Public Health Organization and Management

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Author Note

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The infant mortality rate (IMR) is well-recognized as an indicator of the overall health of a population. For a number of reasons, the U.S. has an IMR which is considerably higher than other developed western nations, with clear disparities within certain segments of its population. An understanding of the causes of these disparities facilitates us to suggest evidence-based public policy programs to mitigate threats and ensure optimal health outcomes for mothers and infants. In the paper, the IMR rates within the U.S. will be presented from the latest available figures and compared to other developed countries. It will further present a range of studies to help identify the medical causes and the socio-economic risk factors which contribute to IMR prevalence in the U.S. and suggest public policy recommendations, interventions and programs to address the identified risk factors and causes of IMR.

# Infant Mortality Rates

A key indicator of a nation’s health and well-being is its IMR. In 2017, Monaco, Japan and Iceland were the leading countries in the world and have the lowest rates of infant mortality globally, which is around 2 deaths per 1000 live births. Generally, such countries also have a high life expectancy rate.

Figure 1 - Countries with the highest IMR in 2017, as per 1000 live births

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Conversely, countries that have the highest IMR in the world include Afghanistan, Somalia and Central African Republic. In these countries over 100 infants are dying per 1000 live births, within their life’s first year. Although a number of reasons and risk factors exist, the leading causes, of high IMR in such countries are diarrhea, pneumonia, and prematurity (CIA Gov, 2018).

Figure 2 - Countries with the highest IMR in 2017, as per 1000 live births

 In the United States, the IMR is nearly 70% higher than the average IMR of a comparable country. According to the WHO’s Human Mortality Database that used figures between 1961 to 2010, Americans faced a three times higher risk of their infant dying within the first year than other 19 OECD member countries. Although, the IMR figures in the U.S. improved, it was still 16% lower than other comparable country averages. Moreover, they had an almost 2.3 times higher likelihood of experiencing ‘Sudden Infant Death Syndrome’ (SIDS) in these years than comparable countries (Johnson, 2018). Globally, the U.S. ranks at 170 among the countries with the highest mortality rates 5.80 deaths per 1000 people, and 55th among countries with the lowest IMR (CIA Gov, 2018). It suggests that nearly 300,000 infant deaths could have been prevented in the last 50 years, if IMR declined in the U.S. as much as it did in other comparable OECD countries.

# Annotated Bibliography: Medical Causes

Petrini, J., Damus, K., Russell, R., Poschman, K., Davidoff, M. J., & Mattison, D. (2002). Contribution of Birth Defects to Infant Mortality in the United States. *Teratology, 66*, S3-S6.

 In the article, the authors illustrate the way birth defects affect different U.S. population subgroups. The study uses a descriptive analysis of how birth defects have contributed to IMR at the state and national level, using IMR data for over 50 states from the National Center for Health Statistics (NCHS). Collecting the data for birth-defect related IMR and overall infant mortality proportions, a descriptive analysis was conducted. The findings confirmed earlier research that the leading cause of high IMR in the U.S. are birth defects which lead to almost 1 in 5 cases of infant deaths. This followed by low birthweight and prematurity. Moreover, there was certain disparities among White, Black, Asian and Native American populations. Low birthweight and premature deliveries were found to be a bigger cause of high IMR in Black populations, whereas birth defects were the leading cause in other White, Asian and Native American population subgroups. However, the overall birth defects were higher among black populations as a whole.

Kinney, H. C., & Thach, B. T. (2009). The Sudden Infant Death Syndrome. *The New England journal of medicine, 361*(8), 795-805.

 The study provides a synopsis of the current understanding of SIDS caused infant mortality by carrying out a systematic review of earlier studies on the issue. SIDS is defined by the authors to be referring to the sudden death of a young child or an infant in a manner that it was not being expected according to the child’s history and in which there is failure to identify a correct cause of death using a post mortem examination. The review found that all previous studies classify SIDS to be leading cause of post-neonatal death among infants in the U.S. and globally, the third leading cause. Moreover, only 20% of such cases have identified severe infections to be the cause of death by SIDS. The findings also indicate extrinsic and intrinsic risk factors for SIDS, which include: physical stressors such as the risk for homeostatic derangement or asphyxia, and developmental factors such as putative genetic factors, prematurity and history of SIDS in family, respectively.

Callaghan, W. M., MacDorman, M. F., Rasmussen, S. A., Qin, C., & Lackritz, E. M. (2006). The Contribution of Preterm Birth to Infant Mortality Rates in the United States. *Pediatrics, 118*(4), 1566-1573.

 In the article, the authors try to provide a more accurate estimate of the impact of preterm birth to higher IMR in the U.S. using a newer approach to evaluate the way IMR is affected by pre-term births. Information is obtained from infant death and birth certificates within the U.S. during the period between 2001 and 2002, within the post-neonatal period. The researchers incorporated more study variables that potentially affect IMR that included birth weight, gestational age and maternal characteristics. The researchers assessed the impact of preterm birth by studying the biological connection between a specific cause of death and preterm birth and associating preterm birth for various different causes of death. The findings indicated 20 main causes for infant mortality, in which a third were found to be linked to preterm birth between 2001 and 2002.

Poma, P. (1999). Effect of prenatal care on infant mortality rates according to birth-death certificate files. . *Journal of the National Medical Association, 91*(9), 515-520.

 In the article, the authors evaluate the impact of pregnancy complications arising from the presence or absence of prenatal care on Chicago’s IMR. The study utilized data from the death and birth certificates of infants between the years 1989 to 1995. The collected data was classified according to the characteristics of the newborns and their mothers, with special emphasis on the initiation of prenatal care and its quality. The data was analyzed by the researchers to assess any differences among the various proportions of available data. It found that the overall IMR of Chicago residents during the time period was 14.3, and found that a better prenatal care was linked to lower IMR, compared to those that did not receive care. However, the study also found that later prenatal care had a greater impact on IMR than earlier care, yet even inadequate prenatal care delivered better results compared to no care.

Hirai, A. H., Sappenfield, W. M., Kogan, M. D., Barfield, W. D., Goodman, D. A., Ghandour, R. M., & Lu, M. C. (2014). Contributors to Excess Infant Mortality in the U.S. South. *American Journal of Preventive Medicine, 46*(3), 219-227.

 In this research article, the authors sought to study the various different contributive factors leading to a higher IMR in the U.S. Southern states using data from the National Center for Health Statistics between the years 2007 and 2009 with regards to infant deaths. Through this, the researchers aimed to understand the underlying factors and conditions leading to higher IMRs within these states including the effect of gestational age, race and other factors. It found that the overall IMR between this time period was 6.59 deaths per 1000 live births while the South had a 1.18 additional IMR. An in-depth analysis revealed that congenital anomalies, SIDS and prematurity were the three top-most causes leading to infant deaths in the South. Compared to other regions, SIDS and prematurity were a more significant cause compared to the national average, whereas race also impacted higher IMRs in the South

# Annotated Bibliography: Socio-economic and Cultural Determinants

Ruiz, J. I., Nuhu, K., McDaniel, J. T., Popoff, F., Izcovich, A., & Criniti, J. M. (2015). Inequality as a Powerful Predictor of Infant and Maternal Mortality around the World. *PLoS One, 10*(10), e0140796 1-11.

In the study, the researchers aimed to establish a link between a nation’s overall Human Development Index (HDI) and their IMRs. Moreover, they aimed to provide evidence for the HDI being a significant predictor for IMR. For this purpose, data was obtained from ‘Cause of Death’ database of the ‘Global Burden of Disease’ in the year 2013, while the Ineqality-adjusted HDI (IHDI) data was obtained from the United Nations Development Program statistics for the same year. The findings suggested that both the IHDI and the HDI significantly correlated with maternal and infant mortality rates, the IHDI being a more accurate predictor. It suggested that disparities in the distribution of healthcare, environmental and socio-economic resources had a key influence on IMRs in different countries, which include factors such as income inequality, access to healthcare, education and environmental resources. Thus, inequality plays a key contributive role in determining the overall health status, especially the IMR.

El-Sayed, A. M., Finkton, D. W., Paczkowski, M., Keyes, K. M., & Galea, S. (2015). Socioeconomic position, health behaviors, and racial disparities in cause-specific infant mortality in Michigan, USA. *Preventive Medicine, 76*, 8-13.

In this research, the authors tried to examine the different disparities such as maternal risk behavior and socio-economic position (SEP) and their contribution to IMR, with emphasis on the significance of racial disparities on infant deaths. For this purpose, they obtained data from the state of Michigan’s Birth Registry for all live births between the years 1989 to 2005, along with data from the State’s Death Registry as collected by their Department of community Health. The SEP was measured by the sample’s hospital payment source and parental education while maternal risk behaviors were measured by their marital status, alcohol consumption and smoking. The findings suggested that maternal behavior, demographics and SEP accounted for almost one third of the disparity between Michigan’s black and White populations in terms of IMR, indicating that both social and racial factors are at play to determine an infant’s health outcomes.

Braveman, P. A., Cubbin, C., Egerter, S., Williams, D. R., & Pamuk, E. (2010). Socioeconomic Disparities in Health in the United States: What the Patterns Tell Us . *American Journal of Public Health, 100*(1), S186–S196.

 In the study, the link of socioeconomic disparities across the U.S. to different health indicators in different socioeconomic groups were studied. The authors incorporated national level data on five indicators of health for children which also included infant mortality, along with adult health indicators as well. These rates were compared to multiple education or income categories in different ethnic and racial groups. The findings suggested that race accounted for a significant difference in IMRs as well as life expectancy, comparing African Americans to White Americans at each level of education or income. It found that health within the U.S. is strongly tied to socio-economic and ethnic lines indicating the effect of social advantage on IMR and overall health.

Sims, M., Sims, T. L., & Bruce, M. A. (2007). Urban Poverty and Infant Mortality Rate Disparities. *Journal of the National Medical Association, 99*(4), 349-356.

In this research, the authors aimed to assess whether high IMRs in larger urban areas were linked to poverty across different ethnic and racial lines. For this purpose, data from large U.S. metropolitan areas was collected with regards to IMR and poverty by ethnicity or race, obtaining it from the 1992 to 1994 ‘Vital Statistics’ data and the 1990 National Census that were maintained by the U.S. National Center for Health Statistics. Areas with higher poverty had nearly 40% families below the poverty line. The study helps provide an understanding of how quality of life and life chances are impacted by economic deprivation, especially within the youngest population segment. The findings revealed that the factors that were linked to IMRs varied across ethnicity and race in those areas. High poverty was linked to a higher IMR, however regional factors and maternal health were also significantly linked to group-specific incidence of Infant deaths.

Kim, D., & Saada, A. (2013). The Social Determinants of Infant Mortality and Birth Outcomes in Western Developed Nations: A Cross-Country Systematic Review. *International Journal of Environmental Research and Public Health, 10*(6), 2296-2335.

 In this research, the authors compared variations in IMR across Western European nations and the U.S. by studying the social determinants of health within each of these nations. For this purpose, a systematic review of literature was carried out by the researchers in which social determinants such as SEP, neighborhood poverty, social policies were studied for their associations with health behaviors and intermediary determinants that were carried out on western developed European nations and the U.S. The studies obtained from the databases were between 1966 to 2011. From the findings, the GDP per capita was not found to play a very large role in explaining higher IMRs across these nations, whereas there is evidence to suggest that societal and macroeconomic conditions are more significant factors. Income inequality and SES was found in nearly two-third of total studies to be closely associated with high IMR. Moreover, social policies such as maternal leaves, and ratio of health to social spending were also linked to IMR predictions.

# Analysis

Globally, almost 5.6 million children dying before the age of five, out of which 2.6 million died during the post-neonatal period. In most cases globally, problems such as diarrhea, malaria and pneumonia are the leading medical causes, whereas half of these suffer from income related causes such as inadequate nutrition (WCF, 2018). In the U.S., the IMR was 5.9 per 1000 live births in 2016 with nearly 23,000 infants dying. The leading causes were preterm births, birth defects, low birth weight, SIDS, injuries and pregnancy complications (CDC, 2018).

For this purpose, the policy and budget choices have to be made relying on rigorous evidence from studies in order to operate, fund and select programs on a more strategic level (VanLandingham, et al., 2014). It also requires public health agencies to collaborate with communities and providers to address the joint behavioral, social and medical factors contributing to the high IMR (CDC, 2018). For this purpose, the best available evidence, information and research is required to guide decisions during the policy making process in terms of budget development, program assessment, targeted evaluation, outcome monitoring, and implementation oversight (VanLandingham, et al., 2014).

From the evidence, to address the leading causes of high IMR, firstly, birth defects have to be minimized by providing adequate nutrition and supplements such as folic acid to prevent some defects such as in the neural tube. Although preterm birth is difficult to prevent, however, a mother’s poor nutrition and chronic health condition are risk factors and require appropriate prenatal care to ensure that infants are born with healthy weights. Moreover, self-care during pregnancy is highly important to prevent adverse outcomes (NIHCD, 2016). Newborn screenings are to be stressed within communities in order to detect certain conditions that may lead to death or disability, and are not noticeable during birth.

A public health approach for this purpose should integrate three important components: research on identifying causes, disease tracking and prevention programs and research. This would involve translating findings from empirical research to public health interventions. In this regard, public policy recommendations can include: enhancing public education and awareness with regards to screenings for newborn, and also on the prevention of SIDS and its associated risk factors to care providers, expecting mothers, and the community at large. This can involve information on the need to prevent overly loose and soft bedding, overheating, maternal smoking or sleeping on the stomach (American Academy of Pediatrics, 2005). Furthermore, funding has to be increased to screen pregnant women for substance or alcohol abuse and for their treatment. Efforts to reduce non-medically induced deliveries, that often lead to preterm births, are needed. Additionally, efforts to expand education, research and programs to reduce incidence of preterm labor are needed.

The three goals of public policy initiatives to reduce socio-economic disparities in this regard, include ensuring access to quality health care during, before or between pregnancies as well as entire life span especially to minority ethnic groups such as African Americans and American Indians, etc. Moreover, community and family systems have to be enhanced so that there is a better integration of support services for families, better parental, especially father, involvement, community building and better reproductive social capital (OOCHD, 2016). Moreover, additional stress on poverty alleviation, educational opportunities and support for working mothers is needed along with sustained efforts to end racism.

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