



Review Paper

Prediction of mortality rate of under five year age of Pakistan

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Abstract

Mortality rate is one of the important indicators of socio economic development of a country. The parameter derived from mortality provide a good picture of overall health status of population. It is mission of every country to save the lives of each and every person of the country. Now a day's mortality rate of under five year age is also the big challenge for every country. Pakistan also facing such kind of problem since last 56 years. But the current pattern shows good picture of the future. So the main purposes of this study was that how many times will be required for Pakistan to fully control over such a problem. I mean to control mortality rate under five year (2016) 78.8 deaths per 1000 per live births to 1 death per 1000 live births. Therefore, secondary data for the period of eleven year from 2006 to 2016, have been carefully collected about the "Mortality rate of under five year age of Pakistan" from one of the international organization. In the initial step liner trend of under five year mortality rate have been used to roughly checked free hand curve. Then it showed that the data have in linear trend. So we have used the linear trend model for the prediction of under five year age of mortality rate. After the Statistical analysis we have come to the conclusion that in next 30 to 32 year Pakistan will control the problem of under five year age mortality rate.

Keywords: Mortality, Under five year, Linear, Live births, Trend, Model.

Introduction

Mortality rates for under five year age and overall mortality indicators (life expectancy at birth or survival to a given age) are important indicators of health status in a most of the countries. Mortality rates are often used to identify vulnerable populations. It is most frequently used to compare socioeconomic development across countries. Among overall death 20% are the death of the children below the age of 5 years old.

Under-five year mortality rate can be defined as: "The probability per 1,000 that a newborn baby will die before reaching age five" (World Bank). In simple way it written by U5MR. It is also known as child mortality rate. There are many causes of under five year mortality rate which are premature birth, pneumonia, diarrhea, malaria, meals and malnutrition during pregnancy smoking is also one of the cause under five year age mortality rate. Mother education level, infectious diseases clean drinking water and other public health measures can help to reduce high rate of mortality.

Improve in standard of living, increase in health status and significant reduction of mortality are the notable achievements of world development. Globally it is estimate that the number of deaths below age five per 1,000 live births decline from 215 to 50 per 1,000 live births during 1950 to 2010 ¹. In Pakistan in 1960 the under five year age mortality rate was 260.20 deaths

Per 1000 live birth of under five year age. Under five year age mortality rate of Pakistan fell gradually from 260.20 deaths per 1000 under five year age live birth to 78.80 deaths per 1000 under five year live births in 2016.

According to Biotechnology and health Sciences education and life expectancy in the leading indicator of U5MR. In 1912 to 1915 Survey of Children in the United States. The income of the father also correlates with high mortality rate. In case where father had no income than the mortality rate of under five year age was 357% more than that for highest income earners. In most of the developing countries one the major issue of U5MR is lack of professional health care resources and skilled personal during the child deliveries. Pakistan is the third highest mortality rate of in Asia. There are many research paper have been published on the topics of mortality rates. In March 2015 P. Prajapati and A. Singh² have been worked on projection of infant mortality rate: Application of life expectancy. The two researchers have concluded that the infant mortality rate is dependent on the life expectancy. Therefore they have used the simple linear regression line for the analysis of data. In 2007 the four Hungarian researchers³ have been used the Lee-Cater method for the forecasting of Hungarian mortality rate they have concluded that the Lee-Cater method of forecasting is more precise in time data. But further modification of Lee-Cater model may be better. Most developments have taken place in the extrapolative approach.

Expectations are generally not a good basis for mortality forecasting, either at the individual or population level. Individual expectations are relevant only to the very-short-term future and have limited applicability. By using ARIMA we have forecasted that the under five year mortality rate of China during 2016 to 2020 might show slightly upward trend⁵. We have used both method either SLR or Holt's Linear Trend can be used to forecast the number of deaths by occurrence yearly in Malaysia. It has concluded that a little consideration have to be made such as the series of data and the approach to be used one-step-ahead or predict few years ahead using the same model⁶.

Methodology

The main step of any research is the collection of data. In this paper we have already sure that we can use the secondary data instead of primary data. Because in this kind of research the collection of primary data is not possible. For the collection of secondary I have used the one of the international organization. Now the second important step of this study is to define the population and draw sample. And the section of sample data to achieve the goals of the study. So the data of mortality rate under five year age were available in the website from 1960 to 2016. But it will be very difficult to use about 56 year data and its analysis. Therefore I have used the last eleven years of mortality rate of under five year age of Pakistan. After collection of data first of all I have used the free hand curve to check the trend of data. The collected data of under five year age per 1000 lives births data have showed in Table-1. Now a

day the availability of different Statistical software's the Statistical analysis is much easy. Therefore I have used the Excel 2010 to analysis of data. I have drawn the free hand curve by using excel 2010 which is show in Figure-1.

Table-1: Under five year age per 1000 live births data.

Years	Mortality Rate of under five year age of Pakistan Per 1000 live birth of under five year age
2006	99.6
2007	97.7
2008	95.8
2009	93.9
2010	92.1
2011	90.1
2012	88
2013	85.7
2014	83.3
2015	81
2016	78.8

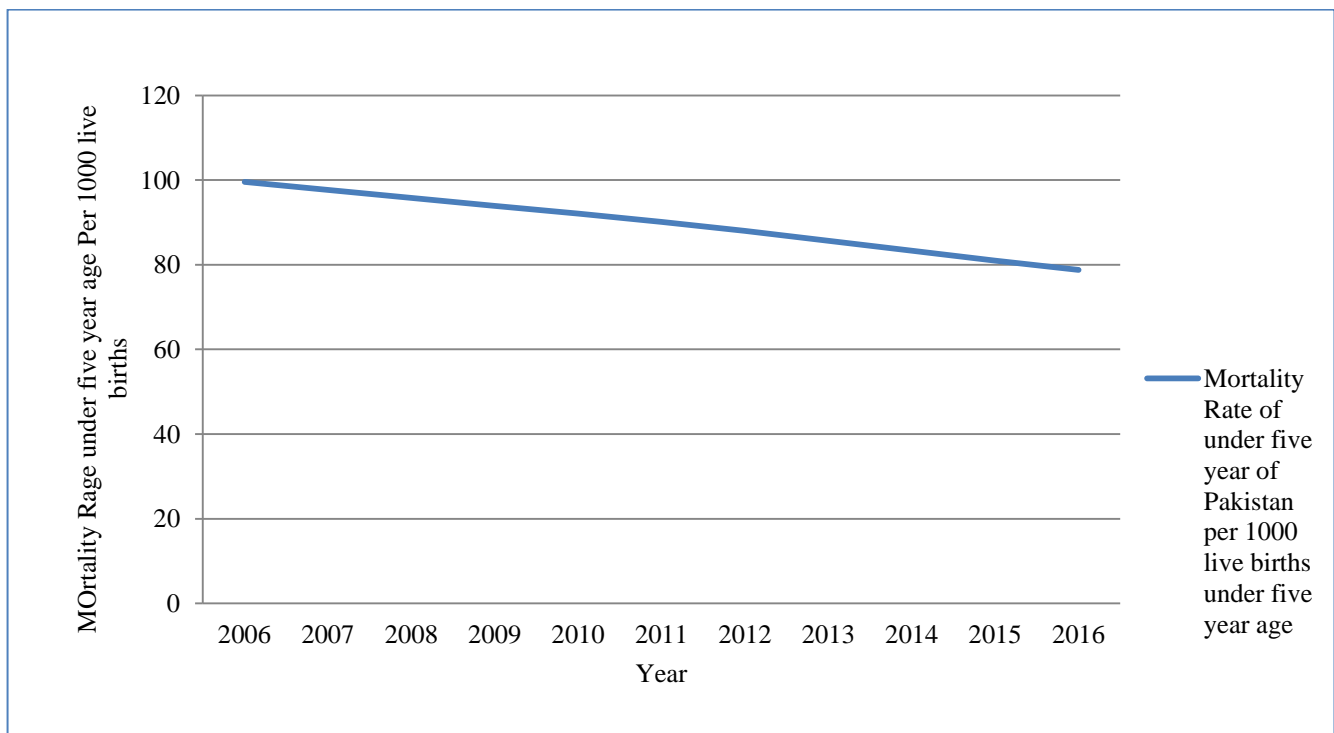


Figure-1: Mortality rate of under five year age of Pakistan per 1000 live births under five year age.

The above curve shows that the mortality rate of under five year of Pakistan is decline from linearly. After the above rough analysis we have gained the knowledge that the mortality rate of under five year age linearly decline so on the basis of this we will use the linear trend model for the further statistical analysis. The model of linear trend line is given Figure-2; where the variable Y represents the mortality rate of under five year age of Pakistan. And the variable t represents the time. Hence we have used the data of mortality by using excel 2010 the detail of the analysis are shown in Table-2.

By using the Table-2 information's I shall fit the linear trend model. The general linear trend modal is show in Figure-3.

$$Y = a + bt \tag{i}$$

Now by using the information of Table-2 we have calculated the value of unknown values of a and b.

$$a = 89.64 \quad b = -1.20$$

The fitted linear trend model is show in Figure-4

$$\hat{Y} = 89.64 - 1.20t \tag{ii}$$

By using the fitted model of mortality rate under five year age of Pakistan in Figure-4 we will predict the different year mortality rate of under five year age are given in Table-3. In

Table-3 \hat{Y} represent the predicted mortality rate of under five year age of different years.

Table-2: Linear trend mode.

Year	Y	t	tY	t ²
2006	99.6	-9	-896.4	81
2007	97.7	-7	-683.9	49
2008	95.8	-5	-479	25
2009	93.9	-3	-281.7	9
2010	92.1	-1	-92.1	1
2011	90.1	0	0	0
2012	88	1	88	1
2013	85.7	3	257.1	9
2014	83.3	5	416.5	25
2015	81	7	567	49
2016	78.8	9	709.2	81
Σ	986	0	-395.3	330

Table-3: \hat{Y} represent the predicted mortality rate.

Year	\hat{Y}	Year	\hat{Y}	Year	\hat{Y}	Year	\hat{Y}
2017	76.44	2025	57.24	2033	38.04	2041	18.84
2018	74.04	2026	54.84	2034	35.64	2042	16.44
2019	71.64	2027	52.44	2035	33.24	2043	14.04
2020	69.24	2028	50.04	2036	30.84	2044	11.64
2021	66.84	2029	47.64	2037	28.44	2045	9.24
2022	64.44	2030	45.24	2038	26.04	2046	6.84
2023	62.04	2031	42.84	2039	23.64	2047	4.44
2024	59.64	2032	40.44	2040	21.24	2048	2.04

Conclusion

As shown in the Figure-1 is that the mortality rate of under five year of Pakistan per 1000 live births is gradually decreased from 2006 to 2016. In 2006 the mortality rate of under five year of Pakistan is 99.9 but it is repeatedly declining from 2007, 2008 up to 2016. Now the in 2016 the mortality rate of under five year age is reduced to 78.8. One of the basic aim of to drawing free hand curve was to check that how the data trend from initial year to current year. There are several Statistical model used for the prediction of data. Such as linear trend model, second degree parabola, moving average etc. But on the basis of free curve trend we decided that the data is suitable for the fitting of linear trend model. So we have been fitted the linear trend model of the mortality rate of under five year age data. On the basis of the result of Table-3 we have concluded that the mortality rate of under five year age of Pakistan is declining. It shows that the Pakistani government is controlling the cause of under-five mortality such premature birth, pneumonia, diarrhea, malaria, meals and malnutrition during pregnancy smoking and other social economic factors day by day. On the basis of predicted trend value we have observed that if current mortality patterns remain constant next 30 to 32 year the government of Pakistan has completely controlled the mortality rate of under five year age to 1 under five year age death of per 1000 live births. Government of Pakistan should start health program to control the diseases such premature birth, pneumonia, diarrhea, malaria, meals and malnutrition in order to expedite to control over mortality rate of under five year.

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