



## **Infant Mortality in Developing Countries: Comprehensive Review**

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### **ABSTRACT**

The death of children before completing one year is called as infant mortality which is measured by IMR (infant mortality rate) that is the number of children death before completing one year of life per thousand live births. Knowledge about this infant mortality is were important as the number of infants deaths are increasing day by day. Asphyxia, pneumonia diarrhea, malnutrition and preterm complications are some of the leading causes of infant mortality. Environmental factors, parental education, sanitation problems should be given some extra care for the prevention of infant mortality. Infant mortality is one of the important index of measuring the development of a country or a region. Further robusting, dynamic and healthy research is suggested in order to recognize loop holes regarding infant mortality globally specially in developing countries to decrease infant mortality rate to lowest level. By throwing light on this topic arranging workshops and awareness programs, infant mortality rate can be reduced

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## INTRODUCTION

The relation of health system factors with infant mortality can help estimating health policy in middle income and low income countries<sup>1</sup>. The word infant derived from a Latin word, meaning “unable to speak” or “speechless” is the very young offspring of a human or an animal. “The death of a baby before his or her first birthday is called infant mortality. The infant mortality rate is an estimate of infant deaths for every 1,000 live births”<sup>2</sup>. As an international metric, infant mortality is an important new phenomenon<sup>3</sup>. For its calculation infant deaths before the first birthday is taken as numerator and all live births is taken as denominator. One of the important indicators of a nation’s health is infant mortality which is associated with a lot of important factors such as maternal health, quality of medicines, access to the medical care, public health practices and socioeconomic factors<sup>4, 5, 6</sup>. Some other factors included are associated directly to child health such as certain diseases. Infant mortality rate is sometimes referred to as infant death rate. It is enormously dropped in the west countries due to sanitary improvements and high technology involved in medical care system but it is still very high in the developing and undeveloped countries. Pakistan is among one of the countries with highest infant death rate. The infant mortality rate has dropped in last few decades but the situation has not improved in Pakistan because the authorities are not addressing this issue. According to WHO the infant mortality rate in the rich are less than that of poor urban people.

In fact the knowledge about infant mortality is very important as the number of deaths are increasing to alarming level due to this. The aim of this article is to count and gather the reasons behind the infant mortality in different regions and try to highlight this issue so that this problem could be reduced.

## MATERIALS AND METHOD

A systematic review using End Note research software was done using Pub med research engine. Approximately 110 research articles related to the infant mortality were gathered and compiled. The critical method adopted was narrative literature review method. The research articles were selected mostly from 2010 to 2015. The research articles were collected related to infant mortality in developing countries and their trends and reasons were observed and gathered. Infant mortality in developed countries was also included in this paper for comparing their trend with developing countries and finding loop holes in this area.

### **Factors affecting infant mortality:**

Loss of a baby before completing first year of age is a very serious issue in any region of the world. National centre for health statics states that for every 1000 babies that are born 6 babies die during their first year and CDC (center for disease control) states that the reasons are as under:

- i. Baby is born with some serious birth defect
- ii. Baby is premature and with low weight
- iii. Some babies are victims of sudden infant deaths
- iv. Some babies are affected with complications during their maternal life
- v. Some are victims of injuries during or after birth

These five mentioned are the top problems due to which infant mortality occurs and 58% of babies die due to this problem in UNITED STATES. Child birth and conception have pronounced effects on the baby health.

According to WHO, the infant mortality rate is highest in the African region i.e. 60 per 1000 live births which is about 5 times higher than the mortality rate in the European region i.e. 11 per 1000 live births. Globally the infant mortality rate has decreased to a large extent i.e. from 63 per 1000 live births to 34 per 1000 live births.

Some of the factors are summarized under

#### **Cesarean delivery:**

Statistically there is significant negative linear corelationship between infant health or infant mortality with the cesarean delivery in the low income or developing countries but there is no such relationship found in the middle income or high income countries.<sup>7</sup> Recent data obtained from WHO showed that half of the high income countries have cesarean delivery rate of 25%.<sup>8</sup> Xie et al thought that cesarean delivery rate more than an extent or limit can do more harm than benefit. Cesarean delivery without any justified medical condition can cause harm to the infant health as it shortens the gestational life of the new born or infant.<sup>9</sup> It also bypasses the normal labor process and also the normal birth canal and both of these processes are very beneficial to baby health.<sup>10, 11, 12</sup> Normal delivery is also very important in the initiation of breast milk and also the quality of breast milk which are important factors for infant health.<sup>13, 14</sup>. So it was concluded that the cesarean delivery can directly affect the health of infant and specially the cesarean delivery without any justified medical condition.

#### **Decentralization of health care facilities:**

Over the past three decades many countries are emphasizing on the decentralization of the health care facilities. It was assumed that by giving power to the local government the decision making

power and implementation of these health care facilities will be improved. Health care reformist has declared the decentralization as a powerful mean of improving health care.<sup>15</sup> It was assumed that by giving powers and authorities to the local governments efficiency and equality will improve and in the same way health outcomes will be improved.<sup>16, 17</sup> In 1997 government of Uganda implemented this decentralization and devolved many of health care responsibilities to the local government for improving public health care facilities.<sup>18</sup> Habibiet al. studied panel data of Argentinean provinces during 1970–1994, and they found that decentralization had a negative association with infant mortality rates.<sup>19</sup> Habibiet al, in another study explained that more fiscal decentralization in china have lower infant mortality rates.<sup>20</sup> 1990-2013 panel data of European countries showed that decentralization have positive effect on infant mortality rates.<sup>21</sup> Therefore , decentralization was supposed to improve infant mortality in Uganda but the results of this article showed that infant mortality rates were deteriorated in 3 out of 4 regions showing a negative impact of decentralization.<sup>22</sup>

#### **Life style and education:**

In Nigeria childhood death is a major problem despite of the fact that the childhood mortality has been decrease to a greater extent.<sup>23</sup> Diarrhoea, malaria, measles ,respiratoryinfection and cholera were the main reasons for these deaths .And all these diseases are preventable and treatable and the lack of effective health policies and proper education were the main problems responsible for these deaths .Currently Nigeria ranked second in under 5 child mortality after India, worldwide. In Nigeria 1 million children under 5 die annually.<sup>23</sup> A study conducted in Nigeria for estimating infant mortality risk factors and study was based on the Mosley and Chen framework of factors influencing child survival in developing countries.<sup>24</sup> Other such previous studies on childhood mortality were also considered for assessment.<sup>25-31</sup> Other factors of maternal characteristics like education, literacy level , occupation ,parental education and Wealth index were included.<sup>32</sup> The study found that poor household ,poor literacy rate ,and poor parental education are mainly responsible for infant and under 5 child mortality.<sup>33</sup> So community based interventions are needed for reducing infant mortality and mainly we should target the mothers of low socioeconomic status.

#### **Sudden infant deaths syndrome:**

Sudden infant death is one of the important leading cause of infant mortality in united states with 53.4 deaths per 100000 live births.<sup>34</sup> The occurrence of infant mortality was decreased to 50% in 1992 after the launch of “Back to sleep” campaign.<sup>34, 35, 36, 37</sup> The rates of infant deaths related to sleep were increased during this time.<sup>38, 39,40</sup> The risk of sleep related infant death and other SIDS

can be affected by the sleep environment of infant and comfort ability of infant sleep. Sleeping on a sofa ,somewhere on a bed ding ,bumper pads and surface sharing can contribute to unhealthy sleep environment.<sup>41,42,43,44</sup> Sleeping on sofa increases the risk of infant mortality from 49 to 67 folds as compared to sleeping on normal surfaces as a bed or a crib<sup>41,42,45-47</sup> Sleep related infants death contribute a large proportion of infant deaths. They are associated with non supine placement for sleep, surface sharing and being found in the side of a sofa or bed. So it was concluded that non supine placement on sofa or other such surfaces

### **Maternal over weight and obesity:**

Obesity and maternal over weight have complications for infant health such as during pregnancy pre-eclampsia and diabetic disorders are more important and common in women.<sup>48</sup> Pre term delivery is directly related to pre-eclampsia and diabetes is directly related to genetic disorders that leads to macrosomia causing the risk of birth trauma.<sup>49,50,51,52</sup> Research on relation between obesity and infant mortality does not provide any useful information .However two recently published meta analysis showed that obesity have no relation with infant deaths as they state that overweight mothers have no chance of their new born at risk.<sup>53</sup> One of these article analyzed that there is risk during pregnancy period.<sup>54</sup> Maternal obesity is directly related to infant deaths via genetic abnormalities.<sup>55</sup> Preterm infants are also associated with infant morbidities.<sup>23,24</sup> The correlation between total body fat and maternal body weight is high during early months of pregnancy.<sup>56,57</sup> Over weight and obesity are directly related to ischemic heart disease ,diabetes and cancer.<sup>58</sup> WHO describes that the risk of obesity doubles from 1980 to 2008 with more than 1.4 million adults over weight in 2008.<sup>58</sup>

### **Hazardous chemicals:**

Many media reports showed that the rates of infant deaths and infant mortality has increased to a large extent in Fallujah Iraq which is present 20 miles west of Baghdad.<sup>59,60,61</sup> There have been great concerns about increase in congenital birth abnormalities ,cancer and leukemia in Iraq .And this was hypothesized that it was due to chemical weapons and carcinogenic agents especially depleted uranium ,used in the wars between 1991 and 2003.<sup>62</sup> In Barash it was investigated and proved that leukemia was significantly increasing since 1991.<sup>63</sup> In Iraq questionnaire based analysis was done and the cause of death was asked.<sup>64</sup> The interviewees were very sensitive explaining the cause of death and the similar situation was faced in past with Hiroshima survivors.<sup>65</sup>

### **Malnutrition and malnourishment:**

Children and maternal malnutrition and malnourishment is hypothesized to be the most contributing cause of 3.5 million annual deaths and 35% of the total disease prevalence in the children younger than five. Starting with vitamin A deficiency it is stated that Vitamin A deficiency during lactation and pregnancy is of great concern in many regions of the world.<sup>66</sup>Sachdev and Gogia presented ameta-analysis and showed postpartum effect of Vitamin A on the infant mortality and morbidity.<sup>67</sup>In a meta analysis it was concluded that newborns with A supplementation reduces the risk of infant mortality.<sup>68</sup>Of 9.7 millions child deaths one third occur due to malnutrition and malnourishment.<sup>69,70</sup>And it is stated that malnourished children are at greater risk of death.<sup>71-76</sup>

### **Parental smoking and alcoholism:**

From 1991 to 2002 smoking has declined from 18.1% to 11.4% but still it is a leading prevalent cause of infant mortality and morbidity in U.S.<sup>77</sup>. In some previous studies it is concluded that 5 to 6 % deaths are due to parental smoking.<sup>78,79</sup> Due to parental smoking a large number of preterm and low weight babies are born which have long term neurological and developmental effects on babies health.<sup>80</sup>Prenatal smoking is decreasing to a greater extent except in some areas where it is alarmingly higher than the average smoking.<sup>81</sup>In another research in Ghazastips it was observed that the smoking was higher in the mothers on died infants that was 59% than the mothers of survived infants that was 38%.<sup>82</sup>Alcohol used by the mothers is one of the marked factor for infant mortality as it was noticed in British women prison in 1899.<sup>83</sup>Maternal alcohol use during pregnancy has been declared a leading marker for SIDS recently.<sup>84</sup>In families with severe alcoholism ,infant mortality and maternal mortality has been increased <sup>85,86</sup>

### **CONCLUSION**

Some corrective measures should be adopted for decreasing infant mortality in developing countries .Maternal education should be given special consideration in this regard firstly. Maternal illiteracy is one of prime factor for infant mortality. There should be proper counseling for family planning in society. For women health there should be seminars against alcoholism and smoking in pregnant women. Proper facilities in the health care systems should be maintained continuously so that they may be provided to society as a continuous supply. Birth attendants should be properly trained so that there should be no sudden deaths of infants.

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