

# Premature Infant Mortality

## Causes and Analysis



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**Abstract:**

Premature infant mortality has been an ongoing issue for hundreds of years; however, as technology progresses, more innovations have attempted to find solutions to the problem. This is primarily because the number of preterm births has been steadily increasing as the number of births increases. Our understanding of scientific principles has allowed us to escape the horrific past in which infants born before the gestation period could not be kept alive. In fact, in the 17th century, some parts of London had approached an infant mortality rate of 75%, of which a large portion were born early. This high infant mortality rate also significantly decreased the mean age, which would have been around 55, to nearly 30[3]. Though some statistical analysts attributed this mean age to a lack of clean water, nutritional food, or other factors, it was clearly because of many newborns dying at such a young age-- acting as outliers.

Preterm births are identified by a shortened gestation period, in addition to a birth weight that is lower than national averages[6]. Neonatal intensive care unit survival rates drastically increased over the past couple of years and premature infant mortality rates have taken an inverse path. Though developments have been made, 75% of perinatal deaths, meaning deaths directly before and after the birth of a child, are due to preterm births[1]. The CDC reports that over 4,000,000 infants are born in the US annually, of which 9.54% are born prematurely in 2015[6]. What identifies this as an issue that must be resolved, other than the death of infants? The socioeconomic burden that America faces due to premature infant mortality was greater than \$26.4 billion dollars in 2005, and has continued to increase.

## Introduction:

To be born prematurely is defined to be born before 36th complete week of pregnancy(gestation period). Being born prematurely means that the fetus inside the womb does not receive the time to develop entirely. These babies have less fatty tissues providing warmth outside of the mother's womb and have not achieved the same development as other infants. The death of preterm babies can be avoided if they can be kept alive longer during their time outside of the womb. Only 80% of the babies born before 32 completed weeks of the gestation period survive, meaning that 20% of that demographic die. The more exact statistic that represents this scenario is that the infant mortality rate per 1000 children born is 180.9 children dead. The improvements in technology, however, have only helped babies that were given birth to after the 23rd completed week of gestation (approximately 4 months). This paper will expound on what causes premature infant mortality, existing causes of premature infant mortality, existing innovations in the field, and consequences of premature infant mortality.

## Causes:

There are behavioral influences that lead to preterm births, including tobacco use, alcohol consumption, drug and steroid intake, poor nutrition, and stress. The use of chewing tobacco and cigarettes is arguably the most common cause of unwanted pregnancy outcomes. Tobacco causes a medical condition known as placental abruption, a separation of the placenta from the uterus before the birth of the baby[5]. This can cause internal bleeding for the mother, along with potentially reducing nutrient and oxygen supply to the baby. Only a correlation - albeit a significant one - has been determined between these two factors (as not all tobacco users have had this issue). Also, the frequency of use as well as the time in which the tobacco use has a

serious effect on placental abruption. Those who use substances toward the latter three months of the gestation period have a greater chance of developing this condition. Alcohol use is another causation of premature infant mortality, as the consumed alcohol enters the bloodstream. Since the umbilical connects the mother to the growing fetus, nutrients are shared between both entities. These growing fetuses cannot digest, or rather, catabolize the alcohol as quickly as a developed adult can. The most common medical condition developed by the child due to parental alcohol consumption during the gestation period is Fetal Alcohol Spectrum Disorders, commonly abbreviated by FASD[2]. This condition can lead to a lack of speech development in the child at an early age, and many case studies have shown strong evidence of physical defects. These children can have awkwardly shaped and “misplaced” facial features due to the damage done to their developing central nervous system. A specific case study in Dublin questioned over 60,000 women approximately 11 weeks after they conceived their child. 71% of these women claimed to have had an occasional drink multiple weeks into the gestation period, and out of these 42,600 women, there were 2 cases of FASD. Since not all heavy drinkers were affected by this syndrome and an occasional drinker was affected by this syndrome, the amount of alcohol taken in to develop this condition cannot be determined. This is why premature infant mortality can be associated with even low amounts of alcohol. Nutrition is also a very important factor during pregnancy to prevent premature infant mortality for to-be mothers who have an unusually low pre-pregnancy weight. This effect, however, cannot be clearly attributed to premature infant mortality because of potential confounding factors. The socioeconomic status of the mother, as well as smoking and drinking habits, influence the data heavily. This is because people from worse socioeconomic statuses are typically underweight and not on healthy diets. Smokers are

also known to be skinnier and have lower BMIs<sup>1</sup> on average. The results show that the risk of premature infant mortality was higher in underweight women[1]. The risks of premature infant mortality were similar in underweight women with a self-reported BMI (RR 1.19, 95% CI 1.09–1.30) and measured BMI (RR 1.28, 95% CI 1.14–1.44), as were the risks of premature infant mortality with self-reported BMI (RR 1.65, 95% CI 1.40–1.95) and measured BMI (RR 1.43, 95% CI 1.14–1.79). The RR is the risk ratio per 100 women who gave preterm birth as per a study done by the Oxford University academia in the department of epidemiology[1], with CI representing the confidence that can be placed in a specific interval of the RR. A RR greater than one indicates that the event is more likely to occur. An underweight mother is nearly 1.19 times more likely than their healthy counterparts to birth a premature infant. However, this risk ratio may not entirely be accurate as their sampling method to calculate the relative risk is not known. Stress is another factor with detrimental effects on a child after being conceived. A mother exposed to an excess amount of stress can have a greater chance of a preterm birth. A commonly used example in the field about this is how expecting mothers who were near the World Trade Center during September 11th, 2001 and the following days were more likely to have preterm births. This is a result of increased blood pressure which is harmful to the child in the womb and can let the water break before the gestation period ends.

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<sup>1</sup> BMI (body mass index) is an objective measure of corpulence, computed by dividing the mass of a person in kilograms by the square of their height in meters. A person with a BMI greater than 25 but less than 30 is considered overweight, while a person with a BMI greater than 30 is considered obese; a person with a BMI less than 18.5 is considered underweight..

### Diagnosis and Treatment:

Preterm births occur because the fetal membrane tears and ruptures before the 37th complete week of the gestation period. As our general understanding of scientific principles has increased, scientists have classified preterm births to be either spontaneous or indicated-- based on how a doctor can identify the type of birth dependent on multiple factors. The weight of the mother during the pregnancy is a strong indicator, as a lower than average weight can indicate that the mother does not have the sufficient amount of nutrients to provide to the fetus growing in the womb. Another indicator of preterm birth is excessive vaginal bleeding, as this can show that there has been a tear of the fetal membrane and that the pregnant woman's water may break. A less common indicator used by doctors is the number of fetuses found growing in the womb after an ultrasound is conducted. This is because evidence proves that as there is another fetus growing in the womb, there is a higher likelihood that the fetal membrane may tear. Like in a regular pregnancy, those with a preterm birth will experience the same contractions. An increasing frequency of uterine contractions in a pregnant woman who has not yet completed the 36 week gestation period is a biophysical predictor of a preterm birth, and a case of premature infant mortality. Those who do not have a spontaneous preterm birth are given antibiotics to prevent the fetal membrane from further damage. These antibiotics are of erythromycin, metronidazole, and clindamycin[2][4], all of which were not backed by statistical evidence, but only case studies. Many obstetricians have stated that there is no evidence to prove that administering these antibiotics will result in a regular pregnancy for at-risk mothers, however, since some women have benefited in the past, they are recommended. For example, the antibiotic erythromycin is commonly given as a topical solution to acne, however, some doctors

recommend it be administered vaginally to assist the womb in carrying the fetus. One benefit of it is preventing bacterial vaginosis infections, which is yet another factor that can lead to preterm birth. Progesterone is also given to mothers to prevent preterm births, which is a hormone released by the ovaries to help prepare for pregnancy. This is because any hormonal discrepancies can lead to premature infant mortalities. A non medical treatment that exists are interventions and support groups which seek to reduce stress in expecting mothers. By discussing the process of pregnancy, things are expected and unexpected, and much more, therapists can alleviate stress from mothers.

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