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## Does Economic Growth Reduce the Mortality Rate?

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### **Abstract:**

*As a universal fact the one born has to die one day. But what is the cause of death matters a lot to the next of the deceased. There could be number of reasons for ones death and disease is one such prominent and main cause of the death in the most of the cases. In an orthodox society like the one prevalent in the Indian society disease is unfortunately considered the destiny of the person suffering of the one. Yes, destiny is something which nobody can deny or challenge but the question arises about the treatment and its quality. Who knows that a person with a disease if treated properly and in time can avert the death of that person? People catch diseases from different sources and of different reasons. At times the diseases get aggravated owing to the poor financial conditions prevailing in the family. However, it is usually believed that the improved financial conditions in the family will certainly enable the diseased person to go for treatment and makes him/ her capable for affording of better medical facilities available. This in turn should help in bringing down the mortality rate. The literature available in this field of research also suggests something close to this fact. However, some researchers have been skeptical for borrowing this conclusion. Their apprehensions are contrary to the former general view concerning the subject. They believe that economic growth is always related to more stress and mental as well as physical burdens.*

*This study tried to test the hypothesis that if the economical growth reduces the mortality rate or not. It was found that despite increased income the mortality rate has risen instead of expected decline. The reasons are many and varied discussed in the analysis and conclusion.*

**Key words:** Income slab. GDP. Mortality rate. Disease. Medical facility

### **1. Scope of This Paper**

It will be an endeavor of this paper to see the relation between economic growth and the mortality rate using scatter gram, correlation and regression techniques. This paper will use the data got from a valid source and some literature concerning the subject drawn from various sources as will be duly referenced.

### **2. Data**

The data are concerned with the total projected population of India and the mortality because of the diseases.

### **3. Subject Pertaining to the Data and Why It Is Interesting**

This study utilizes age-adjusted mortality rates as the outcome measure, while independent variables include real GDP per capita in purchasing power parity.

It is interesting to find the relation as there is a general belief that economic growth does reduce the mortality rate because of the improved health care and better access to the best medical and civic facilities available. However, there is a counter argument that economic growth increases the mortality rate because of the more stress and work load necessary for achieving the economic growth.

### **4. Source of the Data**

The data got online from the official web site of the ministry of health Government of India and economic cell (2009).

- <http://www.cdhidghs.nic.in/index2.asp?slid=1000&sublinkkind=719>
- <http://www.cdhidghs.nic.in/writereaddata/mainlinkFile/socioEconomic%20Indicators.pdf>

And Government of India Census Department

- [http://www.censusindia.gov.in/Census\\_Data\\_2001/Projected\\_Population/Projected\\_Population.pdf](http://www.censusindia.gov.in/Census_Data_2001/Projected_Population/Projected_Population.pdf)

## 5. Hypothesis to Be Tested

The hypothesis to be tested will be that economic growth is the main source for the decline rate of mortality during the present decade in India.

## 6. Introduction

It is generally believed that any growth in the economic conditions should improve the medical facilities besides other facilities and hence should enhance the Medicare for the general citizens of that country. If the medical facilities are improved it should mean an increase in the life expectancy and reduction in mortality rate. "Economic growth rates on an annual basis, without any lag, show a very weak, but a positive relation to age-adjusted mortality rates" Brenner, M H (2005),

This should hold good for any country in the world however, with the degree of their development status. There is enough empirical evidence that economic growth, cumulatively over at least a decade, is the central factor in mortality rate decline in many developed countries (e.g. Schalick L.M, et. al; 2000). However, in the beginning of the growth period there could be increased mortality rate which could be because of the initial stress of adaptation to new technologies, and more work load with high speed and time duration. Though the effect is short lived and diminishes within a short period of time until the mortality rate comes down.

There has been an argument that economic expansion results in increased mortality owing to it by effects. They believe that in order to ensure a marked improvement in the economic growth rate, people work hard and the resulting stress level and the work load coupled with the speed does result in the complex diseases which ultimately lead to the death of a person. But it is as good as saying increased facilities in the education, housing and medical sector will cause more deaths without taking into consideration the effects of the improved facilities on the improved education, enhanced housing and better health care. Therefore it is very important to judge the impacts of the fluctuations of the economic growth in the health and the impacts from the trends both medium and long term of the economic development.

## 7. Literature Review

The hypothesis under test is in line with large epidemiological literature which displays that there is an inverse relation of socioeconomic status to health status in connection with higher mortality and morbidity rates. There is a good amount of evidence that economic growth has remained fundamental for declines in the mortality rate over the last decade. However there is a negation of this argument as well though not substantiated.

According to Tresserras R, et. al (1992), Backlund E, et. al (1996), "it is now among the firmest of epidemiological findings, across industrialized societies, that socioeconomic status is inversely related to health status. In particular, higher income has been routinely shown to be a significant inverse predictor of morbidity and mortality".

It is equally recognized that economic growth does usher in an era of prosperity and growth of living standards which ultimately lead to a better standard of life. It has been recognized that increased economic status does mean better medical and sanitary facilities which lead to decline in the mortality rates (e.g McDonough P, et. al, 1997).

There has been empirical evidence that the death rate varies as does the income group varies in a society implying thereby that economic development is related to the mortality rate. Schalick L.M, et. al (2000) in their research pertaining to the varying mortality rates in different income groups found a positive relationship confirming that increased income reduces the death rate as compared to less income.

People with different kind of diseases can access to the best available facilities for the cure only if their economic position support that facility. It has been found that those people who have solid income enjoy the best medical facilities as compared to the ones with the low income group. Singh G.K, Siahpush M. (2002) supports this view after their research in the field of heart diseases and the mortality rate with the group of adults with varying socioeconomic status.

From the above discussion it becomes clear that economic growth being the primary source of upliftment of socioeconomic status eventually leads to better medical and other civic facilities and hence reduces the mortality and morbidity rates and vice versa of this also holds equally good.

There has been a large amount of literature talking about the relation between employment and mortality rate as well. It is obvious that unemployment leads to decrease in the income generation therefore to poor medical and other facilities which ultimately can lead to higher mortality rates.

Catalano R. (1991) in his research found a positive relation between health standards and unemployment leading to lower economic development what he called as economic insecurity. According to his findings people with different level of education manage to earn their livelihood which in the case of less educated people is not sufficient for their better health care while as people with higher education do earn enough money which help them to have better access to improved health care. It is not only the better health services but the lower income means malnutrition and poor sanitary conditions as well which could be the root causes of the diseases which eventually lead to death.

There is another aspect of unemployment which is desperation and frustration which leads to mental depression. It is a natural outcome of unemployment that people get frustrated which lead them to severe depression. Dooley D, et. al (1994) in their study regarding the depression because of the unemployment confirm that people who do not get proper employment in time and struggle for their livelihood do get severe depressions. Severe depression could be the root cause for the death in some cases.

People after retirement from their jobs have some impact on their health. It is not only because of the aging factor but the psychological effect has an element to do with it. People after retirement do not generally keep good health owing to many reasons

including the psychological one. Kasl SV, Jones BA (2002) while doing his study on the impact of job loss and retirement on health confirmed the positive relation between the two. They found that people after retirement get multiple problems including the depression which lead to complicacies in their health. They also argued that people who lose their jobs land into a severe depression which eventually lead to complex health problems.

Unemployment can be one of the main causes of the poor socioeconomical development in certain countries. During the recessions when people are rendered redundant or shot out of the work earnings per capita comes down and there is a direct effect on the GDP and its growth rate. Once the GDP comes down the Governments are not in a position to spend more on social welfare schemes and research and development schemes which forms the backbone in the medical field. This leads to poor health related facilities including the sanitation and other civic facilities.

Poor health also leads to poor performance. Labor markets can become sluggish if the work force is not healthy. In order to have an efficient labor market it is paramount to have an access to better medical facilities in addition to good nutritious food and other civic facilities. Bartley M, Plewis I (2002) while studying the labor market and long term illnesses and its effects on the GDP growth in a particular period of time found the positive relation between the variables. In the event of the long term illness there is an effect on the labor market which eventually affects the GDP. With the drop in the GDP growth no innovative projects in the medical field can be initiated which could benefit the people.

It is therefore argued that economic growth is important for the declining rate of mortality. The economic growth ensures improvements in health care, nutrition, sanitary and housing sectors besides many other sectors which are directly or indirectly related to good health and hence low mortality rate.

In the light of the above discussions however, it is difficult to understand the relation between the economic growth with a high mortality rate as is argued by Tapia Granados JA (2005), that faster economic growth leads to high mortality. He argues that in order to achieve high economic expansion people are made to work hard which leads to high level of stresses and that could be the cause of more deaths. It is interested to note here that his estimates are simple correlation without any regard to control variables which lead him to such conclusions. According to Brenner, M.H (2005), "the estimates by Tapia Granados are presented in simple correlations, without regard to lag estimation or the usual multivariable controls for confounding and interaction, or the standard econometric tests including those for residual autocorrelation and unit roots, and even without capitation of GDP itself".

It is also interesting to know the basis for claiming that economic growth is the criterion for decline in the mortality rate. In this connection it is strongly argued that any reduction in poverty is the function of economic growth. Economic growth ensures the highest levels of real income and basic earnings go up. The tax contributions go up and Governments can make investments in the research and development projects which can prove milestones in providing effective treatments, drugs etc. to different kinds of diseases which surely will enhance the life expectancy and lower the mortality rates. Ambulance services with better hospitals can become possible only if the Governments have enough funds available for investment in such projects. Improved services to disabled and older population could be provided with improved economic conditions. Working conditions can also be improved with better economical conditions. The eating habits of people could change towards the healthy side with fruits, vegetable and less calorie food added to their diet if their economic conditions improve. People having enough money to spend can manage to go a gym and other such centers for regular exercises to maintain a good health and avoid diseases. All these efforts finally lead to lower mortality rates.

Moreover, increased life expectancy is an outcome of economic growth, however, the earlier period of an economical growth requires adaptation. The earlier adaptation pattern has been referred to as a distinguishing factor between trends in economic growth and rapid economic growth. Schumpeter, J.A. (1942), argues that "innovations are the basis of improvements both productivity and the quality of goods and services". It is also argued that these are the causes for greater stress levels. Those who fail to keep pace with the innovations lose jobs or terminate their businesses which in turn lead to social change. During the fast economic growth people make heavy investments in innovations. In its run for innovations organizations introduce latest technologies which eventually impose heavy stress on employees for their adaptability. Employees have to adapt to the new demands or to be ready to lose the job.

Siegrist, J; Peter, R (2000) in their study of work related stress argues that there are imminent signs of work stress which relates to injuries and cardiovascular illness because of the more workload on the employees. In the event when there is greater demand for the products especially in an economic boom organizations make its employees to work more which lead to the higher stress levels. During an economic upturn organization coming out of recession lack the confidence and do not re employ their ex-employees or appoint new employees in order to cater the growing demand for their products and services but make their present employees work hard which exposes them to higher amounts of stress.

Higher stress levels also lead to higher amounts of tobacco and alcohol consumptions which lead to many diseases including cancer. It can therefore be concluded that higher socioeconomic development surely leads to better medical, civic and other facilities which lead to decline in the mortality rates.

## 8. Data Description

### 8.1. What Is the Data?

The data is related to the income per capita with yearly figures, projected population of the Union of India, as got from the census department of the Government of India and the mortality due to diseases in India on a yearly basis.

8.2. Sources of Data

The data got online from the official web site of the ministry of health Government of India and economic cell (2009).

- <http://www.cdhidghs.nic.in/index2.asp?slid=1000&sublinkind=719>
- <http://www.cdhidghs.nic.in/writereaddata/mainlinkFile/socioEconomic%20Indicators.pdf>

And Government of India Census Department

- [http://www.censusindia.gov.in/Census\\_Data\\_2001/Projected\\_Population/Projected\\_Population.pdf](http://www.censusindia.gov.in/Census_Data_2001/Projected_Population/Projected_Population.pdf)

9. Any Adjustment

The mortality was given in the absolute numbers hence needed to be converted in the percentage given the total population.

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Deceased	2990	4135	4794	5174	5935	7488	8179	8997	8705
Population(00)	10848	10660	10537	10238	10917	10572	11216	11252	11473
Mortality rate	003%	004%	005%	005%	006%	007%	007%	008%	007%
Income per capita	1581	1648	1712	1885	2071	2118	2400	2524	3288

Table 1: Income per Capital and Mortality Rate from Diseases

10. Scatter Diagram

According to Joseph, A (2010), ‘Data showing the relation between two variables are plotted as points on a graph which is called a scatter gram’. Scatter diagram shows graphically the relationship between the variables and help to understand the relationship very easily.

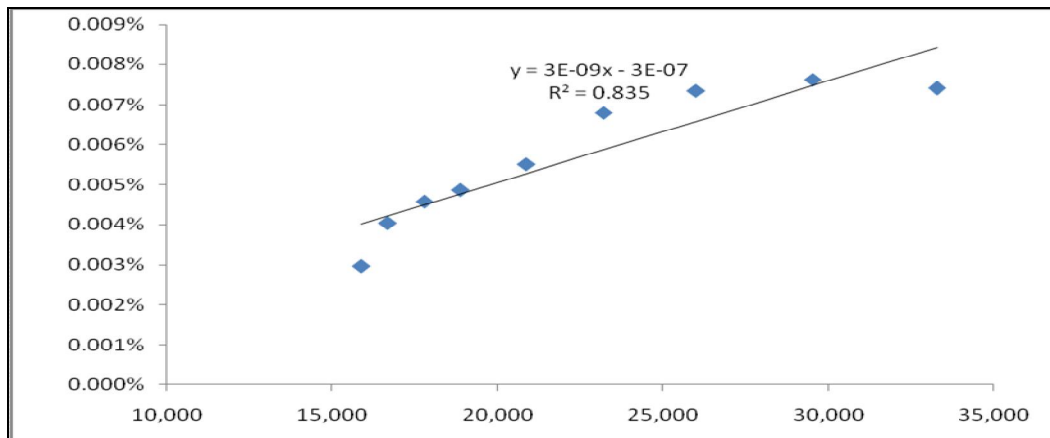


Figure 1

X- Axis Shows The Income Per Capital And Y- Axis Shows The Mortality Percentage.

11. Correlation

The correlation measures the strength and direction of the relation between two variables. From table 02 below the correlation coefficient for income per capita and mortality rate is 0.913921 and is positive. This indicates that an increase in income results in an increase in mortality rate. Since the P - value is 0.0005 (less than 0.05) which is statistically significant therefore the relation could be trusted. However this does not mean that there is any causality which means that increase in the per capita income should necessarily increase the number of deaths.

R<sup>2</sup> is called the correlation of determination and the value is 0.835. This implies that a 83 % change in mortality can be attributed to changes in income per capita level. In this case it is a high %age and shows the strength of the relationship between the variables. It indicates a relationship between the two variables.

Since the correlation is closer to 1 which indicates that the relation between the variables is significantly stronger.

12. Regression & Correlation Analysis

Regression is used to build a model which helps us to forecast one variable from the other or to say dependent variable from the independent variable. The regression equation for income per capita and the mortality is given by variable  $Y = 3E-09x - 3E-07$

The slope of the regression line is while the p value for the slope is 0.00056. Since the p value is less than 0.05 which means that the relation is statistically significant.

From this equation we can forecast to a reasonable degree the mortality rate.

The residual error being 3.754 which means that while calculating the regression there has been an error of 3.754 for different years. It shows the error which is present in the model for forecasting.

SUMMARY OUTPUT								
<b>Regression Statistics</b>								
Multiple R	0.913921							
R Square	0.835252							
Adjusted R Square	0.811717							
Standard Error	7.32E-06							
Observations	9							
<b>ANOVA</b>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	1.90349E-09	1.9E-09	35.48921	0.000566			
Residual	7	3.75449E-10	5.36E-11					
Total	8	2.27893E-09						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	-3.5E-07	9.89899E-06	-0.03531	0.972816	-2.4E-05	2.31E-05	-2.4E-05	2.31E-05
X Variable	2.54E-09	4.27179E-10	5.957283	0.000566	1.53E-09	3.55E-09	1.53E-09	3.55E-09
<b>RESIDUAL OUTPUT</b>								
<i>Observation</i>	<i>Predicted Y</i>	<i>Residuals</i>	<i>Standard Residuals</i>					
1	4.01E-05	-1.04056E-05	-1.51893					
2	4.21E-05	-1.86462E-06	-0.27218					
3	4.49E-05	8.09454E-07	0.118158					
4	4.77E-05	9.58274E-07	0.139881					
5	5.28E-05	2.40664E-06	0.351302					
6	5.87E-05	9.38674E-06	1.3702					
7	6.58E-05	7.68848E-06	1.122302					
8	7.48E-05	1.37514E-06	0.200732					
9	8.43E-05	-1.03545E-05	-1.51146					

Table 2: Showing the Correlation and Regression

### 13. Conclusion

From the discussions and the analysis made above it is evident that there is a strong positive relation between GDP per capita and the mortality rate. It negates the literature and the hypothesis because of the following:

- **Income Inequality**

The income equality can be there as the distribution of wealth is never uniform. If we know the Gini Coefficient we can say to what extent the income distribution is uniform. In this case the people with a solid income and increasing income have benefited from the facilities but unfortunately in India people living below the poverty line is much greater who with their meager income cannot afford to these facilities. That could be the reason for this positive relation.

- **Access To The Facilities**

There are improved medical facilities in India especially in the private sector but it is only the rich people who can afford the expenditure and have the easy access to these facilities. However, the Government has been trying hard to improve the facilities including the civic facilities but lot more remains to do.

- **Stress Level**

There has been a lot of stress on the working class which can result in the more mortality rate despite the increase in the income per capita.

### 14. Limitations

There are some limitations in this study which can influence the outcome results. The sample size itself is too short for analysis. The non availability of large sample size is the main limitation. If it would have been larger like in ten to fifteen years the result could have been different.



The census department provided a projected population data which were used for this analysis. May be the actual figures are different and could have yielded different results.

The actual income distribution is not available for the use of this study. This field could be an area of further research in order to show the accurate results.

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