitted from these lists.

**Table 18: Infant Mortality by Municipality, 2008-12**

| Municipality | IMR per 1,000 live births | | |
|---|---|---|---|
| | White | Black | Overall |
| Braddock | 0.00 | 32.05 | 22.73 |
| McKees Rocks | 8.13 | 30.04 | 20.00 |
| McKeesport City | 10.82 | 11.61 | 11.62 |
| Monroeville | 6.38 | 8.97 | 7.27 |
| Mount Oliver | 28.85 | 8.13 | 21.98 |
| Penn Hills | 4.01 | 14.64 | 8.33 |
| Pittsburgh City | 5.00 | 13.80 | 8.34 |
| Scott Township | 9.97 | 0.00 | 9.13 |
| Wilkinsburg | 4.37 | 17.74 | 14.08 |

**Table 19: Infant Mortality by Neighborhood, 2008-12**

| Neighborhood | IMR per 1,000 live births | | |
|---|---|---|---|
| | White | Black | Overall |
| Carrick | 15.45 | 10.42 | 13.22 |
| Marshall-Shadeland | 20.98 | 24.10 | 21.81 |
| East Liberty | 19.42 | 16.19 | 17.63 |
| Homewood South | 0.00 | 27.93 | 26.32 |
| Northview Heights | 0.00 | 26.46 | 24.51 |
| Lincoln-Lemington-Belmar | 0.00 | 21.46 | 19.84 |
| East Hills | 76.92 | 13.70 | 15.92 |
| Shadyside | 5.48 | 52.63 | 7.47 |

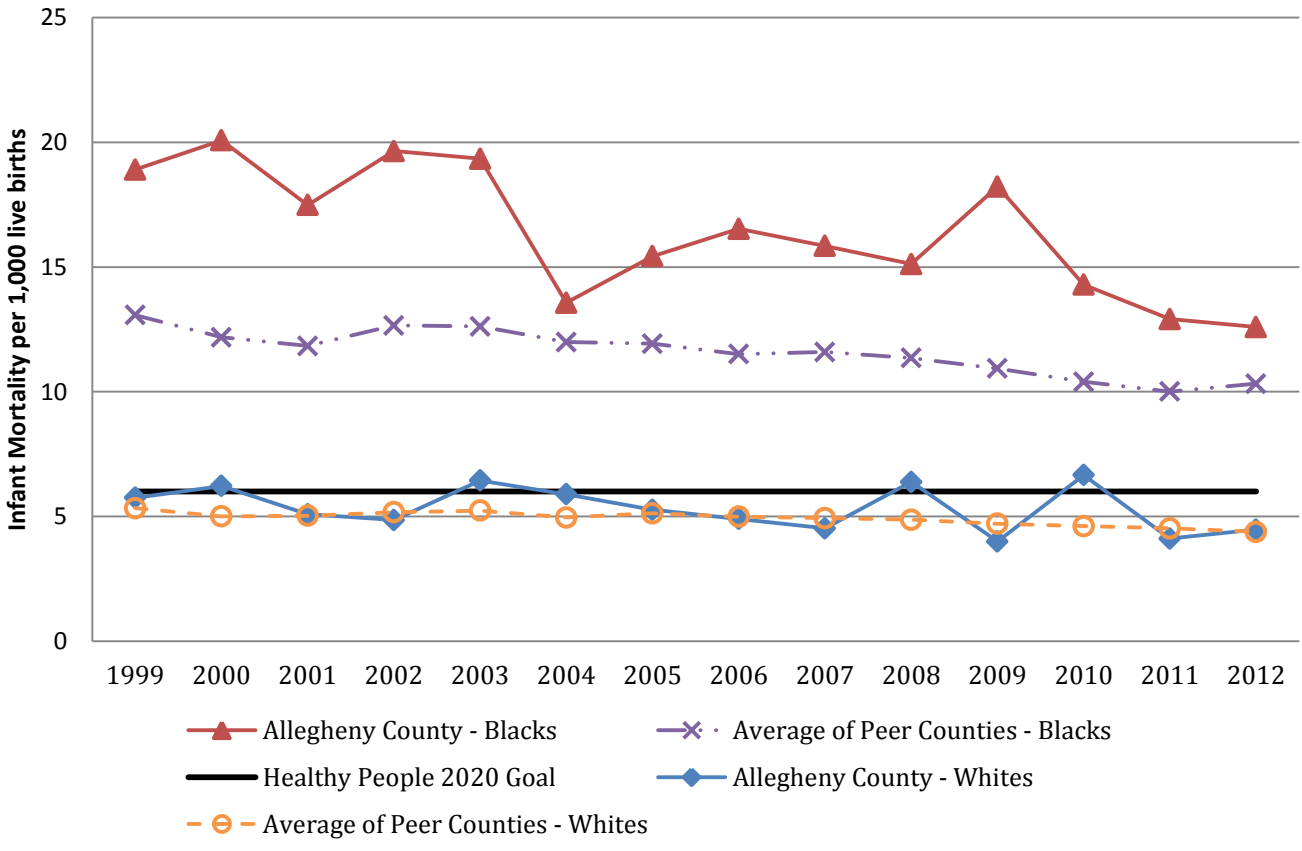
The municipalities of Braddock, McKees Rocks, and Mount Oliver had the highest 5-year overall IMRs. The neighborhoods of Homewood South, Northview Heights, and Marshall-Shadeland had the highest 5-year overall IMRs. Racial disparities for municipalities with significant numbers of both black and white deaths are most prominent in Penn Hills, Pittsburgh, McKees Rocks, and Wilkinsburg.

## Peer County Comparisons

The birth cohort analysis for AC offers many insights into the current state of infant mortality and maternal and child health in the County. Comparing IMR in AC to similar United States populations offers an additional way to assess infant mortality in AC. The Center for Disease Control and Prevention's (CDC) "2009 Community Health Status Indicators" project identified 33 United States counties with similar population size, poverty quartiles, median age categories, and population density to AC. Collecting and comparing IMR data between AC and these "peer counties" offer a good way to quantify where AC stands for this important measure.

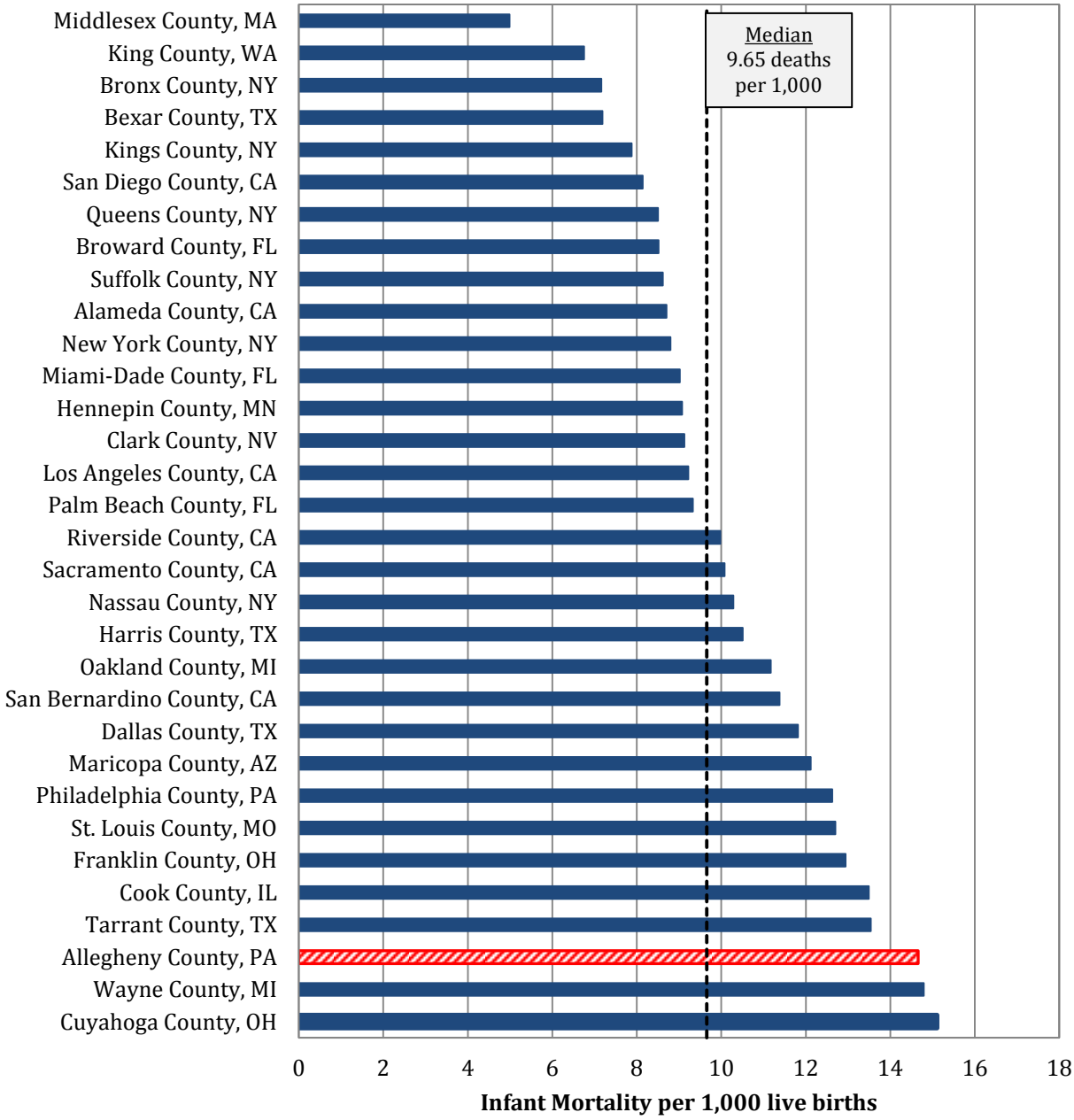
Infant mortality data compiled from the CDC WONDER Database and graphed in Figure 10 shows a striking image of the rate of infant mortality in large, urban environments. The AC black IMR is higher than the average IMR for peer counties, while the AC white IMR and the peer white IMR were nearly identical over the 13 year period between 1999 and 2012. A large racial disparity between white and black IMR also exists for peer counties. Black IMR decreased over the whole period for peer counties and AC, while white AC and peer IMR remained low and stable near the Health People 2020 goal of 6 infant deaths per 1,000 live births. AC blacks appeared to be fairing worse than peer county blacks.

**Figure 10: Infant Mortality Trends 1999-2012**



## Individual Peer County Comparisons for Blacks

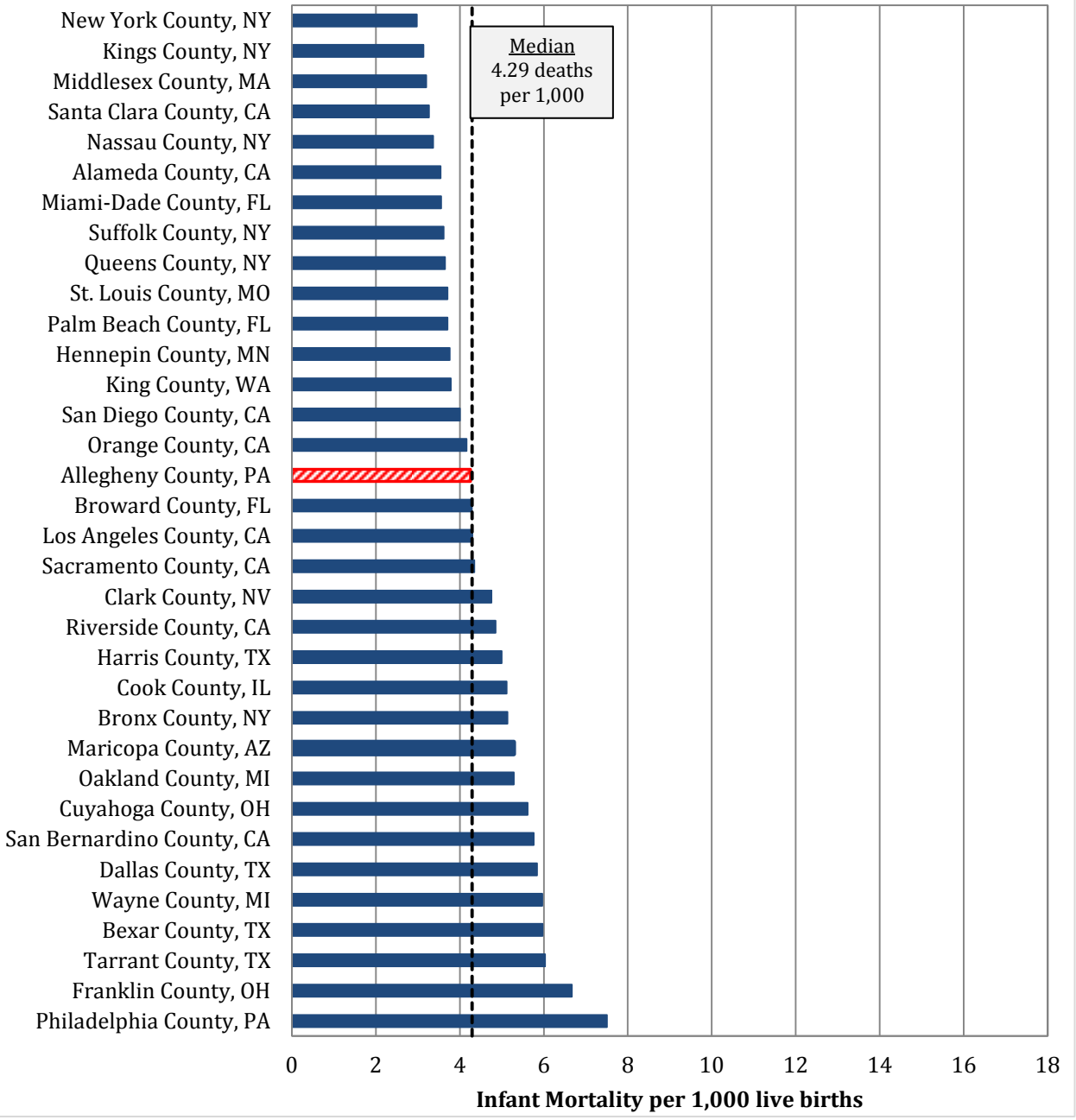
**Figure 11: Black Average Infant Mortality Rate for Allegheny County and its Peer Counties, 2008 – 2012**




Comparing average CDC WONDER IMR data from the most recent 5-year period available (2008 to 2012) shows AC has the third highest black IMR of the peer counties (Figure 11). Only the counties containing Detroit and Cleveland are doing worse. Additionally, the AC black IMR is much higher than the 9.65 median black IMR for the peer group.

## Individual Peer County Comparisons for Whites

**Figure 12: White Average Infant Mortality Rate for Allegheny County and its Peer Counties, 2008 – 2012**




The 5-year average white AC IMR is substantially lower than the AC black IMR. However, compared to its peers, the AC white IMR lies near the median of the peer group (Figure 12). This indicates that while whites appear to be doing very well within AC, there is still room for improvement. More work is needed to lower both black and white IMRs in AC and bring the county closer to the top of its peers.