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# Impact of Income Inequality on Health Status in South Asian Countries: A Panel Data Analysis

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***Abstract:***

***Purpose:*** *This study aims to analyze the impact of income inequality on health status in South Asian countries. These countries are Pakistan, India, Bangladesh, Sri Lanka, and Nepal.*
***Design/Methodology/Approach:*** *Fixed Effect Model is employed to find the impact of income inequality on these countries' health status using panel data from 1998 to 2017. The data is taken from the Standardized World Income Inequality Database, United Nations Educational, Scientific and Cultural Organization database, and World Development Indicators database. Finally, the Hausman test is used to differentiate between the Fixed and Random Effect Models.*
***Findings:*** *The findings of the study show that health is negatively affected by income inequality. Income and education have a significant impact on health status in this region. Further, results show that males are more affected by income inequality than females, and an increase in per capita income has more effect on female health status than males. It is revealed that education has more effect on female health condition as compared to male. The mean life expectancy of a male in this region is slightly higher than that of females. The outcome of the analysis explains that the coefficient value of education and income inequality is higher than income.*
***Practical Implications:*** *The unequal distribution of income has immense harmful effects on health. Health is the fundamental need of human beings, and it has effects on each activity of the individual. The increasing level of income inequality and its effects on health is a big challenge for South Asian countries. Reduction in income inequality is practically desirable.*
***Originality:*** *This research study explains an original empirical analysis based on panel data obtained from the World Development Indicators database for five South Asian countries.*

***Keywords:*** *Health Status, Income Inequality, Life Expectancy and South Asian Countries.*

***JEL codes:*** *C01, I1, I14.*

***Paper Type:*** *Research Article.*

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## 1. Introduction

Health is a leading issue in millennium development goals. All countries of the world wish to improve their health status. World Development Report (2015) states that healthier individuals have longer lives. Health plays a vital role in increasing the production of a country. Nasreen *et al.* (2012) consider health a significant catalyst because it boosts individuals' earning capacity and self-respect. Better health increases the productivity of labor. Musgrove (1993) describes that health is an essential factor in reducing poverty and increasing long-term economic growth.

A better mental and physical condition is known as health. The absence of disease is considered as health status. Health is a condition of the human body without sickness and injury. World Health Organization (WHO) defines *health* as the lack of diseases or infirmity and a situation of complete mental, corporal, and social happiness. WHO (1984) re-define health as the extent to which individuals or groups can realize aspirations and satisfy needs and change or cope with the environment.

*Income inequality* can be defined as a circumstance whereby money is got during a specific period, especially as repayment of factors of production like labor, wage, and interest on capital in diverse size, degree, or situation, particularly in an inequitable distinction in the ranking (Bakare, 2012). Income inequality means the level of income is disseminated in an unequal behavior among a population. Todaro and Smith (2005) discuss that income inequality is the unequal distribution of real national income between families. It is also defined as the unequal distribution of income among the different participants of a country. Graham (1995) defines that it is a line drawn between the wealthy and poor. The proportion of income is distributed between percentages of the population, known as income inequality. *Income inequality* can also be defined as the gap between rich and poor.

Human capital is an essential factor for any economy. Human capital is considered the backbone of any economy, and it increases the production of a country. Human capital plays a significant role in increasing total factor productivity and contributes to any country's income process (Fleisher, Li and Zhao, 2010). Human Development Report (2015) shows that healthier, educated, and skilled employees can perform more varied work, extra productive, innovation and keep a higher standard of living. The welfare indicators of an individual are total income, health, and consumption. Almost all countries have a desire to improve their human capital like education, health, and skill. Better health can improve the living standard, decrease poverty and facilitate affirmative gender results (Human Development Report, 2015).

Income inequality is a primary hurdle in the development of any economy. In a state of affairs where income inequality occurs, the rich become more affluent, and the poor become poorer. Income inequality has many economic consequences, which affect society and public health. Demombynes and Ozler (2005) describe that income inequality positively correlates with violence; it harms health and society. Kawachi and Kennedy (1997) illustrate that income inequality causes the reduction of social

capital like trust among citizens and reciprocity norms. Social capital increases the government's performance to control the crime rate, for the performance of democracy, and increase the level of public health. Income inequality is indirectly proportional to social capital.

Many studies find the relationship between income inequality and health status, but these studies neglect the South Asian region. The various studies find that income inequality harms health status. Some researchers explore that health status is positively affected by income inequality. Therefore, the relationship between income inequality and health status remains a question. Therefore, this study re-examines the relationship between education, income inequality, and health status in South Asian countries.

The study's objectives are to determine the impact of income inequality on health status and the impact of income and education on health status in South Asian countries.

## 2. Literature Review

Health is an essential determinant for economic growth. Better health improves the living standard of society, and it boosts the productivity of the country. Income inequality has direct or indirect effects on the health conditions of the people. The literature shows that education and income inequality have an impact on health status. Wilkinson and Pickett's (2006) analysis are based on 155 reviewed articles, and they conclude that the poor health of the population is affected by unequal distribution of income. Eighty-eight reviews show that the lousy health of the population is associated with broader distribution of income. Forty-four reviews show positive and significant relationships between the unequal distribution of income and the population's worse health. Thirty-seven studies indicate that there is no significant positive association exists between them. Nasreen *et al.* (2012) find a negative relationship between income inequality and health. Amin (2001) concludes that income inequality is negatively related to health. Child (2013) estimates a positive and significant relationship between income and health. Adjaye (2004) indicates that health is negatively affected by income inequality, and it is positively affected by education and income.

Hu, Lenthe, and Mackenbach (2015) analyze the association between income distribution, life expectancy, and cause of mortality using the data of 43 European countries from 1987 to 2008. The data is taken from Standardized World Income Inequality Database (SWIID), Human Life Table database, WHO database, United Nation World Population database, Maddison database, Quality of Government database, and Barro Le Educational Attainment database. Fixed Effect (FE) Model and Clustered Sandwich Estimator are used as econometric tools. The findings of the study show that income inequality is increased in European countries during the analysis period. Unequal distribution of wealth harms the life expectancy of males as well as females. A positive association is found between income inequality and

mortality. The results also indicate that income inequality has a negative impact on other causes of mortality like suicide and cancers.

Heden (2015) explores the relationship between the unequal distribution of income and health status for 19 Organization for Economic Cooperation and Development (OECD) countries. The data is gathered from the OECD database from 2004 to 2011. Life expectancy year, male life expectancy, female life expectancy, infant mortality rate, and per thousand death rates are utilized as dependent variables in econometric models. Health care resources, income inequality, pollution, tobacco, and alcohol are employed as regressors. Generalized Least Squares (GLS) based on panel data method is used. It is found that income inequality determined the health of the population, and it has a substantial and significant impact on population health. The results also show that socio-economic determinants have a substantial impact on life expectancy. Results also indicate that spending on health care, income, and education significantly impacts health at the aggregate level.

Herzer and Nunnenkamp (2015) estimate the relationship between income inequality and health status in developing and developed countries. Data is used from 1981 to 2005 and is retrieved from WDI and SWIID databases. Conventional regression and panel cointegration techniques are used to estimate this relationship. Dynamic OLS and Auto-Regressive Distributed Lagged Model are also used. The findings explain that an increase in income inequality tends to improve health conditions in developed countries. A positive association exists between the Gini coefficient and health in developed countries. It shows that life expectancy is negatively affected by income inequality in developing countries. The study outcomes also illustrate that income inequality has a significant positive impact on developing countries' infant mortality rates.

Bhattacharjee, Shin, and Subramanian (2015) explain the relationship between income distribution and expenditures on health for OECD countries. Data are gathered from SWIID (2013) and World Income Inequality Database (WIID). Two samples of eight OECD countries are used. One sample contained data from 1980 to 2011 while the other from 1988 to 2011. Overlapping Generation Model of the two-time period is employed. A fully Modified OLS is used. Panel cointegration and panel Error Correction Model (ECM) is also employed. The results show that a rise in income inequality and poor health of society is found during the private regime. It shows that during the public regime, income inequality is reduced, and high-income growth in rich countries is observed.

Nejadlabbaf, Jari, and Muhammad (2013) evaluate the effect of unequal distribution of income on health conditions in case of 22 developing countries. Panel data from 1995 to 2008 is used. The results show that health status is negatively affected by income inequality. Child (2013) explores the influence of income inequality on health conditions over the four censuses from 1980 to 2010 with panel data of 51 US states. The results show that income inequality is positively related with health conditions. Baeten, Ourti, and Doorslaer (2013) explain the relationship between income

inequality and health status in the case of china by utilizing the Health and Nutrition Survey data for China. They find that health gaps are allied with income inequality. The people in coastal and rural areas have better health. Income level improves the health condition with decreasing rate (Thalassinos *et al.,* 2019).

Pulok (2012) investigates the relationship between income inequality and health in 31 developing countries using panel data from 1982 to 2002. Results show that income inequality harms health status. However, this relationship is disappeared when education is introduced as a control variable in the model. Torre and Myrskyla (2011) find the relationship between income inequality and the health condition of the population of 21 developed countries with panel data (1975 to 2006). They show that the Gini index has a strong positive impact on mortality of both genders up to 15 years, and equal distribution of income improved\ the health condition of children up to middle-aged men.

## 3. Methodology and Data

### 3.1 Variables

Panel data are used from 1998 to 2017 to investigate the impact of unequal distribution of income on five South Asian countries' health status. Data of life expectancies are taken from WDI. The Gini Coefficient source is SWIID, data of Education is gathered from the UNESCO database, and WDI is the source of per capita GDP.

Measures of health status in literature are life expectancy at birth, infant mortality rate per thousand, under five years mortality rate per thousand, and crude death rate per thousand. The mortality rate is a negative measure of health conditions. Increase in mortality rate is directly meant that health condition becomes worse. Mortality rates are employed as a proxy of health status (Deaton, 1999; Lobmayer and Wilkinson, 2000; Ross *et al.,* 2000; Veenstra, 2002). Life expectancy and mortality rate are used as health indicators in different studies (Amin, 2001; Hu, Lenthe and Mackenbach, 2015; Ross *et al.,* 2000; Shmueli, 2004; Torre and Myrskyla, 2011; Weich, Lewis and Jenkins, 2002). The death rate per thousand is also a negative indicator of health status because if the death rate increases, then health conditions become poor.

We use life expectancy as a measure of health status. Total life expectancy, life expectancy female, and life expectancy male are used as health status indicators in three models. Life expectancy is a more reliable and valid measure of health status (Shmueli, 2004). Life expectancy is a positive measure of health; more life expectancy means better health conditions. Life expectancy is used as a proxy of health status in the studies (Herzer and Nunnenkamp, 2011; Judge, 1995; Shmueli, 2004).

Our study uses the Gini coefficient from zero to 100 scales. Gini coefficient is employed as an indicator of income inequality in the studies of (Gronqvist *et al.,*

2012; Herzer and Nunnenkamp, 2015; Nasreen *et al.*, 2012; Nilsson and Bergh, 2012). Gini coefficient is a proxy variable for unequal distribution of income. Its value lies between zero and one. If the Gini coefficient's value is zero, it means equal distribution of income, and 100 means complete unequal distribution of income. Herzer and Nunnenkamp (2015) use the Gini coefficient to measure income inequality from zero to 100 scales; zero means equal distribution of income, and 100 mean entirely unequal income distribution. Income and Education are treated as control variables in our study. Studies (Deaton, 1999; Hu *et al.*, 2015; Judge, 1995; Lonmayer and Wilkinson 2000; Pulok 2012) use income as a control variable. GDP per capita is employed as a measure of income. Education also has a substantial effect on health conditions (Adjaye, 2004). Education is widely used as an explanatory variable in the studies of (Adjaye 2004; Mellor and Milyo, 2002; Nasreen *et al.*, 2012; Pulok, 2012). In these studies, education level is measured using secondary school enrollment.

### 3.2 Methodology

We use balanced panel data in our study to estimate the impact of income inequality on health status in five South Asian Countries, Pakistan, India, Bangladesh, Sri Lanka, and Nepal, for the period (1998-2017). Hausman test is applied to differentiate the Fixed Effect (FE) and Random Effect (RE) model. This test's null hypothesis is that the individual effect is not correlated with independent variables (Hausman, 1978). If the null hypothesis is not rejected, GLS and LSDV are consistent, but LSDV becomes inefficient. In case of rejection of the null hypothesis, it becomes efficient and unbiased. Inconsistency and biases occur in GLS, so the LSDV is best adopted (Greene, 2008). Chi-square distribution and degree of freedom k are adopted for test statistics. If the null hypothesis is rejected, at least one independent variable is correlated with the individual effect. In this situation, RE Model becomes problematic if it is adopted. When the null hypothesis is rejected, it means FE Model is suitable.

### 3.3 Model Specification

Income inequality and income are important determinants of health status. Studies (Amin, 2001; Hu *et al.*, 2015; Ross *et al.*, 2000; Shmueli, 2004; Torre and Myrskyla 2011; Weich *et al.*, 2002) investigate the relationship between income inequality and health status using the Gini coefficient and income as independent variables. Education is also an essential factor affecting health status (Muller, 2002; Nasreen *et al.*, 2012; Pulok, 2012). The empirical model's selection is constructed considering the studies of Adjaye (2004), Fatukasi and Ayeomoni (2015), Nasreen *et al.* (2012). Total life expectancy, female and male life expectancy is used as proxies of health status (Hu *et al.*, 2015). We specify the following three econometric models to estimate the impact of income inequality on health status.

$$Le_{it} = \beta_0 + \beta_1 GINI_{it} + \beta_2 GDP_{it} + \beta_3 ED_{it} + \mu_{it}$$
$$Lef_{it} = \beta_0 + \beta_1 GINI_{it} + \beta_2 GDP_{it} + \beta_3 ED_{it} + \mu_{it}$$
$$Lem_{it} = \beta_0 + \beta_1 GINI_{it} + \beta_2 GDP_{it} + \beta_3 ED_{it} + \mu_{it}$$

Where:
$Le_{it}$ = Life Expectancy Total in Country i and Time Period t.
$Lef_{it}$ = Female Life Expectancy in Country i and Time Period t.
$Lem_{it}$ = Male Life Expectancy in Country i and Time Period t.
$GINI_{it}$ = Gini Coefficient in Country i and Time Period t.
$GDP_{it}$ = GDP Per Capita in Country i and Time Period t.
$ED_{it}$ = Education Level in Country i and Time Period t.
$U_{it}$ = Error Term

$Le_{it}$, $Lef_{it}$ and $Lem_{it}$ are proxies for health status and are used as dependent variables. Income inequality, income and education are used as the independent variables. $(\beta_0)$ is the value of intercept while $\beta_1, \beta_2, \beta_3$ are slopes of the model.

## 4. Results and Discussion

### 4.1 Descriptive Statistics

Descriptive statistics describe the variables, their maximum, and minimum values. It also elaborates the mean and median values of each variable. The descriptive statistics of the variables are given in Table 1. It shows that the Gini coefficient's average value and its value is 42.80, which is very high. As the value of Gini increases, the gap between rich and poor is increased. The statistics show that there is a wide gap between rich and poor in this region. The average total life expectancy is 66.49 years. The maximum life expectancy is 74.41, and the minimum life expectancy is 58.81 years. The descriptive statistics reveal that the education level is not good because the average secondary enrolment is 54.02%. While the maximum secondary enrolment is 99.81 and the minimum secondary enrolment is 19.63%, there is also a significantly worse condition of education. The mean value of GDP per capita is 723.85 dollars. It means that the countries in this region are impoverished.

***Table 1.*** *Descriptive Statistics*

| Variables | Mean | Median | Maximum | Minimum | Std. Dev. | Obs. |
|---|---|---|---|---|---|---|
| LE | 66.49 | 65.87 | 74.41 | 58.81 | 3.91 | 100 |
| $LE_F$ | 67.94 | 66.92 | 77.60 | 59.56 | 4.75 | 100 |
| $LE_M$ | 65.11 | 64.90 | 71.37 | 58.10 | 3.26 | 100 |
| GINI | 42.80 | 42.33 | 52.76 | 35.61 | 5.50 | 100 |
| EDU | 54.02 | 48.56 | 99.81 | 19.63 | 20.85 | 100 |
| GDP | 723.85 | 620.14 | 2135.66 | 254.53 | 398.35 | 100 |

***Source:*** *Author's Own Calculation.*

### 4.2 Correlation Matrix

The correlation matrix shows that there is a negative correlation between income inequality and health status. All categories of life expectancy are negatively correlated with income

inequality. It means there is a negative relationship between income inequality and health status. The correlation matrix indicates that education is positively correlated with health. The outputs of correlation also reveal a high positive relationship between income and health. There is a solid and positive relationship between income and income inequality. The results also show a positive relationship between education and income. The results of the correlation matrix are given in Table 2.

***Table 2.*** *Correlation Matrix*

| Variable | LE | $LE_M$ | $LE_F$ | GINI | EDU | GDP |
|---|---|---|---|---|---|---|
| LE | 1 | | | | | |
| $LE_M$ | 0.97 | 1 | | | | |
| $LE_F$ | 0.98 | 0.92 | 1 | | | |
| GINI | -0.48 | -0.31 | -0.58 | 1 | | |
| EDU | 0.78 | 0.66 | 0.84 | 0.83 | 1 | |

***Source:*** *Author's Own Calculation*.

### 4.3 Fixed Effect Model with Life Expectancy Total

Table 3 and Table 4 represent the results of the Hausman test and FE model consequently. Hausman test is used to distinguish between FE and RE models. Hausman's test is based on the value of Chi-square and its probability value. If the probability value of Chi-square is less than five percent, it rejects the null hypothesis and accepts the alternative hypothesis, meaning that the FE model is appropriate.

***Table 3.*** *Hausman Test Result*

| Test summary | Chi-square | Df. | P-Value |
|---|---|---|---|
| Period random | 36.68 | 3 | 0.000 |

***Source:*** *Author's Own Calculation*.

Table 3 shows that the probability of Chi-square is 0.000. It means FE is appropriate when the life expectancy total is used as the dependent variable. The fixed effect model results when total life expectancy is used as regress and are given in Table 4.

***Table 4.*** *Fixed Effect Model Results with Least Square Dummy Variable*

| Variables | Co-efficient | Std. error | T-Statistics | P-Value |
|---|---|---|---|---|
| GINI | -0.56* | 0.07 | -7.83 | 0.000 |
| GDP | 0.004* | 0.001 | 6.07 | 0.000 |
| EDU | 0.21* | 0.02 | 10.61 | 0.000 |
| C | 76.04* | 2.17 | 35.04 | 0.000 |
| R-Squared | 0.85 | | Adjusted R-Squ. | 0.81 |
| F-Statistics | 20.39 | | Prob(F-Stat) | 0.000 |

***Note:*** *Sign (*) and (**) shows the significance level at 1 and 5 % respectively.*
***Source:*** *Author's Own Calculation.*

Table 4 shows the results of the FE model. The results confirm that income inequality has a significant negative impact on health status. The coefficient of income

inequality is -0.56, which indicates that if income inequality increases by one percent, life expectancy is decreased by 0.56 years. It means that a one percent decrease in income inequality boosts life expectancy by 204 days. The results of this study are comparable with studies. Nasreen *et al.* (2012) find that total life expectancy is negatively affected by income inequality. The estimated coefficient is -0.65, which indicates that if one percent decreases in income inequality, life expectancy total is boosted by 0.65. The results are also supported by (Nejadlabbaf *et al.* 2013). The coefficient value of income inequality is -0.0003, which indicates that if income inequality is reduced by one percent, life expectancy total increases by 0.0003 years. Vogli *et al*. (2005) find the same results. The study results show that if the Gini coefficient is decreased by one percent, the life expectancy total is decreased by 0.443 years. It indicates that the results of the current analysis are according to the literature.

The coefficient value of GDP is 0.004, indicating that income is a positive determinant of health status and is statistically significant. One dollar increases in gross domestic product per capita raises the life expectancy total by 1.46 days. Adjay (2004) finds that GDP per capita has a significant positive impact on life expectancy total. The coefficient value is 0.026, representing that a one dollar increase in GDP per capita will raise the life expectancy total by 0.026 years. Heden (2015) explores that if one dollar increases ease in GDP per capita, the life expectancy total is boosted by 0.027 years. Pulok (2012) shows that a one dollar increase in GDP per capita will raise the life expectancy total by 0.130 years. This literature shows that life expectancy total is positively affected by GDP per capita, so the results are according to prior expectation.

The coefficient of education is 0.21, and its probability value is 0.000, which shows that education has highly significant positive impacts on health status. One percent increase in secondary enrollment is increased the life expectancy total by 76.65 days. Nejadlabbaf *et al.* (2013) discuss that if one percent increase in secondary enrollment, life expectancy total is increased by 0.033 years. Nasreen *et al. (*2012) represent that education has a significant positive impact on life expectancy. The study's coefficient value is 0.41, which shows that if one percent increases in literacy rate, then life expectancy total is increased by 0.41 years. Vogli *et al.* (2005) explore that if one percent increases in education, then life expectancy is raised by 0.306 years. It shows that the present analysis is supported by previous literature.

The mean life expectancy in Pakistan, Sri Lanka, Nepal, Bangladesh, and India is 76.04 years. The probability value of intercept is 0.000, which means that it is highly significant. The F-statistic value is 20.39, which confirms that the FE Model's result is significant overall, and the FE Model is preferred on Pooled OLS. R-square value is 0.85, which shows that 85% variation in health status is due to income inequality, education, and income.

### 4.4 Fixed Effect Model with Life Expectancy Female

Table 5 and Table 6 show the outcomes of the Hausman test and FE model consequently. Hausman test is employed to differentiate the FE and RE model when female life expectancy is used as a health status proxy. The probability value of Chi-square is 0.000, which means that the alternative hypothesis is not rejected. Hausman test confirms that FE Model is appropriate when female life expectancy is used as a dependent variable.

***Table 5.*** *Hausman Test Result*

| Test summary | Chi-square | Df. | P-Value |
|---|---|---|---|
| Period random | 34.11 | 3 | 0.000 |

***Source:*** *Author's Own Calculation*.

Table 6 shows the finding of income inequality on health status in South Asian countries. This model is based on the least square dummy variable. The study's findings show that the Gini coefficient's parametric value is negative, meaning that income inequality harms female health in the case of South Asian countries.

The probability value of Gini is 0.000, which indicates that the Gini coefficient has a statistically significant impact on female life expectancy. The coefficient value of Gini is -0.55, which shows that a one percent increase in the Gini coefficient is reduced the female life expectancy by 200.75 days. Haden (2015) shows that the Gini coefficient has a significant negative impact on female life expectancy. This study's coefficient value is -0.023 which represent that if one percent increases in Gini coefficient, then life expectancy female is reduced by 0.023 years. Shmueli (2004) also represents that a one percent increase in the Gini coefficient will reduce the female life expectancy by 0.171 years. Torre and Myrskyla (2011) find that a one percent increase in the Gini coefficient will boost the female's life expectancy by 0.06. The study is supported by previous literature.

***Table 6.*** *Fixed Effect Model Results with Least Square Dummy Variable*

| Variables | Co-efficient | Std. error | T-Statistics | P-Value |
|---|---|---|---|---|
| GINI | -0.55* | 0.08 | -7.02 | 0.000 |
| GDP | 0.005* | 0.001 | 6.83 | 0.000 |
| EDU | 0.25* | 0.02 | 11.23 | 0.000 |
| C | 74.54* | 2.39 | 31.18 | 0.000 |
| R-squared | 0.87 | | Adjusted R-Squ. | 0.84 |
| F-Statistics | 25.55 | | Prob(F-Stat) | 0.000 |

***Note:*** *Sign (*) and (**) shows the significance level at 1 and 5 % respectively.*
***Source****: Own creation.*

The outputs of the FE model show that education has a significant positive effect on female life expectancy. Education's coefficient is 0.25, representing that one percent raise in secondary enrollment boosts the female life expectancy by 91.25 days. Heden (2015) finds that a one percent increase in secondary enrolment will boost the female

life expectancy by 0.016 years. Education has a significant impact on female life expectancy (Amin, 2001; Adjaye, 2004; Fatukasi and Ayeomoni, 2015).

The fixed-effect model results indicate that gross domestic product has a significant positive impact on female life expectancy. The coefficient value of GDP is 0.005, which indicates that a one dollar rise in the gross domestic product will boost the female life expectancy by 1.82 years. Heden (2015) elaborates that if one dollar increases in GDP per capita, female life expectancy is raised by 0.026 years. Torre and Myrskyla (2011) also find that GDP per capita income has a significant positive impact on female life expectancy, and its coefficient value is 0.71. Gross domestic product has a significant positive impact on female life expectancy (Amin, 2001).

The average life expectancy of females in Pakistan, Nepal, Sri Lanka, Bangladesh, and India is 74.54 years. The probability value of constant also confirms that it is highly significant. The value of F-statistics is 25.55, which confirms that FE Model is superior to pooled OLS.

R-squared' s value is 0.87, which specifies that 87% variation in female life expectancy is due to GDP per capita, secondary enrollment, and Gini coefficient in these five South Asian countries.

### 4.5 Fixed Effect Model with Life Expectancy Male

Table 7 and table 8 show the findings of Hausman test and FE model respectively when life expectancy male is used as an indicator of health.

***Table 6.*** *Hausman Test Result*

| Test summary | Chi-square | DF. | P-Value |
|---|---|---|---|
| Period random | 39.07 | 3 | 0.000 |

***Source:*** *Author's Own Calculation.*

Table 7 shows the result of the Hausman test to decide the Random and FE Model. Hausman's test is based on the Chi-square value and its probability. The value of the Chi-square is 39.07, and the probability value is 0.000. It means that the RE Model's hypothesis is rejected, and FE Model is appropriate when the life expectancy of a male is used as a proxy variable of health status. The results of the FE Model are given in Table 6.8.

Table 8 presents the outputs of the FE Model when male life expectancy employs as a regress. Male life expectancy uses as a representative of health status in this model. Outcomes of the Hausman test confirm that FE Model is best to be applied. The finding of fixed effect reveals that, like previous models, income inequality harms health status. The probability value of the Gini coefficient is 0.000, which indicates that income inequality has a highly significant impact on health status. The coefficient value of Gini is -0.57, which confirms that a one percent increase in income inequality

would shrink the life expectancy of a male by 208 days. Heden (2015) describes that a one percent increase in income inequality will reduce the male life expectancy by 0.002.

***Table 7.*** *Fixed Effect Model Results with Least Square Dummy Variable*

| Variables | Co-efficient | Std. error | T-Statistics | Probability |
|---|---|---|---|---|
| GINI | -0.57* | 0.07 | -8.22 | 0.000 |
| EDU | 0.18* | 0.02 | 9.27 | 0.000 |
| GDP | 0.003* | 0.001 | 4.87 | 0.000 |
| C | 77.46* | 2.09 | 37.08 | 0.000 |
| R-Squared | 0.80 | | Adjusted R-Squ. | 0.74 |
| F-Statistics | 14.39 | | Prob(F-Stat) | 0.000 |

***Note:*** *Sign (*) and (**) shows the significance level at 1 and 5 % respectively.*
***Source:*** *Author's Own Calculation.*

Hu *et al.* (2015) explain that male life expectancy is negatively affected by income inequality. The value of its slope is -0.0049. Male life expectancy is negatively affected by income inequality, and its value is -0.09 (Torre and Myrskyla, 2011). These studies show that the literature supports the results of the present analysis.

The probability value of education also confirms that it has a significant influence on health status. The parametric result of education is 0.18, which reveals that life expectancy is positively affected by education. Suppose one percent increases in education, the life expectancy of a male is improved by 65.7 days. Heden (2015) explains that a one percent increase in secondary enrollment will boost the male life expectancy by 0.036. Education is a positive indicator of male life expectancy (Adjaye, 2004; Fatukasi and Ayeomoni, 2015). The results are according to prior expectations.

The outputs of the FE model also show that health status is positively affected by income. The probability value of GDP per capita reveals that it is significant at one percent. The coefficient of income is 0.003 it means that one dollar increases in income; male life expectancy is boosted by one day. Torre and Myrskyla (2011) analyze that a one dollar increase in GDP per capita will boost the male life expectancy by 0.75. Heden (2015) elaborates that male life expectancy is positively affected by income, and its coefficient is 0.036. Numerous studies (Amin, 2001; Adjaye, 2004; Fatukasi and Ayeomoni, 2015; Li and Zhu, 2006) show that male life expectancy is positively affected by GDP.

Results indicate that the average male life expectancy of Nepal, Sri Lanka, India, Pakistan, and Bangladesh is 77.46 years, and it is statistically significant. The R-square value of this model is 0.80, which shows that 80% variation in life expectancy of a male is due to Gini coefficient, income, and education, remaining 20%, variation in life expectancy other variables that are not included in the model. It is easy to say that these variables have an actual effect on the life expectancy of males. The F-test result shows that FE Model is overall significant, and it is favored over Pooled OLS.

## 5. Conclusion

The study estimates the impact of income inequality on health status in five South Asian countries. The results show that income inequality has a significant negative impact on health status. The coefficient value of income inequality confirms that the effect of income inequality on male health status is higher as compared to female. It shows that income inequality has a worse effect on the male and female health condition. The results also show that education has a significant positive impact on females' and males' health conditions. If the education level is increased, it boosts the health condition. It reveals that education has more effect on female education as compare to male. The results indicate that as income increase, it improves the health condition of female and male health. The coefficient value of per capita income reveals that income has more effect on female health than males. The results indicate that the average life expectancy of a male is higher than females in South Asian countries.

## References:

Amin, K. 2001. Income distribution and health: A worldwide analysis. The Park Place Economist, 9(1), 45-52.

Adjaye, J.A. 2004. Income Inequality and Health: A Multi-Country Analysis. International Journal of Social Economics, 31(1/2), 195-207.

Baeten, S., Van Ourti, T., Van Doorslaer, E. 2013. Rising inequalities in income and health in China: who is left bhind? Journal of Health Economics, 32(6), 1214-1229.

Bakare, A. 2012. Measuring the income inequality in Nigeria: the lorenz curve and gini co-efficient approach. Amercian Journal of Economics, 2(1), 47-52.

Bhattacharjee, A., Shin, J.K., Subramanian, C. 2015. Health and income inequality: An analysis of public versus private health expenditure. International Journal of Academic Research in Business and Social Sciences, 5(8), 11-19.

Child, J. 2013. Income inequality and health: is there an associaition? (undergraduate project). Retrieved from University of Nottingham (Econometric Project No. L13520).

De Vogli, R., Mistry, R., Gnesotto, R., Cornia, G.A. 2005. Has the relation between income inequality and life expectency disappeared? evidence from Italy and top industrialised countries. Journal of Epidemiology and Community Health, 59(2), 158-162.

Demombynes, G., Ozler, B. 2005. Crime and local inequality in South Africa. Journal of Development Economics, 76(2), 265-292.

Fatukasi, A., Ayeomoni, I.O. 2015. Effect of income inequality on health indicator in Nigeria (1980-2014). International Journal of Academic Research in Business and Social Sciences, 5(8), 274-285.

Fleisher, B., Li, H., Zhao, M.Q. 2010. Human capital, economic growth, and regional inequality in China. Journal of Development Economics, 92(2), 215-231.

Graham, H. 1995. Cigarette smoking: alighton gender and class inequality in Britian? Journal of Social Policy, 24(04), 509-527**.**

Greene, W.H. 2008. The Econometric approach to efficiency analysis. the measurment of productive efficincy and productivity growth. Oxford, England: Oxford University Press.

Gronqvist, H., Johansson, P., Niknami, S. 2012. Income inequality and health: lessons from a refugee residential assignment program. Journal of Health Economics, 31(4), 617-629.

Hausman, J.A. 1978. Specification tests in econometrics. Journal of the Econometric Society, 46(6), 1251-1271.

Heden, D. 2015. Is income inequality an important health status determinant in the OECD? (Master Essay). Lund University School of Economics and Manegment. (NEKN06 No. 20142).

Herzer, D., Nunnenkamp, P. 2015. Income inequality and health: evidence from developed and developing countries. Economics, 9(4), 1-57.

Hu, Y., Van Lenthe, F.J., Mackenbach, J.P. 2015. Income inequality, life expectency and cause-specific mortality in 43 European countries, 1987-2008: A fixed effect study. European Journal of Epidemiology, 30(8), 615-625.

Judge, K. 1995. Income distribution and life expectency: A critical appraisal. British Medical Journal, 311(7015), 1282-1285.

Kawachi, I., Kennedy, B.P. 1997. The relationship of income inequality to mortality: dose the choice of indicator matter? Social Science and Medicine, 45(7), 1121-1127.

Kennedy, P. 1988. A guide to econometrics. Cambridge, England: MIT Press.

Khanam, R., Nghiem, H.S., Connelly, L.B. 2009. Child health and income gradient: evidence from Australia. Journal of Health Economics, 28(4), 805-817.

Kiel Instiute of the World Economy. 2011. Income inequality and health: new evidence from panel data (Kiel Working Paper No. 1736). Kiel, Germany: Herzer, D., Nunnenkamp, P.

Leigh, A., Jencks, C. 2007. Inequality and mortality: long run evidence from a panel of countries. Journal of Health Economics, 26(1), 1-24.

Li, H., Zhu, Y. 2006. Income, income inequality, and health: evidence from China. Journal of Comparative Economics, 34(4), 668-693.

Max Planck Institute for Demographic Research. 2011. Income inequality and population health: A panel data analysis on 21 developed countries (Working Paper No. 006). Rostock, Germany: Torre, R., Myrskyla, M.

Mellor, J.M., Milyo, J. 2002. Income inequality and health status in the United States: evidence from current population survey. Journal of Human Resources, 37(3), 510-539.

Muller, A. 2002. Education, income inequality, and mortality: A multiple regression analysis. British Medical Journal, 324(7328), 23-25.

Musgrove, P. 1993. Investing in health: The 1993 world development report of the world bank. Bull Pan Am Health Organ, 27(3), 284-286.

Nasreen, S., Anwer, S., Ahmad, N. 2012. Health status, income inequality and institutions: evidence from Pakistan economy. Pakistan Journal of Life and Social Sciences, 10(2), 139-144.

National Bureau of Economic Research. 1999. Inequalities in income and inequalities in health (Working Paper No. 7141). Princenton, New Jersey: Deaton, A.

National Bureau of Economic Research. 2002. Health, inequality and economic development (Working Paper No. 8099). Princenton, New Jersey: Deaton, A.

Nejadlabbaf, S., Hadian, M. 2013. Effect of inequality of income distribution on health status in selected countries using panel data analysis over the 1995 to 2008 period. World Applied Science Journal, 28, (Economic, Finance and Management Outlooks), 216-221.

Pakistan Ministary of Finance. 2014-15. Economic survay of Pakistan (Publication No. 65). Retrived from: http://www.finance.gov.pk/survey_1415.html. pdf.

Pulok, M.H. 2012. Revisting health and income inequality relationship: evidence from developing countries. Journal of Economic Cooperation and Development, 33(4), 25-62.

Ross, N.A., Wolfson, M.C., Dunn, J.R., Berthelot, J.M., Kaplan, G.A., Lynch, J.W. 2000. Relation between income inequality and mortality in Canada and in the United States: cross sectional assessment using census data and vital statistics. British Medical Journal, 320(7239), 898-902.

Shmueli, A. 2004. Population health and income inequality: new evidence from Israeli time-series analysis. International Journal of Epidemiology, 33(2), 311-317.

Thalassinos, E., Cristea, M., Noja, G.G. 2019. Measuring active ageing within the European Union: implications on economic development. Equilibrium. Quarterly Journal of Economics and Economic Policy, 14(4), 591-609. https://doi.org/10.24136/eq.2019.028

Todaro, M.P., Smith, S.C. 2005. Economic development. Boston, USA: Addison-Wesley Publisher.

UNDP. 2015. United Nations Development Program. Human Development Reports. Retrieved July 9, 2015, from http://hdr.undp.org/.

Veenstra, G. 2002. Income inequality and health: coastal communities in British Columbia, Canada. Canadian Journal of Public Health/Revue Canadienne De Santee Publique, 93(5), 374-379.

Weich, S., Lewis, G., Jenkins, S. 2002. Income inequality and self rated health in Britain. Journal of Epidemiology and Community Health, 56(60), 436-441.

Wilkinson, R.G., Pickett, K.E. 2006. Income inequality and population health: A review and explanation of the evidence. Social Science and Medicine, 62(7), 1768-1784.

World Bank. 2015. World Development Report 2015: Mind, Society, and Behavior. Washington, DC: World Bank. Retrieved from: https://openknowledge.worldbank.org/handle/10986/20597 License: CC BY 3.0 IGO.

World Health Organization. 1984. Health promotion: a discussion document on the concept and principles: summary report of the Working Group on Concept and Principles of Health Promotion, Copenhagen, 9-13 July 1984 (No. ICP/HSR 602 (m01)). Copenhagen: WHO Regional Office for Europe.