A Review Article on Estimation of Child Death Mortality under Age of Five In India

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Abstract:

Background: Under-five children have long term effect on their heath. In India, according to the United Nations International Children’s Emergency Fund (UNICEF) more than 2.3 million children died in 2005. Child death mortality determines world base data provided by inter agency child mortality estimation group of UNICEF.

Objective: The main objective of this research is to explore the child death mortality rate at present in India and to reach lower mortality using long term prediction.

Material and Methods: The secondary data was collected from National Family Health Survey (NFHS) of India and UNICEF. Determinants of child death time series analysis followed by Autoregressive Integrated Moving Average (ARIMA) model were performed.

Result: Infant, Neonatal and under five mortality rates are higher for female than for male in India in which parental gender preferences are insignificant. Under-five mortality rates were captured from 1990 to 2015. The effect of Infant mortality rate and neonatal mortality rate has decreased based on the deaths per 1000 birth. Global child mortality has decreased from 75.89 to 33.15 per 100 live births. According to the ARIMA model, in the year 2027 the mortality rate can come down to 5.40 in India.

Conclusion: Improvements in standards of living, advances in knowledge about disease and hygiene and public health measures has contributed towards improved numbers. Child health has now gradually improved since past 25 years (1990-2015). It can be more stable if measures are taken towards more spectacular advances in personal medical care and knowledge.

Keywords: Child Death rate, Neonatal Mortality rate, Infant Mortality rate, Regression Model, ARIMA model.

Introduction

Across the world, children are at higher risk of survival if they are from poor family. In more developed and wealthy countries, diseases are the major killers of children today. One of the significant finding seen for child mortality throughout the world, is the higher rate of mortality among Males than in Females. In India mortality in female exceeds from males. The standard of child mortality in a country has long been treated as an index of general development. Over the long time the international community has established periodic targets for the reduction of the child mortality. Millennium Development Goal Indicator is an indicator which is used to measure child health survival and overall development.

Child health and mortality both create an impact on economy of country. There are three basic reason are: First, they are important indicators of the success or failure of Government policy. Second, child health has long term impacts on their health and third, there is increasing recognition that children are economic actor in their own right.

The main objective of this research is to explore the child death mortality rate at present in India and to reach lower mortality using long term prediction.

Materials and Methods

Death and counting the number of deaths is a crucial public health indicator for many reason. Under-five mortality rate (U5MR) as the term most commonly used, is the probability of dying before age of live, usually expressed per 1000 live births. There are many different rates used to measure mortality. These rates are in the name of Crude mortality rate (CMR), Age-specific mortality rate under 5 years (ASMR-U5), Infant mortality rate (IMR), Maternal mortality rate (MMR) etc.

Inclusion criteria:

1. Area: Neonatal, Infant mortality is refers to deaths of children.
2. Appropriate measures of death rate based on the descriptive variables (Age, Sex)
3. Box-Jenkins 2 follows up the study that measures mortality rate and estimates its predictive value after long time.

Exclusion criteria:

1. Calculation has done up to 2015 database because; there is no current data available.
2. Population or sub-population is used as unknown parameters.
3. Other dependable variables are not covered in this research due to lack of information.

This research article basically research focuses on Neonatal and Infant mortality rate. Neonatal mortality is newborn death within 28 days of postpartum period. Neonatal death is attributed towards insufficient access to general medical care, during pregnancy and after delivery. [7]

Infant mortality refers to deaths of young children, typically in less than one year of age. It is measured by the infant mortality rate (IMR).

Neonatal Mortality Rate = Number of neonatal deaths X 1000
Total number of live births

Infant Mortality Rate = Number of infant deaths X 1000
Total number of live births

The study mainly focuses on under-five mortality rate. Under-five mortality rate is the probability per 1000 that a newborn baby will die before reaching age five. Data has been collected on secondary basis, which are available from several sources. One of the major organizations is UN Inter-agency Group on Child Mortality Estimation, a group consisting of UNICEF, World Health Organization (WHO) and National Family Health Survey (NFHS) of India.[5]

The data sources and methods used to measure the mortality structure (mortality rates by sex and age), is also used for creating the life table of child. Statistical software for social sciences (SPSS 20) has to measure life table of child under five. The method uses statistical models to obtain a best estimate trend line by fitting a country-specific linear regression model of mortality rates. Probability of the death is denoted as q(x, n).

\[ q(x, n) = \frac{d(x, n)}{l(x)} \]

Calculation of q(x, n) from d(x, n) is done according to the relationship [1]. The main data source for estimating and analyzing mortality rate by age group is Vital statistics [1]. Vital statistics provides data on deaths according to age group.

Time series measures the future behavior based on the certain way from past within certain limits by building models. Autoregressive Integrated Moving Average (ARIMA) model allows building up a predicting time series. Which is also called Box-Jenkins 2 model. ARIMA (0, 1, and 0) series is used [6]. The prediction for this model can be written as:

\[ Y_t - Y_{t-1} = \mu \]

Where the average period to period change in Y. It includes a no seasonal difference and a constant term.

Result

In 1990, the estimation of child death mortality rate was very high (75.89) according to the world data estimation organization (UNICEF, WHO, World Bank). Fig. 1 shows current world status based on the mortality rate of child death. Fig. 2 shows world wise mortality rate of child death less than 5. This has gradually gone down from the year of 1990 to 2015. Increase in life expectancy at birth, by initial mortality level and the rate of decrease of mortality day by day. By 2015, world mortality death rate has come down to around 44%.
Table A. Change in mortality death rates and Sex death rates from 1990 through 2015: India

<table>
<thead>
<tr>
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<th>Sex specific under five mortality rate (deaths per 1000 live birth)</th>
<th>Infant Mortality rate (deaths per 1000 live birth)</th>
<th>Neonatal mortality rate (deaths per 1000 live birth)</th>
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<tbody>
<tr>
<td>M</td>
<td>122</td>
<td>130</td>
<td>46</td>
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<tr>
<td>F</td>
<td>101</td>
<td>124</td>
<td>45</td>
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Fig. 3 and Fig. 4 shows Neonatal, infant, and under-five mortality rates are higher in females than in males in India, where parental gender preferences are insignificant. A comparison has been done between infant mortality and neonatal mortality based on the year 1990 and 2015.

In India, with high death rates, child mortality is a relatively sensitive indicator of health issues. Mortality among children under five decreased from 125.80 to 47.70 per 1000 live birth between 1990 to 2015 (Fig. 5). A comparison also can be done to see the current status of the India, based on the all over the world. Comparison between world and India’s mortality rate, shows that in the year of 2015 child mortality rate is high from 33.15 to 47.70 per 1000 live birth (Fig. 2 and Fig. 5).

In the year 2027, the lowest mortality rate can be expected in India. The estimation of child mortality rate will come to an acceptable lower regain in 2027 – around 5.40, calculated through time series ARIMA model (Fig. 6). A regression value of model fit r-square is .996. This is a highly acceptable value to fit this model.

Fig. 5: Estimation of child mortality rate under five years of age from the year of 1990 to 2015 per 1000 live births in India.

Fig. 6: Trend in the original and estimation values of the mortality rate in India: 1990- 2027

**Conclusion**

Mortality statistics alone are not sufficient to perfectly describe the measure and compare the health statistics of child. This is because death rates underestimate the burden of ill health. During the period 1990 to 2015, in this 25 years reduction was seen more in the under-five mortality. By 2015, neonatal deaths were found two third of infant death in the country (India). From the bivariate analysis, among the selected variables, child mortality rate consistently showed the lowest differentials in both infant and neonatal mortality rate.

**Suggestion**

Many of these deaths can be averted if parents are aware of warning signs, and take appropriate feeding practices and facility based care. Health in childhood is one of the most important factors predicting health. Community is essential for the development of a sense of health. In order to bring further quick
improvement, country needs to focus on other countries. Different countries have different approaches, strategies.
Child mortality has declined; but still 10.5 million children die each year. Its reduction must remain a focus of public policy.

We know a lot about the extent and decline of child mortality but less about its causes. Thus, this study should serve as an important factor for better child survival circumstances.

References


[5] National Family Health Survey Subject Reports, Number 11


