Infant Mortality: A Leading Health Indicator

Ariana Vitale, Anita Mandal and Prabir K Mandal*

Edward Waters College, Biology Program, 1658 Kings Road, Jacksonville, FL, USA

Abstract

The purpose of this research was to study infant mortality and their rates in Duval County, Florida. Infant mortality rate is the estimate of infant deaths per 1,000 live births. The U.S. Infant Mortality Rate (IMR) currently ranks 27th among industrialized countries, with wide and persistent disparities by race, socioeconomic status, and geography. The objective of this research was to study infant mortality rates in each zip code in Duval County along with demographic information such as poverty, household income, prenatal care, and education. An analysis of the data collected was then used to establish whether there is a correlation between as poverty, household income, prenatal care, and education with infant mortality rates in zip codes with the highest and lowest infant mortality rates. The data for this research was gathered through the Florida Health department and nefloridacounts.org. The infant mortality rates and demographic information was sourced from the year 2014.

Keywords: Infants; Mortality; Demographics; USA; Duval County

Introduction

Infant mortality is the death of children under the age of one year old. Multiple factors are responsible for infant mortality. The first factor of infant mortality is the overall health of a mother before conception. A woman must first take care of herself before she can obtain a healthy pregnancy. In order to prevent the chances of health problems for both a mother and child, a woman must have a healthy lifestyle during preconception. For example, a female should maintain a healthy diet and weight along with exercising regularly. Furthermore, a woman should not use tobacco at all and cut alcohol consumption down to a minimum. In order to prepare for a healthy pregnancy, a woman should take prenatal vitamins which include folic acid. Folic acid is an important vitamin for women to take because folic acid is needed in the development of the brain, spinal cord, and red blood cells for babies within 3-4 weeks of development [1]. The second factor in preventing infant mortality is seeing the gynecologist regularly before and after conception in order to receive updates on the health of the mother and child. If a woman is deemed to have an at risk pregnancy, a doctor may schedule a cesarean beforehand which will decrease the probability of death due to birth complications. The third factor in preventing infant mortality is creating a clean stable environment for the child along with a healthy diet and constant supervision. One of the causes for infant mortality in the past has been diarrhea which can be caused by an unsanitary environment and food handling. If a first time mother is unsure of how to take care of her newborn she should attend infant care classes in order to gain the skills necessary to properly care for her child. There are also books and videos that provide education on caring for an infant available for free through public libraries and YouTube.

In addition to a woman's prenatal health, studies have shown that there is a relationship between infant mortality and socioeconomic background. Komro et al. showed the evidence of socioeconomic status affecting infant mortality rate. They found that "Across all models, a dollar increase in the minimum wage above the federal level was associated with a 1% to 2% decrease in low birth weight births and a 4% decrease in post neonatal mortality". In addition they found that "If all states in 2014 had increased their minimum wages by 1 dollar, there would likely have been 2790 fewer low birth weight births and 518 fewer post neonatal deaths for the year". Thus, it was concluded that if minimum wage was raised, infant mortality rates should decrease. In this study, minimum wage and infant mortality was analyzed from 1980 to 2011 [2].

In addition to socioeconomic status, inequality has also been an important factor in infant mortality. It has been found that throughout the world infant mortality is greater in areas with more inequality. Ruiz et al. found that there was a relationship between inequality and infant mortality worldwide. They stated that both the Human Development Index (HDI) and Inequality-Adjusted Human Development Index (IHDI) correlate with the infant and maternal mortality rate, the IHDI is a better predictor for these two health indicators. Therefore, these results add more evidence that inequality is playing an important role in determining the health status of various populations in the world and more efforts should be put into programs to fight inequality. As a result of this research, it can be concluded that inequality plays a role in infant mortality. Thus serving as another reason why median household income and poverty should be measured in relation to infant mortality in Duval County, Florida. In areas of low income and poverty it can be assumed that educational and housing condition will vary along with the education of the population [3].

Another factor that has been proven to influence infant mortality is education. The more educated the mother is, the lower infant mortality rates there typically are along with higher birth rate. Birth outcomes' responses to education are much stronger among African Americans and European Americans than among Mexican Americans. Male birth outcomes respond more strongly to education than female birth outcomes, controlling for race and ethnicity. Birth outcomes' responses to education are stronger among European Americans than among African Americans. Thus racial disparities increase with education. In all racial and ethnic groups, birth outcomes, such as mean birth weight, standard deviation in birth weight, and rate of low birth weight, improve with higher education. Mortality declines with higher education. This is entirely independent of the changes in birth weight and is due to direct effects. The significant indirect effects (potentially causal through

*Corresponding author: Prabir K Mandal, Edward Waters College, Biology Program, 1658 Kings Road, Jacksonville, FL, USA 32209, Tel: 9044708091; Fax: 9044708047; E-mail: prabir.mandal0807@ewc.edu

birth weight) all tend to increase infant mortality even though birth outcomes generally improve [4].

Thus, it was found that the education of mothers had a direct relationship between birth rate and mortality. As a result of this research, infant mortality rate and percentage of people with a bachelor's degree under the age of 25 will be studied in Duval County. The correlation between these two factors will be used to tell whether or not there is a relationship between the two sets of data. Based off of this research, it would be predicted that infant mortality rates would be lower in areas where a higher number of individuals are educated with a bachelor's level education.

Methods

The method of this research is to use floridacharts.com and nefloridacharts.org to collect data on infant mortality in Duval County for 2014. The year 2014 were used to collect data because it is the most recent non-provisional data available on the topic. Unfortunately, infant mortality data for the year 2015 was still marked as provision when this research was conducted in June and July of 2016. An analysis of the data collected will then be used to establish whether there is a correlation between poverty, household income, prenatal care, and education with infant mortality rates in zip codes with the highest and lowest infant mortality rates and all Duval County zip codes overall.

Results

The overall infant mortality rate in Duval County is 8.8, while the Florida's infant mortality rate is 9.7 deaths per 100 live births (15.4 among nonwhites) is higher than that of most other states. The five zip codes with the highest infant mortality rates are 32208, 32219, 32211, 32218, and 32254. The five zip codes with the lowest infant mortality rates are 32738, 32258, 32256, 32265, and 32207. Overall there are 34 zip codes in Duval County. The following charts indicated the values for percent prenatal care, median household income, percent if people in poverty, infant mortality rate, and percent of population with a bachelor's degree under the age of 25 along with the zip codes with the highest and lowest infant mortality rates (Tables 1 and 2).

Zip code	% Prenatal care 2014	Median Household Income ($)	% People in Poverty 2014	Infant Mortality Rate 2014	% with a bachelor's degree under 25
32208	55.6	33,339	27.0	19.4	12.7
32219	63.0	37,408	19.6	16.3	15.1
32211	59.6	37,110	22.0	14.1	16.0
32218	71.4	47,401	15.9	13.3	18.9
32254	49.0	26,313	36.3	12.2	4.7

Table 1: Top five highest infant mortality rates in Duval County along with zip code, percent prenatal care, median household income in USD, % people in poverty in 2014, and percent of population with a bachelor's degree under the age of 25.

Zip code	% of population with a bachelor's degree under the age of 25	Infant Mortality Rate 2	Household Income	% Prenatal Care	People living in poverty (%)
32738	15.6	3.6	38379	65.7	3.7
32207	28.2	4.8	47436	77.8	8.6
32256	29.5	4	54666	79	10.5
32258	44.6	4	63572	79.1	14
32065	51.2	4.3	82879	90.1	21.6

Table 2: Top five lowest infant mortality rates in Duval County along with zip code, percent prenatal care, median household income in USD, % people in poverty in 2014, and percent of population with a bachelor's degree under the age of 25.

Discussion

The five zip codes with the highest rates of infant mortality in Duval County were 32208, 32219, 32211, 32218, and 32254. Within these five zip codes no correlation was found between infant mortality, prenatal care, median household income, and people in poverty. The only positive correlation that was found was between infant mortality rate and the percent of the population with a bachelor's degree by the age of 25. Since there was a positive correlation between infant mortality rate and percent of population with a bachelor's degree under the age of 25 is opposite from what was predicted. Based on previous research, it would be assumed that the higher the percentage of the population that is education, the lower the infant mortality rates would be. However, in this case the infant mortality rates actually raised with the percent of the population under 25 years old with a bachelor's degree in areas with the highest infant mortality rates in Duval County. As a result of this, more research on the five zip codes with the highest infant mortality rates in Duval County will have to be done. Perhaps the percent of the population with a bachelor's degree under the age of 25 are mostly men or woman without children. On the other hand, it can also be conclude that people in areas with high infant mortality rates are not necessarily uneducated. The five zip codes with the lowest rates of infant mortality in Duval County were 32738, 32258, 32256, 32265, and 32207. In these zip codes, there was a positive correlation between infant mortality rate, prenatal care, and people living in poverty. A weak positive correlation was found between the infant mortality rate, percent of population with bachelor's degree under the age of 25, and household income. In order to expand the research, the correlation between infant mortality rate, prenatal care, median household income, and people in poverty in all Duval county zip codes was found. The correlation between infant mortality rate and prenatal care was 0.574. The correlation between infant mortality rate and median household income was 0.21. The correlation between infant mortality rate and the percent of people in poverty was 0.191. The correlation between infant mortality rate and percent of people under 25 with a bachelor's degree was 0.185. Thus no correlation was found between infant mortality rate, median household income, percent of people in poverty, and percent of people under 25 with a bachelor's degree. However, there was a weak positive correlation between infant mortality rate and prenatal care indicating that in order to decrease the infant mortality rate of Duval County it may be wise to invest in prenatal care services available to all women. Duval County should invest more funding into ensuring that every woman in Duval County receives prenatal care because in every graph of infant mortality and prenatal care in this research, the slop is negative. This indicates that as the percentage of prenatal care increases, infant mortality decreases. If this research was expanded, more studies will be done based on education and infant mortality rate. The research would be expanded to include the percentage of educated mothers in Duval county receiving a bachelor's degree or higher and the infant mortality rate in each zip code. In addition, the research would be expanded to analyze the effect of motherhood education classes taken by pregnant woman and the health of their children afterwards to see whether or not infant mortality rates would decrease with educating woman on how to care for infants.

References

1. WebMD (2016) Folic Acid and Pregnancy. Benefits of Folic Acid. Available from: http://www.webmd.com/baby/folic-acid-and-pregnancy

2. Komro KA, Livingston MD, Markowitz S, Wagenaar AC (2016) The Effect of an Increased Minimum Wage on Infant Mortality and Birth Weight. Am J Public Health 106: 1514-1516.

3. Ruiz JI, Nuhu K, McDaniel JT, Popoff F, Izcovich A, et al. (2015) Inequality as a Powerful Predictor of Infant and Maternal Mortality around the World. PLoS ONE 10: e0140796.

4. Gage TB, Fang F, O'Neill E, Dirienzo G (2013) Maternal education, birth weight, and infant mortality in the United States. Demography 50: 615-635.