

**High Infant Mortality Rates among the Poor in America**  
**The Roles of Income and Other Social Factors**

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## Introduction

Infant mortality, defined as the death of an infant before he or she reaches one year of age, is a tragic event that evokes deep sadness. With the average life span of an American reaching seventy-nine years in 2011, it is unnatural for an infant facing a lifetime of opportunities, experiences, and successes to meet death before his or her first birthday.<sup>1</sup> All infant mortalities can be classified as one of two types: neonatal or postneonatal. Neonatal infant mortalities occur before the infant reaches twenty-eight days of age, and postneonatal mortalities occur between twenty-eight days and one year of age.<sup>2</sup> While the former is typically related to preterm delivery and low birth weight (LBW), the latter is commonly due to causes such as Sudden Infant Death Syndrome (SIDS) and preventable injuries.

Many causes of infant mortalities, both neonatal and postnatal, are due to unpreventable congenital malformations. The other causes are largely preventable. Prenatal care, adequate maternal nutrition, and abstinence from substance abuse can help prevent both preterm births and LBW infants. After birth, safe sleeping conditions and an adequate home environment can prevent SIDS and the development of respiratory diseases, which are both leading causes of postneonatal mortality. Given today's world of modern medicine, one would think the overall infant mortality rate would be low, especially given the fact that many causes of infant mortality are readily preventable. However, in 2010, disorders related to LBW/preterm delivery and SIDS were two of the three leading causes of the 24,586 infant mortalities contributing to America's

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<sup>1</sup> "Life Expectancy at Birth, Total (Years)," The World Bank, accessed March 31, 2014, <http://data.worldbank.org/indicator/SP.DYN.LE00.IN>.

<sup>2</sup> "Neonatal and Postneonatal Mortality," Child Health USA 2011, accessed March 31, 2014, <http://mchb.hrsa.gov/chusa11/hstat/hsi/pages/206npm.html>.

relatively high infant mortality rate of 6.15 infant deaths per 1,000 births.<sup>3</sup> Moreover, this high infant mortality rate is not evenly distributed. Certain populations face rates of infant mortality that greatly exceed rates of other groups. Of specific concern is the disparate infant mortality rates based on income. Infants of mothers with higher incomes are less likely to die than infants born to mothers with lower incomes.<sup>4</sup> The distribution of infant mortality rates amongst different populations should raise some red flags. This problem regarding American infant mortality deserves deep investigation.

### **Defining the Problem**

Worldwide, infant mortality definitively correlates with poverty and socioeconomic status. In 2000, there were four million neonatal mortalities. One percent of these four million deaths occurred in the thirty-nine countries with the highest income, while the other 99% occurred in low- and middle-income countries.<sup>5</sup> These statistics initially suggest infant mortality is not a problem in developed countries, but closer examination suggests otherwise. Surprisingly, despite its wealth, advanced health care system, and dominating world status, the United States of America ranks fifty-fifth on the infant mortality index, sandwiched between Serbia and Poland.<sup>6</sup> In comparison, countries of much lesser wealth, including Guam, Malta, and Bermuda rank forty-ninth, seventeenth, and third, respectively. In fact, a recent report found that the

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<sup>3</sup> Sherry L. Murphy, Jiaquan Xu, and M. A. Kochanek, "Deaths: Final Data for 2010," *National Vital Statistics Report* 61 (2013): 12.

<sup>4</sup> Elayne J. Heisler, "The U.S. Infant Mortality Rate: International Comparisons, Underlying Factors, and Federal Programs," Congressional Research Service (2012): 15.

<sup>5</sup> Joy E. Lawn, Simon Cousens, and Jelka Zupan, "4 Million Neonatal Deaths: When? Where? Why?" *Lancet* 365 (2005): 892.

<sup>6</sup> "Country Comparison: Infant Mortality Rate," Central Intelligence Agency, accessed March 4, 2014, <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2091rank.html>.

United States possesses the highest first-day mortality rate among industrialized countries.<sup>7</sup>

These statistics suggest a basal level of wealth is necessary to achieve low infant mortality rates, but above this basal level, income does not ensure high rates of infant survival.

Beyond having relatively high infant mortality rates compared to other developed countries, America also faces extremely disparate infant mortality rates based on income. Those with the fewest resources in America face the highest rate of infant mortality. The data on this infant mortality gap by income in the United States is striking. In 1988, the National Maternal and Infant Health Survey (NMIHS) found that the infant mortality rate, as a whole, was over 60% higher amongst infants born to women living in poverty. The postneonatal mortality rate for infants born into poverty was twice that of infants born to parents with higher income.<sup>8</sup>

Strikingly, the mortality rate of children born to families in extreme poverty with an income of less than \$10,000 was almost double that of children born to families making more than \$35,000.<sup>9</sup>

The poverty line set by the federal government only accounts for a person or family's income. In reality, income poverty is only one piece of impoverishment. Social factors including poor housing, lack of education, and inadequate nutrition also contribute to poverty. The term "poverty" is used to label deficits in income, but a life in poverty includes deficits in areas other than income. These social deficits and their connection to infant mortality must also be considered.

Defying the typical pattern, American infant mortality rates provide an interesting case to examine. Infant mortality greatly exceeds what would be expected based on its gross domestic

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<sup>7</sup> Save the Children. "Surviving the First Day: State of the World's Mothers 2013," (2013): 8.

<sup>8</sup> Centers for Disease Control and Prevention, "Poverty and Infant Mortality-United States, 1988," *Morbidity and Mortality Weekly Report* 44 (1995): 923-927.

<sup>9</sup> Gopal K. Singh and Stella M. Yu, "Infant Mortality in the United States: Trends, Differentials, and Projections, 1950 through 2010," *American Journal of Public Health* 85 (1995): 961.

product (GDP). However, of more concern is the inequality in infant mortality rates based on income. It seems that the infant mortality rates of the poor population are a strong factor in America's low ranking on the infant mortality index. If the causes behind this inequality are determined, public policy can work to normalize rates of infant death and improve America's standing. While the federal government defines the poverty line solely by income, other social factors that are strongly positively correlated with income poverty cause infant mortality. Based on findings that parental education and housing are the most important factors in promoting infant survival, public health policy can increase the odds of survival for infants born into poverty in America.

### **Correlation, Not Causation**

Correlation, of course, does not imply causation. Just because income poverty correlates with high rates of infant mortality does not mean that monetary deficits cause these rates. Because poverty encompasses more than income, the gap in the infant mortality rates between the impoverished and those with greater financial resources is not necessarily caused by income differences. A life in poverty often means parents with lower educational attainment, a lack of access to pre- and post-natal care, neighborhoods filled with violence, and substandard living conditions. Any one of these factors, apart from few financial resources, can reduce an infant's chance at surviving. When many of these factors combine, as they often do in impoverished environments, it is easy to hypothesize multiple pathways through which infant mortality could be dramatically reduced. Although it is possible that many social factors strongly associated with income poverty are the pathways to high infant mortality rates among the impoverished, we cannot immediately eliminate lack of income as the cause of low infant survival rates among the impoverished in America. To elucidate the relationship between poverty and infant mortality, the

correlation between all aspects of poverty (both income and social) and infant mortality need to be examined.

### **A. Low Birth Weight**

The most important factor in the prediction of neonatal and postneonatal infant mortality is birth weight.<sup>10</sup> Low birth weight has historically been strongly correlated with infant mortality in the United States. One study published in the 1970s reported 61% of all infant mortalities occur in the 7% of babies who are born with underweight.<sup>11</sup> This striking statistic suggests that the birth weight of infants is an area on which public health initiatives aimed at reducing infant mortality could focus. Unfortunately, despite rapid advances in modern medicine and the overall decline in infant mortality, LBW rates are increasing rather than falling in the twenty-first century. In 2006, the rate of LBW births reached 8.3% and declined only to 8.1% in 2011.<sup>12</sup> Despite this stagnation in the percentage of infants born underweight, overall infant mortality continues to fall due to an increase in likelihood that a baby of any given weight will survive.<sup>13</sup>

There are many potential mechanisms to explain income poverty's correlation with underweight infants. For one, those living in impoverished conditions may lack the resources to purchase prenatal vitamins or adequate nutrition, which both help induce healthy development of the fetus. Numerous studies cite results indicating that a direct correlation does in fact exist between income poverty and underweight infants. Controlling for mothers' age, education, smoking, and marital status, one study used data from the National Longitudinal Survey of

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<sup>10</sup> Paul H. Wise, "The Anatomy of a Disparity in Infant Mortality," *Annual Reviews of Public Health* 24 (2003): 348, accessed March 3, 2014, doi: 10.1146/annurev.publhealth.24.100901.140816

<sup>11</sup> Steven L. Gortmaker, "Poverty and Infant Mortality in the United States," *American Sociological Review* 44 (1979): 285.

<sup>12</sup> "Preterm Birth and Low Birth Weight," Child Stats.gov, accessed April 1, 2014, <http://www.childstats.gov/americaschildren/health1.asp>.

<sup>13</sup> Wise, "The Anatomy of a Disparity in Infant Mortality," 348.

Youth (NLSY) and found mothers living below the official poverty line were 80% more likely to give birth to LBW infants. Further analysis revealed that the length of time a woman spends in income poverty interacts with the effect of poverty on LBW status. If a woman was living in poverty at the time she agreed to participate in the NLSY and at the time of birth of her child, her likelihood of giving birth to an underweight infant increased three times more than women who were not poor at both times.<sup>14</sup> Such findings support the harmful effects chronic income poverty presents over short-term income poverty.

While there is evidence for a strong correlation between income poverty and LBW, there is also reason to believe that social factors associated with poverty are contributing to this correlation. One study in 1994 examined the relationship between multiple indicators of socioeconomic status, including parental educational attainment, occupation, and income, and three reproductive outcomes: low birth weight, size for gestational age, and preterm delivery. Nearly all of the socioeconomic indices, including the three cited above, were correlated with LBW in both White and Black impoverished women.<sup>15</sup> While a correlation between these socioeconomic indices and LBW does not prove causation, it does demonstrate that factors apart from income poverty may play an important role in the infant mortality gap. If social determinants of poverty are correlated with the most important predictor of infant mortality as this study indicates, we should examine these social determinants and their relationship to infant mortality in further detail.

## **B. Race**

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<sup>14</sup> Jeanne Brooks-Gunn and Greg J. Duncan, "The Effects of Poverty on Children," *The Future of Children* 7 (1997): 60.

<sup>15</sup> Jennifer D. Parker, Kenneth C. Schoendorf, and John L. Kiely, "Associations between Measures of Socioeconomic Status and Low Birth Weight, Small for Gestational Age, and Premature Delivery in the United States," *Annals of Epidemiology* 4 (1994): 271-278.

One social factor correlated with income poverty, high underweight birth rates, and high rates of infant mortality is race. In the 1994 study discussed above, the negative correlation between income poverty and LBW rates was significantly greater for Black women than for White women. For example, 12.1% of the poor Black women in the study gave birth to underweight infants compared to only 6.5% of poor White women.<sup>16</sup> The difference in the strength of this correlation by race indicates that just as important racial differences exist in the impoverished population, so too do important racial differences in the infant mortality rate.

Indeed, when merely race is examined, Black infants in America face an extraordinarily higher risk of infant mortality than White infants. Although the absolute infant mortality rate has dropped steadily for both Whites and Blacks since 1975, the infant mortality rate for Black infants was over 2.5 times that of White infants in 2000.<sup>17</sup> This disparity should immediately raise concern. While there is no implication that being either Black or impoverished inherently causes infant mortality or the LBW outcomes that contribute to infant mortality, the increased likelihood of living in poverty that Black infants face over White infants coupled with the increased likelihood for infants born into poverty to be born underweight places Black infants born into poverty at extremely high risk.

Although Blacks face a higher risk of living below the poverty line than Whites, Whites comprise 41.5% of the impoverished, while Blacks comprise only 25.4%.<sup>18</sup> If income poverty were the sole cause of an increased infant mortality rate, one would expect to see higher infant mortality rates for Whites than Blacks. Additionally, a 5% racial disparity between White and

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<sup>16</sup>Parker, Schoendorf, and Kiely, "Associations between Measures of Socioeconomic Status and Low Birth Weight, Small for Gestational Age, and Premature Delivery in the United States," 273.

<sup>17</sup> Wise, "The Anatomy of a Disparity in Infant Mortality," 343.

<sup>18</sup> Robert Ross, "Poverty More Than a Matter of Black and White," *Inequality.org*, October 8, 2012, accessed March 5, 2014, <http://inequality.org/poverty-matter-black-white/>.



Black infant mortality rates exist across all income levels.<sup>19</sup> Even in impoverished environments, White infants face a decreased mortality rate compared to Black infants. While income poverty is correlated with increases in the infant mortality rate, this finding provides evidence that low income alone cannot be the single cause of this relationship. If income were the only factor, one would expect to see nearly identical rates of infant mortality among Whites and Blacks in poverty. Instead, at least a 5% disparity separates White infants and Black infants across all socioeconomic groups. Income is not the only issue. Social factors of poverty must also play a role.

Examining Hispanics in America provides further evidence supporting the above conclusion. This population does not display such definitive trends regarding infant mortality. On the whole, infant mortality rate for children born to Hispanic mothers is lower than that of children born to non-Hispanic White mothers. However, the rates for different populations within the larger Hispanic community vary tremendously. The infant mortality rate for infants of Puerto Rican mothers is 77% higher than the mortality rate for infants of Central and South American mothers and 50% higher than infants of mothers of Cuban or Mexican descent.<sup>20</sup> Additionally, prematurity for Hispanic babies differs based on the mother's birthplace. Prematurity is one important cause of LBW and subsequently infant mortality. U.S.-born Mexican-American women are more likely than Mexican born women living in America to have premature infants.<sup>21</sup> This fact raises questions about the living conditions of Mexican

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<sup>19</sup> Jeffrey B. Gould and Susan LeRoy, "Socioeconomic Status and Low Birth Weight: A Racial Comparison," *Pediatrics* 82 (1988): 902.

<sup>20</sup> Diane L. Rowley and Vijaya Hogan, "Disparities in Infant Mortality and Effective, Equitable Care: Are Infants Suffering from Benign Neglect?" *Annual Review of Public Health* (33): 76, accessed March 10, 2014, doi: 10.1146/annurev-publhealth-031811-124542.

<sup>21</sup> Wise, "The Anatomy of a Disparity in Infant Mortality," 354.

immigrants to the United States and begs investigation into the effects of impoverished neighborhoods on pregnant women and infants.

The low Hispanic infant mortality rate despite economic disadvantage, reduced prenatal care, and discriminating circumstances compared to Whites is the Hispanic paradox. This paradox provides further support for the conclusion that lack of financial resources cannot be the main factor causing increased infant deaths among the income poor. Indeed, although only a little over 10% of non-Hispanic Whites faced poverty from 2007-2011 compared to over 20% of Hispanics, Hispanics still face lower infant mortality rates than their wealthier White counterparts.<sup>22</sup> Unfortunately, the explanation to this paradox is not easy to find, as Hispanics in America typically fare worse than Whites on the most important inputs into infant mortality, including children's access to health care.<sup>23</sup> Still, examination of the racial discrepancies in American infant mortality illustrates that money alone is not causing the correlation between income poverty and infant mortality.

### **C. Access to Care**

Other pathways to infant mortality associated with income poverty may interact with lack of financial resources to cause higher infant mortality rates among the poor than among the general population. Many factors associated with impoverished environments are independently and positively correlated with infant mortality rates apart from income poverty. One of the most important is access to healthcare. It is critically important for a developing fetus and newborn

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<sup>22</sup> Suzanne Macartney, Alemayehu Bishaw, and Kayla Fontenot, "Poverty Rates for Selected Detailed Race and Hispanic Groups by State and Place: 2007-2011," *American Community Survey Briefs* (2013): 1.

<sup>23</sup> Robin M. Weinick and Nancy A. Krauss, "Racial/Ethnic Differences in Children's Access to Care," *American Journal of Public Health* 90 (2000): 1772.

infant to receive the necessary prenatal and postnatal care, respectively. Studies have indicated that women who have access to healthcare face lower risk of preterm births.<sup>24</sup>

Impoverished women often face barriers in accessing health care services, causing the women at the greatest risk for poor birth outcomes to receive the worst prenatal care.<sup>25</sup> Data from the 1980 National Natality Survey indicate that the likelihood a woman will initiate prenatal care within the first trimester correlates with her income bracket. Only 65.6% of the women living at less than 150% of the federal poverty line began prenatal care in the first trimester, compared to 80.8% and 85.3% of women living at 150-249% and greater than 250% of the poverty line, respectively. Furthermore, 2.1% of women living below 150% of the poverty line receive no prenatal care during their pregnancy.<sup>26</sup> The cause of this correlation may not be the low income itself, but rather the lack of insurance associated with income poverty.

Apart from complete lack of care, inadequate care can also be detrimental to the health of a developing fetus. There are many ways to define inadequate care in regards to prenatal visits. Some definitions are based on the duration of the pregnancy when the care is initiated, and others are based on the total number of prenatal visits. One narrower definition identifies inadequate care when a woman either has no prenatal visits or no visits until the third trimester. Using this definition, research has found that those living below 150% of the federal poverty receive inadequate care at much higher rates than those who live above this limit. Only 10.2% of women

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<sup>24</sup> Wise, "The Anatomy of a Disparity in Infant Mortality," 355.

<sup>25</sup> Betty Lia-Hoagberg et al., "Barriers and Motivators to Prenatal Care Among Low-Income Women," *Social Science & Medicine* 30 (1990): 487-495.

<sup>26</sup> Sushella Singh, Aida Torres, and Jacqueline Darroch Forrest, "The Need for Prenatal Care in the United States: Evidence from the 1980 National Natality Survey," *Family Planning Perspective* 17 (1985): 118-124

above 150% of the poverty line received inadequate care compared to 19% of women below this line.<sup>27</sup>

Efforts to increase the care pregnant impoverished women are receiving are necessary. Solving this problem is not so straight forward because the mechanisms causing it are numerous and intertwined. First, having health insurance is positively correlated with income. In 2012, 24.9% of households making less than \$25,000 per year were uninsured, and only 7.9% of households making over \$75,000 lacked insurance.<sup>28</sup> Furthermore, from 1993-2003, the largest drop in health insurance coverage occurred among women at reproductive age.<sup>29</sup> Pregnant women up to 138% of the poverty line are eligible for health insurance, but coming from uninsured households, these eligible women may not be familiar with insurance, know how to obtain it, or even know they are eligible. Lack of coverage increases a woman's odds of giving birth to an underweight infant by 22%, indicating insurance coverage may be just as or even more important than income.<sup>30</sup>

Perhaps ensuring that impoverished women access prenatal care would improve birth outcomes and contribute to a drop in infant mortality rates among this high-risk group. Other points of view suggest that women who have a higher risk of problems that could contribute to infant mortality will be the least likely to seek health care, even when it is readily available. This perspective again reinforces the all-encompassing nature of poverty. Providing the opportunity to obtain insurance and prenatal care does not necessarily ensure uptake of these services. Though

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<sup>27</sup> Ibid.

<sup>28</sup> Carmen DeNavas-Walt, Bernadette D. Proctor, and Jessica C. Smith, "Income, Poverty, and Health Insurance Coverage in the United States: 2012," *Current Population Reports* (2013): 29.

<sup>29</sup> Wise, "The Anatomy of a Disparity in Infant Mortality," 355.

<sup>30</sup> Gortmaker, "Poverty and Infant Mortality in the United States," 291.

they are the highest risk group, these impoverished women may not understand the importance of accessing health care services in the course of their pregnancy.

#### **D. Parental Education**

Low educational attainment is one reason impoverished women may not recognize the need to access prenatal care during pregnancy. Education level is often used as a proxy for socioeconomic status and is another social factor that accompanies income poverty. Parental educational attainment is negatively correlated with infant mortality rates. In fact, some contend that parental education is the most important social predictor of child survival through the first year of life, particularly in low-income areas.<sup>31</sup> Using data from twenty-two developing countries, one study found that children of mothers with no education are the most vulnerable to infant mortality. Children of mothers with an elementary education are at reduced risk, but children of mothers with a secondary education face the least risk.<sup>32</sup>

This trend is equally as present in the United States as it is in developing nations. Controlling for the effects of an infant's sex, birth order, and maternal age, the 1980 National Natality Survey found that mothers with fewer than twelve years of education have a low birth weight odds ratio of 2.38 and mothers with twelve years have a low birth weight odds ratio of 1.24 compared to women with thirteen or more years of schooling.<sup>33</sup> This correlation is especially strong when examining Sudden Infant Death Syndrome (SIDS), a leading and preventable cause of infant mortality. In both America and in Europe, babies born to women

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<sup>31</sup> John Caldwell and Peter McDonald, "Influence of Maternal Education on Infant and Child Mortality: Levels and Causes," *Health Policy and Education* 2 (1982): 251-267.

<sup>32</sup> Sonalde Desai and Soumya Alva, "Maternal Education and Child Health: Is There a Strong Causal Relationship?" *Demography* 35 (1998): 75.

<sup>33</sup> Joel C. Kleinman and Jennifer H. Madans, "The Effects of Maternal Smoking, Physical Stature, and Educational Attainment on the Incidence of Low Birth Weight," *American Journal of Epidemiology* 121 (1985): 843-855.

with fewer than twelve years of education have over a two-fold risk of dying from SIDS compared to infants of women with more than twelve years of schooling.<sup>34</sup>

This relationship between parental educational attainment and infant mortality is not unexpected, given the fact that income poverty is correlated with both higher rates of infant deaths and lower educational attainment. There is a significant difference in the mean number of years of education for students in income poverty versus those above the federal poverty line. The former received (on average) 12.08 years of school, and the latter received 13.42 years of education.<sup>35</sup> While there is a correlation between income and education, and although education may sometimes be used as a proxy for SES status, the correlation between parental educational attainment and rate of infant mortality further supports the claim that factors other than income mediate the relationship between income poverty and infant mortality.

A person's education includes both scholastic knowledge and general health knowledge that will undoubtedly influence the mortality risk of a developing child. For example, the negative correlation between low birth weight rate and maternal educational attainment can be explained by smoking differences among women of different education levels. Women with lower educational attainment are more likely to smoke prior to pregnancy, more likely to smoke heavily, and more likely to continue to smoke during pregnancy. Because the odds of giving birth to an underweight infant increase by 26% with every five cigarettes smoked, smoking cessation would lead to a 35% drop in the LBW rate among women with less than twelve years

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<sup>34</sup> Michael H. Malloy and Karl Eschbach, "Association of Poverty with Sudden Infant Death Syndrome in Metropolitan Counties of the United States in the Years 1990 and 2000," *Southern Medical Journal* 100 (2007): 1107-1108.

<sup>35</sup> Lance Hannon, "Poverty, Delinquency, and Educational Attainment: Cumulative Disadvantage or Disadvantage Saturation?" *Sociological Inquiry* 73 (2003): 583.

of education and a 20% decrease for women with twelve years of education.<sup>36</sup> Just as income alone cannot explain the infant mortality gap between the rich and the poor, both academic and general health knowledge explain the correlation between low educational attainment and infant mortality.

Lacking the general health knowledge provided by higher educational attainment has many implications for the environment into which parents will bring a developing newborn. The three leading causes of infant mortality in 2006 were birth defects, low birth weight/prematurity, and SIDS, the risks of which are significantly increased when a fetus or newborn is exposed to second hand smoke.<sup>37</sup> A recent study found that when a woman smoked throughout the pregnancy, her risk of birthing a child with musculoskeletal defects increased by 16%.<sup>38</sup>

Additionally, nutrition is critical in helping a LBW infant reach and maintain a normal weight as quickly as possible, thereby eliminating the greatest physiological risk for mortality. Proper nutrition will also decrease an infant's susceptibility to disease and infection. During the critical postnatal period, any illness can be fatal. One of the most effective and inexpensive nutritional components an infant can receive is breast milk. Unfortunately, supporting the earlier

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<sup>36</sup> Kleinman and Madans, "The Effects of Maternal Smoking, Physical Stature, and Educational Attainment on the Incidence of Low Birth Weight," 843-855.

<sup>37</sup> "Birth Defects: Leading Cause of Infant Death," Centers for Disease Control and Prevention, accessed March 15, 2014, <http://www.cdc.gov/features/dsinfantdeaths/index.html>.

<sup>38</sup> Allan Hackshaw, Charles Rodeck, and Sadie Boniface, "Maternal Smoking in Pregnancy and Birth Defects: A Systematic Review Based on 173,687 Malformed Cases and 11.7 Million Controls," *Human Reproduction Update* 0 (2010): 5, accessed March 16, 2014, doi: 10.1093/humupd/dmr022.

conclusions regarding the importance of education in influencing health practices, lower educational attainment is negatively correlated with breastfeeding.<sup>39</sup>

Mothers in poverty, often without high levels of educational attainment, are at an increased likelihood to smoke but a decreased likelihood to breastfeed. These two behaviors increase the already elevated risk of infant mortality for a baby born into income poverty. Furthermore, these parental choices to smoke or not to breastfeed may be worsening the negative effects of other uncontrollable factors on infant health. It is not implied that all parents in poverty or with low educational attainment are smoking around their infant or failing to breastfeed him or her. Rather, this discussion highlights more social aspects of a life in poverty, apart from income, that may interact to produce elevated infant mortality rates among the poor.

#### **D. Housing**

One largely uncontrollable factor in poverty that may negatively influence an infant's mortality risk is housing. Housing is hypothetically a choice, as people decide where to live. However, when faced with income poverty, housing choices may be between two undesirable locations or the choice may not exist at all. People lacking financial resources are limited to living in areas with low rent. Perhaps they can choose between two low-rent apartments, but both may be substandard housing in poor neighborhoods. In America, two million people live in homes with severe problems, and an additional 4.8 million live in homes with moderate problems.<sup>40</sup> Many of those nearly seven million people fall below the federal poverty line.

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<sup>39</sup> Amy S. Humphreys, Nancy J. Thompson, and Kathleen R. Minger, "Intention to Breastfeed in Low-Income Pregnant Women: The Role of Social Support and Previous Experience," *Birth* 25 (1998): 169-174.

<sup>40</sup> James Krieger and Donna L. Higgins, "Housing and Health: Time Again for Public Health Action," *American Journal of Public Health* 92 (2002): 758.



Housing is an important determinant of health. Quality housing brings not only privacy and security for a family, but also provides important contributions to health. For infants, housing should provide a safe, clean environment in which a newborn can continue critical development. In contrast, substandard housing and poor neighborhoods can negatively affect a person's health, and both of these are associated with income poverty. One study found that those below the federal poverty line are more likely to live closer to sources of air pollution than those above the federal poverty line.<sup>41</sup> Because infants born into income poverty face elevated risks for a variety of physiological birth outcomes, they are also more vulnerable to environmental stressors. Unfortunately, these high-risk babies are often introduced to substandard housing, which will only add to their risk of infant mortality.

Contributing to infectious disease is one of the ways substandard housing negatively affects health. The lack of sanitary water and prevalence of disease vectors are some of the aspects commonly found in substandard living conditions that contribute to the spreading of disease. Introducing a newborn into substandard housing only increases her chances of being susceptible to bacterial sepsis and circulatory system diseases, two top causes of infant mortality.<sup>42</sup> Furthermore, crowding, typically defined as more than one person per room, is a problem that is associated with substandard housing. Conditions of crowding can play an influential role in the development of respiratory infections, another leading cause of infant mortality.<sup>43</sup> Finally, studies provide evidence of poor housing conditions contributing to poor

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<sup>41</sup> Susan A. Perlin, David Wong, and Ken Sexton, "Residential Proximity to Industrial Sources of Air Pollution: Interrelationships among Race, Poverty, and Age," *Journal of the Air & Waste Management Association* 51 (2001): 412, accessed March 22, 2014, doi: 10.1080/10473289.2001.10464271.

<sup>42</sup> "Birth Defects: Leading Cause of Infant Death."

<sup>43</sup> Perlin, Wong, and Sexton, "Residential Proximity to Industrial Sources of Air Pollution," 412.

child nutritional outcomes. Parents who face relatively expensive housing costs compared to their total income have less money to use for adequate nutrition for their children.<sup>44</sup>

The neighborhood and location of housing can also be a determinant of health and contribute to infant mortality.<sup>45</sup> While the actual home or apartment can affect health outcomes in the neo- and postneonatal periods, the neighborhood more directly influences gestational development and thus birth outcomes. Examining the relationship between neighborhood and birth outcomes among five different ethnic groups, one study found lower-income neighborhoods are associated with increased rates of LBW infants, even when controlling for the mothers' SES.<sup>46</sup> However, this association is true only for Blacks and Asians; no strong relationship existed between White mothers, neighborhoods, and LBW outcomes. This racial discrepancy can potentially be explained by the disproportionate share of minority races, particularly Blacks, living in areas of concentrated income poverty.<sup>47</sup> This finding emphasizes the concern for minority race infants born into concentrated income poverty.

This examination of housing has a variety of important implications. First, housing is an input to health, and poor housing conditions can negatively affect one's wellbeing. While unclean water, overcrowding, mold, etc. can be detrimental to anyone's health, these conditions are particularly unfavorable to the developing newborn, whose body is still developing and is

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<sup>44</sup> Krieger and Higgins, "Housing and Health," 758-759.

<sup>45</sup> Krieger and Higgins, "Housing and Health," 759-760.

<sup>46</sup> Michelle Pearl, Paula Braveman, and Barbara Abrams, "The Relationship of Neighborhood Socioeconomic Characteristics to Birthweight Among 5 Ethnic Groups in California," *American Journal of Public Health* 91 (2001): 1808-1814.

<sup>47</sup> Algernon Austin, "African Americans Are Still Concentrated in Neighborhoods with High Poverty and Still Lack Full Access to Decent Housing," *Economic Policy Institute*, July 22, 2013, accessed April 6, 2014, <http://www.epi.org/publication/african-americans-concentrated-neighborhoods/>.

therefore susceptible to any environmental threat.<sup>48</sup> Second, because income poverty is correlated with LBW outcomes and substandard housing conditions, infants with an increased likelihood for poor birth outcomes are also more likely to be placed in an environment that will exacerbate their disadvantage. Thirdly, this examination of housing, poverty, and infant mortality again illustrates that correlation does not imply causation. Low birth weight is the most important physiological predictor of infant mortality. If substandard housing were causing the infant mortality gap between the rich and the poor, one would expect to see similar LBW outcomes of women from all low-income neighborhoods, not only Blacks and Asians. Just as income alone cannot solely explain the infant mortality gap, neither can only substandard housing.

### **Causation**

Although it is extraordinarily difficult to prove causation when many factors interact to produce a single outcome, some causal mechanism must exist to explain the clear trend between infant mortality and income poverty. Multiple factors associated with income poverty but apart from income interact to cause the gap infant mortality gap based on income. The causal mechanism to be proposed draws from the previous discussion on common correlates between income poverty and infant mortality to implicate parental education and housing as the main causes of disparities in the death of newborn infants between the rich and the poor.

#### **A. Income**

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<sup>48</sup> Ishtiaq Mannan et al., "Vulnerability of Newborns to Environmental Factors: Findings from Community Based Surveillance Data in Bangladesh," *International Journal of Environmental Research and Public Health* 8 (2011): 3437-3452, accessed March 30, 2014, doi: 10.3390/ijerph8083437.

Data indicates that beyond a basal level of income, financial resources do not play a large causal role in the correlation between income poverty and high infant mortality rates. However, until a family reaches this basal level of income, lack of financial resources will cause higher rates of infant deaths. Although America ranks poorly on the infant mortality index compared to other developed countries, it still faces infant mortality rates much lower than those of underdeveloped, poor, third world countries like Ethiopia, Uganda, and Togo.<sup>49</sup> These countries are extremely poor, and lack the basal level of income necessary to allow low infant mortality rates. Similarly, within America, for the extreme poor (defined as people living below half of the federal poverty line, or less than \$9,000 for three people) the lack of financial resources likely directly contributes to high infant mortality rates. Black children are more likely than White children to live in extreme poverty, and Black infants are more than twice as likely to die before the age of one than White infants.<sup>50-51</sup> The increased rates of extreme poverty for Blacks can causally explain their high rates of infant mortality. A certain level of income must be achieved to support low infant mortality rates.

However, beyond this basal level, income ironically does not seem to play a large causal role in the correlation between income poverty and infant mortality. This fact is supported by three main findings. First, countries with a lower GDP per capita than the United States have drastically lower infant mortality rates. In 2003, America's GDP per capita was 37,800 and the infant mortality rate was 6.75 per 1,000 live births, In contrast, the Czech republic had a GDP per capita of 15,700 (less than half of the United State's per capita GDP) but an infant mortality

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<sup>49</sup> "Country Comparison: Infant Mortality Rate."

<sup>50</sup> Freddie Allen, "Black Children Live in Poverty at Higher Rates than Whites," *Black Press USA*, January 27, 2014, accessed April 6, 2014, <http://www.blackpressusa.com/black-children-live-in-poverty-at-higher-rates-than-whites/#sthash.1rbzQNpL.dpbs>.

<sup>51</sup> Children's Defense Fund, "The State of America's Children Handbook," (2012): 21.

rate of only 5.37 per 1,000 live births.<sup>52</sup> Furthermore, countries with comparable wealth to America have much lower infant mortality rates. Norway, whose GDP in 2003 was exactly the same as America's, had half America's infant mortality rate. Though a country's GDP generally negatively correlates with infant mortality rate, America has a GDP much higher than that of other poorer countries but still ranks lower on the infant mortality index, providing the first clue that there is more to high infant mortality rates than income in America. America possesses the basal level of income, but other social factors hinder the achievement of low infant mortality rates.

Additionally, the infant mortality gap based on income in America does not exist in other countries. One study examined the association between income and infant mortality in New York City, Paris, London, Tokyo, and Manhattan in two time periods (1988-1992 and 1993-1997). Manhattan was the only city with a significant negative correlation between income and infant mortality rates for both time periods.<sup>53</sup> This study also looked at the infant mortality rates of low-income neighborhoods in comparison with the rest of the city for all four cities examined. In Manhattan, the researchers found the infant mortality rate in low-income neighborhoods was almost 2.5 times greater than the rest of the city. For the three other cities, the infant mortality rate in low-income neighborhoods never exceeded 1.25 times that of the rest of the city.<sup>54</sup> While income may contribute to creating some minimal disparity in infant mortality rates between the rich and the poor, other nations do not face such a significant gap based on income, likely because they do not face such gross inequality of income. In other developed countries, the top

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<sup>52</sup> "GDP-Per Capita (PPP) Vs. Infant Mortality Rate," Index Mundi, accessed March 19, 2014, <http://www.indexmundi.com/g/correlation.aspx?v1=67v2=30y=2003>.

<sup>53</sup> Victor G. Rodwin and Leland G. Neuberger "Infant Mortality and Income in 4 World Cities: New York, London, Paris, and Tokyo," *American Journal of Public Health* 95 (2005): 86-90.

<sup>54</sup> *Ibid.*

1% of income earners have not acquired as much of a share of the total income as in America.<sup>55</sup> Apart from absolute income levels, social factors including income inequality are driving the infant mortality discrepancy in America.

Finally, the previous discussion of race, poverty, and infant mortality rates provides some of the most convincing evidence that in America, the correlation between income poverty and high infant mortality rates is not primarily caused by income. Despite their decreased wealth relative to non-Hispanic Whites, Hispanics have much lower infant mortality rates.<sup>56</sup> Furthermore, as noted earlier, Blacks possess at least a 5% higher infant mortality rate than whites across all income levels.<sup>57</sup> While there is no argument that being Hispanic or Black directly causes low infant mortality rates, sociological factors for which race is a proxy may be causing high rates of infant mortality. Still, there must be an explanation for White, poor populations who face increased infant mortality rates over their richer White counterparts. It seems likely that social determinants that are highly correlated with both income and race are causing the high infant mortality rates associated with income poverty, explaining not only the correlation between income and infant mortality rate, but also the varying rates of infant mortality by race.

## **B. Parental Education**

Apart from being strongly correlated with infant mortality rate, parental, particularly maternal, educational attainment directly causes the correlation between high infant mortality rates and income poverty. Parental education enhances the use of modern health services to

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<sup>55</sup> Facundo Alvaredo et al., "The Top 1 Percent in international and Historical Perspective," *Journal of Economic Perspectives* 27 (2013): 4-7, accessed April 6, 2014, doi: 10.1257/jep.27.3.3.

<sup>56</sup> Rowly and Hogan, "Disparities in Infant Mortality and Effective, Equitable Care," 76.

<sup>57</sup> Gould and LeRoy, "Socioeconomic Status and Low Birth Weight," 902.

improve child health outcomes.<sup>58</sup> The decreased use of pediatric services associated with income poverty can be explained by the lower educational attainment of those below the federal poverty line. The odds of a child receiving recommended care increases with parental education level, and is not affected by age of the child, family income, or even health insurance status.<sup>59</sup> Additional evidence illustrates that education affects the use of preventative healthcare services even after controlling for class and occupation, providing further support that this social determinant may directly cause an increase in the use of health care services.<sup>60</sup>

However, the relationship between education and infant mortality can only be classified as causal if the increase in the use of health care services that parental education will bring will decrease the infant mortality rate. Available data indicate that it will. One reason America lags behind other nations in infant mortality rate is the high prevalence of preterm births. Twelve percent of American babies are birthed before their due date.<sup>61</sup> A recent study that focused on the richest, most developed countries estimates that strengthening implementation of preventative care measures (like smoking cessation and progesterone supplementation) for pregnant women would lead to a 5% decrease (corresponding to 58,000 babies) in preterm births. The paper also notes that the highest pre-term birth rates occur in low-income areas where even simpler preventative care solutions, such as treatment of infections during pregnancy, may produce just

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<sup>58</sup> Desai and Alva, "Maternal Education and Child Health," 72.

<sup>59</sup> Suzanne C. Hughes and Deborah L. Wingard "Parental Beliefs and Children's Receipt of Preventive Care: Another Piece of the Puzzle?" *Health Research and Educational Trust* 43 (2008): 291, accessed March 25, 2014, doi: 10.1111/j.1475-6773.2007.00759.x.

<sup>60</sup> Ricardo Sabates and Leon Feinstein "The Role of Educaiton in the Uptake of Preventative Health Care: The Case of Cervical Screening in Britain," *Social Science & Medicine* 62 (2006): 3005-3006, accessed March 25, 2014, doi: 10.1016/j.socscimed.2005.11.032.

<sup>61</sup> Centers for Disease Control and Prevention, "CDC Grand Rounds: Public Health Approaches to Reducing U.S. Infant Mortality," *Morbidity and Mortality Weekly Report* 62 (2013): 625-628.

as radical results.<sup>62</sup> While this discussion does provide evidence that an increase in education and subsequent increase in preventative care uptake would decrease infant mortality rate, a study directly examining the use of health care services by mothers of infants who died before their first birthday would be invaluable to pursue.

Furthering the education of impoverished parents would have positive postnatal effects as well. Studies indicate two risk factors associated with an infant's failing to receive appropriate vaccinations are paternal and maternal education level.<sup>63</sup> As parental education rises, so too does the likelihood that a child will receive all vaccination requirements. Vaccinations are critical in protecting newborns from contracting infectious diseases, and it is important immunizations begin at birth.<sup>64</sup> Additionally, the increase in healthcare uptake that would accompany an increase in parental education would work to promote breastfeeding, an important postnatal behavior, among low-income parents. Lacking education, parents may not understand the benefits of breast milk for a developing newborn; increased use of prenatal services would allow physicians to explain the efficacy of breastfeeding and to promote this postnatal behavior to low-income parents.

If education decreases the infant mortality rate by increasing the utilization of healthcare services, why not simply increase the availability and/or decrease the cost of these services?

Recall that as income decreases, a woman becomes increasingly less likely to receive prenatal

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<sup>62</sup> Hannah H. Chang et al., "Preventing Preterm Births: Analysis of Trends and Potential Reductions with Interventions in 39 Countries with Very High Human Development Index," *The Lancet* 381 (2013): 223-234.

<sup>63</sup> James S. Marks et al., "Risk Factors Associated with Failure to Receive Vaccinations," *Pediatrics* 64 (1979): 306.

<sup>64</sup> "Immuization Schedules for Infants and Children in Easy-to-Read Formats," Centers for Disease Control and Prevention, accessed March 23, 2014, <http://www.cdc.gov/vaccines/schedules/easy-to-read/child.html>.



care. While access may be part of the problem, it is not the full story. Just as throwing money at impoverished neighborhoods is not enough to fix them, simply providing the healthcare will not ensure utilization. If people do not understand the benefits of certain medical services, providing them will not incentivize utilization. Rather, parents must be educated on the values of both pre- and postnatal care in order to maximize utilization of such cost effective services.<sup>65</sup>

Additionally, increasing education will affect parental behaviors apart from utilization of health care services to positively influence the health of the newborn. Notably, tobacco use, which correlates with educational attainment, will be affected. Those who smoke are likely to have completed less school than those who do not smoke, and there is evidence to suggest that this relationship is largely causal.<sup>66</sup> Furthermore, simply providing parents with education regarding specific health concerns can alter behavior. When people are educated on the harms of smoking, they are less likely to start. Even after people have started smoking, education regarding the health effects of smoking proves effective in incentivizing attempts to quit.<sup>67</sup> Because second hand contributes to respiratory problems in newborns, investing in education could also provide improvements in vulnerable newborns' home environments. While there is no magic bullet in solving the infant mortality gap between the rich and the poor, evidence suggests that investing to increase parental education regarding health outcomes for those facing income poverty can directly cause a reduction in infant mortality rate.

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<sup>65</sup> Robin Barlow and François Diop, "Increasing the Utilization of Cost-Effective Health Services through Changes in Demand," *Health Policy and Planning* 10 (1995): 292.

<sup>66</sup> Stephen E. Gilman et al., "Educational Attainment and Cigarette Smoking: A Causal Association?" *International Journal of Epidemiology* 37 (2008): 615-624, accessed April 1, 2014, doi: 10.1093/ije/dym250.

<sup>67</sup> Deborah Brauser and Charles P. Vega, "Randomized Trials Confirm Efficacy of Smoking Cessation Programs," *Medscape Multispecialty*, accessed March 30, 2014, <http://www.medscape.org/viewarticle/754711>.

The causal pathway from low parental education to infant mortality rates among the impoverished helps explain the gap in infant mortality rates seen by race (Black versus White) across all income levels. Because Blacks face an increased risk of both income poverty and lower educational attainment over their White counterparts, it is likely Blacks in poverty have a lower average educational attainment than Whites. Since parental educational attainment is a main cause of infant mortality, Whites having higher educational attainment than Blacks across all income levels provides a potential explanation of the racial gap. However, based on the fact that Black infants with college-educated parents still have twice the infant mortality rate of White infants with college-educated parents, these sociological pathways cannot totally explain the gap between these two races.<sup>68</sup> Other cultural factors that differently affect policy implementation in the two races are likely at work.

### **C. Housing**

Housing is another social determinant likely causing high infant mortality rates in income poverty and is therefore an area in which investment could have positive impact. Housing is largely out of impoverished parent's control, but it can play a significant and negative role in a newborn's early life, particularly when the newborn is already disadvantaged as a preterm or LBW baby. This insufficient housing can be crowded, unsanitary, in poor neighborhoods, etc., and each of these qualities can increase a neonate's risk of infant mortality instead of nurturing it during a critical period of development.

The overcrowding associated with substandard housing directly contributes to the prevalence of SIDS in America, which accounts for between 2,000 and 3,000 infant deaths each

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<sup>68</sup> Meredith Brebner, "How Can We Fix the Racial Gap in Infant Deaths? Legal Approaches and Community Based Solutions" (Poverty and Human Capability Studies Capstone, Washington and Lee University, 2010).

year.<sup>69</sup> One study found SIDS deaths to be increased when infants shared a bed or a room, two scenarios that are likely to occur in overcrowded housing. Specifically, when infants shared a bed with their parents, they faced a SIDS increased odds ratio of 1.9; the increased odds ratio was 5.4 when the infants shared a bed with people other than their parents. Furthermore, in a multivariate model, bed sharing remained a significant predictor of SIDS risk.<sup>70</sup> Another main cause of SIDS is smothering during sleep, which is much more likely to happen when a newborn is sleeping with another person in the bed.<sup>71</sup>

Substandard housing conditions can also contribute to respiratory distress in newborns. Rates of respiratory illness are higher among children living in disadvantaged neighborhoods, and such infections are leading causes in infant mortality/SIDS.<sup>72</sup> The dampness, mold, and increased prevalence of fungi in substandard housing explain this relationship. Additionally, the ventilation systems in substandard housing may not be effective in removing microorganisms that are respiratory irritants. Because newborn infants spend the majority of their time in the home, respiratory infections that contribute to infant mortality are likely to be contracted in a home environment, regardless of whether the infant lives in substandard housing. However, given the likelihood of those facing income poverty to live in substandard housing, it is logical to

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<sup>69</sup> "Sudden Unexpected Infant Death (SUID)," Centers for Disease Control and Prevention, accessed March 26, 2014, <http://www.cdc.gov/SIDS/INDEX.HTM>.

<sup>70</sup> Fern R. Hauck et al., "Sleep Environment and the Risk of Sudden Infant Death Syndrome in an Urban Population: The Chicago Infant Mortality Study," *Pediatrics* 111 (2003): 1207-1214.

<sup>71</sup> Nancy Fliesler, "Whether Sleep Environment Is Safe or Not, SIDS is Linked to Brainstem Abnormality," Boston Children's Hospital, accessed March 28, 2014, <http://www.childrenshospital.org/research-and-innovation/vector/2013/november-2013/11-13-2013-sids>.

<sup>72</sup> Judith Wright and Nazeem Muhajarine "Respiratory Illness in Saskatoon Infants: The Impact of Housing and Neighbourhood Characteristics," *Social Indicators Research* 85 (2008): 85-89, accessed March 25, 2014, doi: 10.1007/s11205-007-9125-3.

conclude that the poor quality of this environment causes the contraction of respiratory illnesses at higher rates, contributing to the infant mortality gap between the rich and the poor.

### **Moral Argument for Pre- and Postnatal Care**

Before public health policies aimed to reduce disparities in infant mortality can be discussed, it is critical to understand the moral obligation of society to work to protect the life of newborns. As explained by Norman Daniels in his book *Just Health: Meeting Health Needs Fairly*, healthcare is of special moral importance in most countries. Even in America, a nation of gross inequalities even beyond disparities in the infant mortality rate, policies like Medicaid are in place to help ensure that people have the ability to receive healthcare. Such policies exist to protect the range of opportunities available to citizens. Because healthcare contributes to this range, it is of special moral importance.<sup>73</sup>

This argument on the moral importance of healthcare is enough to justify policies, funding, and research that work to better the abysmal infant mortality rate in America. The death of a baby is always premature, removing the infant's range of opportunities before it is developed. Furthermore, although the argument for healthcare to protect fair equality of opportunity applies to all humans regardless of age, even those who question where personal responsibility falls in this moral argument should appreciate the protection of infant life. The death of an infant holds an emotional connotation implying tragedy and the loss of an innocent life.<sup>74</sup> These sentiments are evoked because a baby is a helpless being. When an infant dies, there is no possibility that he or she holds any personal responsibility for the death. Furthermore, parents in income poverty who lack supportive social determinants also lack an equal

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<sup>73</sup> Norman Daniels, *Just Health: Meeting Health Needs Fairly* (Cambridge: Cambridge University Press, 2008), 18-20.

<sup>74</sup> Wise, "The Anatomy of a Disparity in Infant Mortality," 341.

opportunity to take responsibility for the wellbeing of their baby. It is society's moral obligation to protect fair equality of opportunity. We must work to promote a lower infant mortality rate.

### **Public Policy Suggestions**

These moral grounds justify public policies to decrease the abysmal infant mortality rate in America. There are a myriad of ways to attempt to solve this issue, including increased prenatal care, increased parental education, improved postnatal care, etc. Though all of these methods may provide some benefit, not all of them can be pursued in a world of limited resources. It is necessary examine which will be the most cost-effective and produce the most return for the investment.

#### **A. Neonatal Intensive Care Units**

With the impressive advancement of modern medicine, one logical approach to the infant mortality problem is to increase access to neonatal intensive care units (NICUs). Babies born into income poor families are more likely to be underweight and face barriers to accessing vital healthcare services. However, there are multiple reasons this particular policy should not be pursued above others. First, these facilities are incredibly expensive. One study found that treating extremely LBW babies (500 to 999g) in these facilities results in an economic loss.<sup>75</sup> While it is difficult to place a price on life and imply efforts to reduce mortality rates are not worth the cost, studies like this one emphasizing the cost of NICUs suggest that there may be other, more cost-effective, ways to address the issue. Investments elsewhere may save more lives.

Other noteworthy reasons to concentrate efforts and public policy on areas apart from modern medicine and NICUs exist. The plausible leading causes of the infant mortality rate gap

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<sup>75</sup> Michael H. Boyle et al., "Economic Evaluation of Neonatal Intensive Care of Very-Low-Birth-Weight Infants," *New England Journal of Medicine* 308 (1983): 1332-1334, accessed March 27, 2014, doi: 10.1056/NEJM198306023082206.

between the rich and the poor include low parental educational attainment and substandard housing issues, both of which are increasingly common among the income poor compared to the general population. Access to NICUs and other modern health services were not backed as one of the likely top causes of the disparity. Rather, the causal factors contributing to the correlation between low income and high infant mortality are at work much before NICUs could be of help. These causal factors occur before the baby is born. Improving access to NICUs can be likened to putting a band-aid on the problem. If the cause of the problem begins with parental education and housing standards, then using NICU access to address the problem does not attack the source of the issue. Indeed, improved medical technology has been cited as one of the contributing factors to a decrease in America's high infant mortality rate.<sup>76</sup> However, given the high cost of the NICU, it seems much more cost-effective to enact policies focused on prenatal care, maternal nutrition, the harms of smoking, etc. to reduce the amount of LBW infants that need the NICU, for it is always cheaper and more effective to treat than to prevent.

## **B. Parental Education**

Multiple polices in the past have attempted to reduce the infant mortality rate by educating parents on neonatal and postneonatal care. One of the most well known policies is the "Back to Sleep" program. Implemented in 1994, this program attempts to reduce infant mortality deaths due to SIDS by educating parents on the sleep position of their infant.<sup>77</sup> Because the sleeping arrangements of an infant can create high risk of suffocation, the "Back to Sleep" program advises parents to place the infant on his or her back during sleep, to ensure the sleeping surface is firm, and to remove all soft objects (i.e. pillows and extra bedding). This program has

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<sup>76</sup> Wise, "The Anatomy of a Disparity in Infant Mortality," 348.

<sup>77</sup> National Institute of Child Health and Development, "Infant Sleep Position and SIDS: Questions and Answers for Health Care Providers," U.S. Department of Health and Human Services (2007): 1.

been credited with the 50% decline of SIDS rates in the mid-1990s, providing evidence that education can be effective.<sup>78</sup>

Based on the facts that LBW is the greatest predictor of infant mortality and that infants born into income poverty are most likely to be born underweight, an educational initiative similar to the “Back to Sleep” program should be implemented to reduce the LBW incidence among the income poor and generally improve birth outcomes. This program should educate pregnant mothers by teaching them the importance of nutrition, abstinence from substance abuse, regular use of prenatal care, etc., in allowing full development of the fetus and securing excellent birth outcomes. Contrary to increasing access to a NICU, an intervention of this type would work to reduce leading social and physiological causes of infant mortality simultaneously. Furthermore, a policy of this type may help combat harms of substandard housing. Infants who are born at a normal birth weight will be better equipped to handle the physiological stressors in substandard housing that can contribute to mortality.

Apart from providing evidence on the potential gains of educational initiatives, much can be learned from the “Back to Sleep” campaign. This program was extremely effective in lowering the absolute infant death rate due to SIDS, but it also widened the already disparate rates between those with lower incomes and those with higher incomes.<sup>79</sup> The “Back to Sleep” campaign favored educated, higher-income families. One theory proposes that the primary care physicians who implement the program are not taking into account the different parenting styles.<sup>80</sup> For instance, Blacks place increased emphasis on extended family. While the primary care physician may educate the mother and/or father on the importance of sleep position, he or

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<sup>78</sup> Wise, “The Anatomy of a Disparity in Infant Mortality,” 346-347.

<sup>79</sup> *Ibid.*

<sup>80</sup> Malloy and Escbach, “Association of Poverty with Sudden Infant Death Syndrome,” 1112.

she may fail to encourage the parents to pass the information along to other people who will be caring for the infant. While this particular problem would not be as much of an issue in a policy to reduce LBW infants, it illustrates the importance of taking into account the culture of the family. Infant mortality has both sociological and physiological causes, so both must be addressed in any policy or initiative to lower the infant mortality rate and decrease the disparity in these rates between the rich and the income poor.

### **Conclusion**

The high infant mortality rates and the disparate gaps between the rich and the poor in America are not trivial problems, although the former informs the latter. Compared to countries of similar development and wealth, America ranks poorly on the infant mortality index. The fact that America ranks lower than would be expected based on its GDP per capita indicates other social factors apart from income may be contributing to infant mortality. Ironically, these social factors are likely driving the correlation between income poverty and high rates of infant mortality. Although the government defines poverty largely based on income, those living underneath the federal poverty line are actually facing multifarious social deficits.

These social deficits that accompany income poverty also definitively correlate with high rates of infant mortality. Though many social factors such as decreased access to care and race correlate with high rates of infant death, lack of parental educational attainment and inhabitation of substandard housing are social factors that go beyond correlation to cause infant mortality. Low parental educational attainment seems to play the largest role in causing infant mortality through poor birth outcomes, while substandard housing, commonly associated with mold and overcrowding, can harm the developing newborn during the neonatal and postneonatal periods. Infants who initially survive poor birth outcomes in the hospital but are taken home to



substandard housing are all the more vulnerable to the negative environment these conditions present. It is often infants born into income poverty who are immediately introduced into such trying circumstances.

In pursuit of fair equality of opportunity for all humans, society has a moral obligation to adopt public policies to lessen the infant mortality gap between the rich and the poor. Increasing parental education on the importance of the prenatal period for a developing fetus to promote maternal nutrition, prenatal care, nicotine abstinence, etc. will lead to a reduction in preterm and underweight infants, which are two of the most important predictors of infant mortality risk. Although no single policy will completely solve the problem, this particular approach will be extremely cost effective. Many of the steps that need to be taken to secure better birth outcomes, particularly in neighborhoods stricken with income poverty, are relatively inexpensive. Furthermore, these educational initiatives have the potential to save many infant lives. No child should be born and immediately have to fight for his or her life. Reductions need to be made in the American infant mortality rate. Policies to meet this goal will be most effective when they are aimed to save the infants facing disproportionate risk of mortality in income poverty.

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