

***PREGNANCY, CRIME, AND INFANT BIRTH OUTCOMES, Kalamazoo County,
2008-2009***

Kalamazoo County Healthy Babies-Healthy Start – June 2018

PROJECT NAME: Kalamazoo County Healthy Babies-Healthy Start

TITLE OF REPORT: Pregnancy, Crime, and Infant Birth Outcomes, Kalamazoo County, 2008-2009

AUTHOR: Catherine L. Kothari, Olivia Barth, & Local Evaluator

Section I: Introduction

While the infant mortality rates (IMRs) within Kalamazoo County have dropped steadily over the past few years, the racial disparity between White and Black infant deaths has grown substantially. The overall IMR for Kalamazoo County dropped from 10.2 (per 1,000 live births) during the 2001-2003 period down to 6.0 (per 1,000 live births) during the 2011-2013 period. Although significant progress has been made in reducing these numbers, just within Kalamazoo County, there were still over 3,000 infant deaths in 2016.^{1, 2, 3}

There is a well-documented association between elevated maternal stress and the risk of adverse birth outcomes. This stress is caused by both biological and societal conditions, including poverty, racial discrimination and lack of access to quality health care. The Black-White ratio in infant deaths within the county has increased from 2.3 in the 2001-2003 period to a 4.0 ratio in the 2011-2013 period. This racial disparity in IMR between White and Black infants is double that of Michigan's Black-White ratio of 2.3 as well as the entire nation's ratio of 2.2 in 2013. This racial inequality in adverse birth outcomes follows the social determinants of health theory and is the result of social institutions that continuously disadvantage people of color by presenting them with barriers to economic participation and encouraging racially segregated neighborhoods through intergenerational poverty.^{4, 5} Individuals residing in segregated neighborhoods with concentrated poverty rates increases the likelihood for exposure to stressors from the physical environment (pollution, dilapidated infrastructure), social environment (support systems, norms, crime, politics), and limitations on health-related resources (health care, physical activity, nutrition, transportation).^{6, 7}

¹ Michigan Department of Community Health. (2015) Michigan Infant Death Statistics: January 1 through December 31, 2013. Michigan Department of Community Health; Division for Vital Records and Health Statistics.

² Mathews, RJ, MacDorman, MF, Thoma, ME. (2015) Infant Mortality Statistics from the 2013 Period Linked Birth/Infant Death Data Set. National Vital Statistics Reports. Vol 64, no 9.

³ Michigan Department Department of Health & Human Services. (2018) Michigan Resident Birth and Death Files: 2012 - 2016, Division for Vital Records & Health Statistics.

⁴ Osypuk, T.L., Galea, S., McArdle, N. & Acevedo-Garcia, D. 2009, "Quantifying separate and unequal racial-ethnic distributions of neighborhood poverty in metropolitan america", *Urban Affairs Review*, vol. 45, no. 1, pp. 25.

⁵ Smedley, B.D., Stith, A.Y. & Nelson, A.R. (eds) 2003, *Unequal treatment: Confronting racial and ethnic disparities in health care*, The National Academies Press, Washington, D.C. 4 Link, B.G. & Phelan, J. 1995, "Social conditions as fundamental causes of disease", *Journal of Health and Social Behavior*, , pp. 80. 5 Krieger, N. 2014, "Discrimination and health inequities", *International Journal of Health Services*, vol. 44, no. 4, pp. 643.

⁶ Kramer, M.R. & Hogue, C.R. 2008, "Place matters: Variation in the black/white very preterm birth rate across U.S. metropolitan areas, 2002-2004", *Public Health Reports*, vol. 123, pp. 576.

⁷ Derose, K.P., Gresenz, C.R. & Ringel, J.S. 2011, "Understanding disparities in health care address, and reducing them, through a focus on public health", *Health Affairs*, vol. 30, no. 10, pp. 1844-1851.

PREGNANCY, CRIME, AND INFANT BIRTH OUTCOMES, Kalamazoo County, 2008-2009

Kalamazoo County Healthy Babies-Healthy Start – June 2018

Few studies have examined the impact of crime and criminal justice involvement on adverse birth outcomes. However, there is some evidence that residence in high crime neighborhoods can significantly increase the risk for preterm births.⁸ Additionally, parental incarceration has been shown to increase the odds of maternal stress and decrease engagement in perinatal health behaviors.⁹ Even fewer studies have examined how maternal criminal justice involvement, rather than paternal, impacts poor birth outcomes. As a result, this study aims to provide a thorough examination of the relationship between maternal criminal justice involvement and adverse birth outcomes throughout Kalamazoo County.

Key Questions:

1. Does maternal criminal justice involvement predict infant outcomes?
2. Does the type of criminal justice (i.e. victim, perpetrator) involvement differentially affect birth outcomes?

Section II: Process / Methodology:

Study Design:

This was a secondary analysis of three existing databases: (1) Charging requests, (2) birth certificates, and (3) linked birth-death records. Criminal justice data included all Kalamazoo County charging requests, 2007-2010, involving a named victim. The Michigan Department of Community Health Vital Records birth and linked birth-death datasets were shared through a data use agreement, with the study investigator, Catherine Kothari PhD.

Population & Study Sample:

Women delivering in Kalamazoo County between 2008-2009 constituted the study sample (N=6,217). This study was performed with Institutional Review Board oversight provided by Western Michigan University.

Data Collection & Measurement:

Three existing databases were employed for analysis, including (1) Charging requests, (2) birth certificates, and (3) linked birth-death records. Criminal justice data included all Kalamazoo County charging requests, 2007-2010, involving a named victim. The Michigan Department of Community Health Vital Records birth and linked birth-death datasets consisted of all births within Kalamazoo County, 2008-2009, and any infant deaths (0 to age 1) occurring among this population. The birth dataset included information regarding maternal demographics, health risks and birth outcomes. The data were matched using Link Plus, a standalone, probabilistic record linkage program, using personal identifiers.

Statistical Analysis:

⁸ Messer, L.C., Kaufman, J.S., Dole, N., Savitz, D.A., Laraia, B.A. 2006, "Neighborhood Crime, Deprivation, Preterm Birth", *Annals of Epidemiology*, vol. 16, no. 6, pp. 455-462.

⁹ Dumont, D.M., Wildeman, C., Lee, H., Gjelsvik, A., Valera, P.A., Clarke, J.G. 2014, "Incarceration, Maternal Hardship, and Perinatal Health Behaviors", *Maternal and Child Health Journal*, vol. 18, no. 9, pp. 2179-2187.

***PREGNANCY, CRIME, AND INFANT BIRTH OUTCOMES, Kalamazoo County,
2008-2009***

Kalamazoo County Healthy Babies-Healthy Start – June 2018

Logistic regression was conducted using the matched dataset to predict the association of maternal crime-involvement with infant health (premature delivery, low birthweight or death within the first year).

Section III: Findings

Demographics & Health Indicators:

The mean age of women delivering in Kalamazoo County between 2008 and 2009 (N=6,217) was 27.3 years (SD: 5.88). As can be seen in Table 1, White women made up 76.9% of the study population, while Black women made up 18.8%. There were 19.8% of women within the study population that smoked during their pregnancy. Fifteen percent of the study population suffer from chronic conditions, including chronic or gestational diabetes or diabetes. Of the women delivering between 2008 and 2009 in Kalamazoo County, 5.1% suffered from bad birth outcomes during a prior pregnancy.

Table 1. Maternal Demographics, Condition, Health Behaviors, and Healthcare Access. Kalamazoo, 2008-2009.	
Age – Mean (SD)	27.34 (5.88)
Teens – N (%)	627 (10.09%)
Medicaid – N (%)	2933 (47.25%)
Race – N (%)	
White	4779 (76.88%)
Black	1168 (18.79%)
Other	269 (4.33%)
Education – N (%)	
High school or less	2439 (39.24%)
Some college or more	3776 (60.76%)
Hispanic – N(%)	369 (5.94%)
Health	
Chronic disease – N (%)	936 (15.06%)
STI's – N (%)	
Gonorrhea	114 (1.84%)
Chlamydia	356 (5.76%)
Syphilis	4 (0.06%)
Herpes	476 (7.70%)
Hepatitis B	11 (0.18%)
Hepatitis C	1 (0.02%)
Prior birth outcome – N (%)	
Never pregnant	1897 (30.53%)
Prior pregnancy, bad outcome	317 (5.10%)
Prior pregnancy, good outcome	3999 (64.37%)
Health Behaviors	
Smoking – N (%)	1227 (19.75%)
Alcohol – N (%)	283 (4.56%)

**PREGNANCY, CRIME, AND INFANT BIRTH OUTCOMES, Kalamazoo County,
2008-2009**

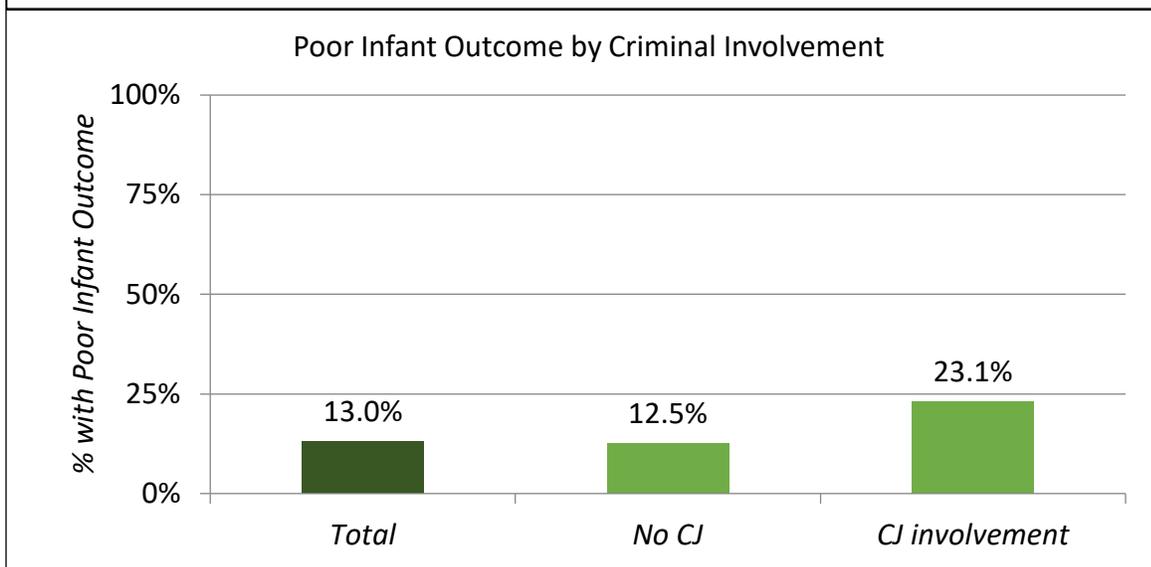
Kalamazoo County Healthy Babies-Healthy Start – June 2018

Healthcare Access	
Kotelchuck – N (%)	
Inadequate	865 (13.99%)
Intermediate	975 (15.77%)
Adequate	2638 (42.67%)
Adequate plus	1705 (27.58%)
Prenatal care – N (%)	6148 (98.92%)

Criminal Justice Involvement:

Of the 6,217 women in the sample, 294 (4.7%) had criminal justice involvement during the perinatal period. In total, there were 526 separate incidents, with 63.3% of women involved in crime as the victim only, 18.7% involved as the perpetrator, and 18.0% involved as both. Between 2008 and 2009, there were 809 (13%) pregnancies that resulted in a poor birth outcome, including low birth weight (LBW), premature delivery, and infant death). Of those women involved in crime within the study population, 23.1% experienced a poor birth outcome (Figure 1). Thus, maternal criminal involvement nearly doubled the risk of a poor birth outcome.

Figure 1. Poor Infant Outcome by Criminal Involvement. Kalamazoo County, 2008-2009.



As can be seen in Table 2, there does appear to be a significant association between perinatal criminal justice involvement and poor birth outcomes before adjustment. In the unadjusted odds ratio estimates, there also appears to be a greater risk of poor birth outcomes for mothers involved in crime as victims only or both victim and perpetrator as compared to mothers who were involved in crime as the perpetrator only. However, after adjusting for maternal demographics (age, race, SES, education), maternal health (chronic disease, STI, prior pregnancy outcome), health behaviors (prenatal smoking, prenatal alcohol consumption), and prenatal care (any, Kotelchuck Index), there is not a significant association between maternal criminal justice involvement and poor birth outcomes. Additionally, there is no significant difference in poor birth outcomes between criminal justice involvement type once the

***PREGNANCY, CRIME, AND INFANT BIRTH OUTCOMES, Kalamazoo County,
2008-2009***

Kalamazoo County Healthy Babies-Healthy Start – June 2018

odds ratios are adjusted for the maternal demographics, maternal health, health behaviors, and prenatal care variables.

Table 2. Simple & Multivariable Regression Analysis of Perinatal Criminal Justice Involvement on Poor Infant Outcome. Kalamazoo County, 2008-2009.		
	Unadjusted OR (95% CI)	Adjusted OR (95% CI) ^c
Perinatal Criminal Justice Involvement – N(%)	2.01 (1.51, 2.67) ^a	1.19 (0.59, 2.41)
Criminal Justice Involvement Type – N(%)		
Victim Only	1.90 (1.36, 2.65) ^b	1.23 (0.62, 2.44)
Perpetrator Only	1.64 (0.91, 2.94)	0.97 (0.45, 2.11)
Both	2.27 (1.38, 3.73) ^a	1.18 (0.50, 2.77)
Neither	Referent	Referent
^a Significant at p<0.05 ^b Significant at p<0.001 ^c Adjusted for maternal demographics (age, race, SES, education), maternal health (chronic disease, STI, prior pregnancy outcome), health behaviors (prenatal smoking, prenatal alcohol consumption), prenatal care (any, Kotelchuck Index).		

Conclusions:

The purpose of this analysis is to demonstrate the link between maternal criminal justice involvement and adverse birth outcomes for women delivering between 2008 and 2009 in Kalamazoo County and identify any differences in birth outcomes between the criminal justice involvement type. This analysis adds upon previous research investigating the social determinants of poor birth outcomes. While some research has previously been conducted on parental, paternal criminal justice involvement or neighborhood crime, few studies have touched upon maternal criminal involvement specifically. In the unadjusted odds ratio estimates, maternal criminal justice involvement presents itself as a significant predictor of poor infant outcomes. The regression analysis also suggests that victimization is associated with the greatest risk for harm as compared to maternal criminal involvement as the perpetrator.

After adjustment for the maternal demographic, maternal health, health behavior, and prenatal care variables in the regression analysis, the association between maternal criminal involvement and poor infant outcome disappeared. This was also true for the variance in odds ratio estimates between criminal involvement roles within the study population. Although maternal criminal involvement can predict poor birth outcomes, it likely associated with other predictors of poor birth outcomes, such as prenatal care, prior poor birth outcomes, race, chronic disease, prenatal smoking, and other demographics or health behaviors.

Recommendations & Resources:

Based on the results of this analysis, further investigation into race and its effect on infant health outcomes is encouraged. Although no significant association between maternal criminal justice involvement and poor birth outcomes was observed, this study does identify a potential upstream point

***PREGNANCY, CRIME, AND INFANT BIRTH OUTCOMES, Kalamazoo County,
2008-2009***

Kalamazoo County Healthy Babies-Healthy Start – June 2018

for identification of individuals that may be at risk of a poor pregnancy outcome. As a result, consideration of the court's role in preventing poor birth outcomes is necessary. Increased education for probation officers, parole officers, judges, and other court staff to provide greater support to pregnant women within the criminal justice system. Additionally, there may be room for the development of a criminal justice system intervention that provides referrals and connections to important resources such as victims' advocates or other relevant support.