Estimating Health Determinants of Two Generations: Evidence from Selected Districts of Pakistan

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ABSTRACT
Health status is an important indicator of quality of life. There are a number of social, economic and administrative factors and physical environment at personal, family, community, and national levels that shape the health status of individuals, households, communities or nations. These factors determine the health status of people, which is crucial to the economic development of the country. The present study estimates the range of health determinants for the two generations in Pakistan. The results show that access to health facilities, family literacy level, household size, housing and sanitation facilities, nutrition and drinking water, family income, maternal mortality rate and rural/urban area are important determinants of health across generations in the country. The study uses primary data of two generations, with sample size of 2000 households. This paper is the first of its kind in Pakistan which tries to find out the generational effect on determinants of health.

Keywords: health status, education, infant mortality, child mortality, generation.

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1 Introduction
In a country, human capital is a vital aspect for the development of an economy. The health status of the people and their educational levels shape human capital and the general condition of life. The relationship between human capital and economic development substantiates important link between economic well-being and health status. Healthier people are more productive, which builds a strong basis for viable economic growth (Schultz, 2010 and Currie, 2009). While, poor health of people hinders economic growth. Ali et al. (2012) estimate strong positive correlation of economic growth and three dimensions of human capital and conclude that 1 percent increase in infant mortality rate result in 2.47 percentage point decline in GDP in Pakistan. Akram et al. (2008) examine long-term positive effects of different health on economic growth.

Pakistan is a developing country and health situations are pitiable here as the health statistics have been presenting poor performance consistently. Pakistan allocates only 1.1 percent of GDP for health sector, which is very low as compared to WHO recommendation of 5 percent. This reality has been indicated in World Development Report (2005) which states that Pakistan accounts the problem of higher maternal and child mortality rates in comparison with its other neighbouring South Asian countries. According to World Bank 1, under-five mortality rate in Pakistan has recorded at 67.2 per 1000 in 2019 and maternal deaths at 140 for per 100,000 live births in 2017. About 60 percent of the children are immunized here, where is very low. Nearly 150 polio cases were reported in 2019. Pakistan is ranked 154th among 195 countries in terms of quality and accessibility of healthcare.

1 https://data.worldbank.org/
However, healthcare access and quality (HAQ) has developed since 1990 and its HAQ index has improved from 26.8 in 1990 to 37.6 in 2016. The global HAQ score was 54.4 in 2016, increasing from 42.4 points in 2000 (Lancet 2018). Different socioeconomic conditions including unjust distribution of wealth and income, gender discrimination, regional disparities, urban-based development, population composition, illiteracy, religious element, corruption and lack of accountability are responsible for the low level of health status in Pakistan. Though health indicators of the country have improved during last two decades, yet a lot of work is required as it lag behind regional countries (GOP 2019-20).

It is very complex to determine health status in developing countries. It is difficult to decide which variable/s should be utilized to indicate health status. Health is, not only, the absence of disease or ailment, but it is a state of total physical, mental and societal well-being (WHO).²

2 Literature Review

In literature, there has always been complete consensus that human capital is very crucial for economic development. Though health is one of the key elements of human capital, proper attention has not been given to health (Dauda 2011). Usually, education is considered as the sole component of human capital. Schultz (1961) recognized health and education as main indices of human capital. Grossman’s work in 1972 highlights the role of health in human capital formation because a person’s productivity intensely depends on his health status. Human capital formation leads to economic development. Increased expenditures on health and nutrition raise the productivity; therefore, it is termed capital formation. Health expenditures, good nutrition and drinking water reduce the probability of a person to fall sick, which increases the life expectancy.

WHO 1998; Khan and Bhutta 2001; Bhutta et al. 2003; Waxman 2003; Rehman et al. 2004; Luby et al. 2004 and Khan et al. 2005 commonly suggested in their studies that gender discrimination in the distribution of resources have led to malnourishment amongst mothers with pregnancy and breast-feeding their children. This discrimination has resulted in a higher child mortality rate for girls than for boys. Low status of women has spoiled lot of health policies and programs due to lack of female participation (Khan, 1996; Khan & Raza, 1998; Pakistan, 2004-05). Similarly low literacy especially among women accounts for the same reasons for health policy failures (Bhutta et al. 2003 and Luby et al. 2004). Corruption is pervasive in all sectors of Pakistan. Waxman (2003) in his study suggested that corruption is so pervasive in all the sectors that among the other top six key sectors it has seriously affected health sector in Pakistan as well. Many factors are held responsible for corruptions in health sector. Khan (2005) traced out many factors in his study such as fragile legal structure, no accountability, non-acknowledgment of hard work, lack of incentives and low wages of professionals working in rural areas.

The determinants of health are a variety of elements that impact the health status of people. According to Merriam-Webster, “determinant is an element that determines the nature of something.”³ A number of social, economic and administrative factors and physical environment at personal, family, community, and national levels shape the health status of individuals, households, communities or nations. These factors determine the health status of people, which is crucial to the economic development of the country. These determinants

² https://www.who.int/about/who-we-are/constitution
³ www.merriam-webster.com › dictionary › determinant
also depend on one another and they have important contribution to health inequality levels. Here we discuss some important determinants of health.

Family income plays an important part to determine the health status of the household, especially of the next generation. The rich parents can spend more income to improve the health status of children by providing them with good housing and living facilities, balanced diet, clean drinking water, sanitation and access and better choice of health facilities. They also live in safe neighborhoods. Low income people live in poor neighborhoods with meager facilities. Case et al. (2002) uses US datasets for children below 17 and concludes that offspring’s health has an important positive relationship with the household income levels. Currie and Stabile (2003) and Currie et al. (2007) find similar results for Canada and England respectively. By using UK data for the children up to 7, Propper et al. (2007) estimate positive connection between child health and parental income. Health status of people gets better progressively as their socioeconomic position improves (Marmot et al. 2012). Kuehnle, D. (2014) examines the impact of household earnings on different offspring’s health measures in United Kingdom. He tries to explore the role of possible transmission tools. He concludes that income and child health has a minor causal but statistically significant correlation in United Kingdom.

A number of other studies including Cunha and Heckman (2007); Khanam et al. (2009), Currie (2009); Kruk (2012), Reinhold and Jürges (2012) and Apouey and Geoffard (2013) have also examined positive correlation between household earnings and children’s health in different countries including USA, Canada, Australia, Germany, UK and other countries. These studies conclude that good child health has significant correlation with better educational attainment and good adulthood health which ultimately results in good adulthood earnings through skill development. Contrary to this, people having poorer social or economic background usually have poor health (Mackenbach 2015). In this study, household income has been taken as the collective annual income of the household from all sources. For our regression, we have taken the natural logarithm of the household income to capture potential income nonlinearities. Pakistan confronts a number of challenges in provision of quality and inexpensive health services to its population. These challenges continue to increase daily and deficient economic, financial and environmental conditions have resulted in inadequate treatment (Amir 2017). Poverty is the dominant reason for poor health conditions and substantially strong causal link exists between health and poverty (Hafeez 2014). National Nutrition Survey (NNS) 2018 reveals that almost 18 percent (38 million) of our population is severely food insecure. About 40 percent under five children are stunted and another 29 percent are underweight. The country is estimated to lose 3 percent ($7.6 billion) of its GDP every year due to malnutrition (GOP 2019-20). Usually, education, and income describe socioeconomic status of the people (Galobardes et al. 2006). Education has central role in improving health position of people during their lifetime. Education facilitates health status because of enhanced awareness (Schultz 1961). Education equips individuals to survive with poor health and helps them in seeking proper health related assistance. Literacy rate of the household or educational attainment of parents improves not only their own health status, but of their family as a whole and the dependent children have no exception. Health outcomes including life expectancy, self-rated health and maternal and child mortality have direct links with the levels of educational attainments. Therefore, it can be said that educational investment is just like health investment.

Alderman and Garcia (1993 & 1994) intensely endorse mothers’ education as a logical element to cope with the problems of malnutrition of children and large family size. WHO (2010) also emphasize the importance of mother’s education for the health of children. Parental education shrinks child mortality (Breierova and Duflo 2004). The growth of junior
high schools improved toddler health and decreased infant mortality in Taiwan during 1960s (Chou et al. 2010). Education may indirectly cast its impact on child nutrition by improving knowledge about nutrition status, vaccination, breast feeding and probability of infections (Alderman and Garcia 1994). The study strongly recommended mothers education as a cogent factor to deal with the problems of malnutrition of child.

Balanced nutrition is an important determinant of health. High quality foods improve health status. Nutrition is a significant transmission tool (Currie et al. 2009). Focusing food and nutrition as determinants of health, Alderman and Garcia (1994) found that malnutrition and morbidity are interdependent. They argued that in addition to food, nutrition awareness and other community welfare related programs should be addressed to cope with these problems particularly in rural Pakistan.

Health status of a household is also associated with good and safe housing facilities which help parenting children in a good way (Mallet et al. 2011). Low quality housing worsens health of the household. People are left in higher risk of developing health issues. Poor quality housing also has bad impact on mental health. Similarly sanitary condition is an important determinant of health status because a number of diseases including diarrhea have strong association with sanitary conditions (Alderman and Garcia 1994). Community level investment is needed to improve sanitary conditions in order to eliminate these problems.

Household size also determines the health status of a household. Health status and household size have negative correlation. Alderman and Garcia (1994) conclude that the reduction in the family size also decreases the child stunning and wasting. They estimate that the child wasting is reduced by 2.1 percent, if household size is reduced by one percent.

Average birth interval indicates parents’ attitude towards health. Birth interval also affects maternal and infant health as World Health Organization (WHO) recognizes it as one of the key factors of child and maternal mortality risks. WHO advocates for three to five years interval between two consecutive live births (WHO 2007). A number of studies including Whitworth and Stephenson (2002), Becher et al. (2004), Rutstein (2005) and Conde-Agudelo et al. (2012) confirm that no or short birth intervals are linked with high risk of infant and maternal deaths. Perinatal health care is very important to lay the foundations of good health of an individual (Lynch & Smith 2005). It also improves the health status of mothers. In this study, a variable, number of births with skilled care in a household has been taken to represent perinatal health care.

The health status of parents directly and positively affects their next generation’s health directly and genetically. Parental health is an essential factor of children health (Kelly and Bartley, 2010). In other words, parental health is transmitted to their young ones. Abbas et al. (2020) conclude that usually healthy parents have healthy children. They measure and find that there exist strong intergenerational health transmissions in Pakistan. To capture parental, self-rated health perception of parents has been used in our regressions. Maternal health is an important indicator of health and it is important determinant of the health of the household, especially the next generation. Recognizing the importance of maternal health, Propper et al. (2007) recommend that the governments must focus motherly health to improve child health.

An individual’s health status is also determined by his area of residence, whether in urban or rural areas. Area affects the capability of an individual to access health services, earning opportunities, safe housing, sanitation and clean water, which are necessary good health.  

4 https://www.ruralhealthinfo.org/
Evidence identifies that rural inhabitants have inadequate access to health care (NRHA 1992). The doctors and health officials are hesitant to serve in rural areas (Kletke et al 1991). Rural population has to travel long distances and require more time than the urban population to get primary medical care (Van Nostrand 1993).

Access to health services also affects the health levels of people (McGibbon 2008). The timely use of health facilities for the achievement of the best health effects is access to health services (Millman 1993). Health status improves if health care facilities are available at short distance and the people can easily see doctors when they are sick. The present study used distance of hospital as indicator of access to health services.

The objective of the present study is to estimate different determinants of health for the two generations. The study is a contribution to the literature because it is unique for two reasons. Firstly, the study is the first of its nature in Pakistan. No study has been conducted so far to estimate the health determinants of two generations. Secondly, the study is established on the data, collected from different parts of the country. Data and methodological issues have been discussed in section II. Section III deals with estimation results and conclusion is given in section IV.

3 Data and Methodology

This study is based on a survey data, conducted by the authors. The multi-topic household survey was conducted in rural and urban areas of all four provinces of Pakistan and federal capital Islamabad. The data were collected through interview of the head and other members of the family. The data were collected from eight districts/cities of the country including Islamabad, Karachi, Sukhar, Lahore, Vehari, Rajanpur, Peshawar and Quetta. The number of respondents was selected on the basis of population of 1998 census. For the estimation of health determinants of two generations, two models for each generation will be regressed through Ordinary Least Square technique. The detail of dependent and independent variables is given in table 1.

Table: 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Hypothesized Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEPENDENT VARIABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMR&lt;sub&gt;i&lt;/sub&gt;</td>
<td>Infant Mortality Rate of Household&lt;sub&gt;i&lt;/sub&gt;.</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>CMR&lt;sub&gt;i&lt;/sub&gt;</td>
<td>Child Mortality Rate of Household&lt;sub&gt;i&lt;/sub&gt;.</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td><strong>INDEPENDENT VARIABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABI&lt;sub&gt;i&lt;/sub&gt;</td>
<td>Average Birth Interval of Children of Household&lt;sub&gt;i&lt;/sub&gt;.</td>
<td>Negative</td>
</tr>
<tr>
<td>DH&lt;sub&gt;i&lt;/sub&gt;</td>
<td>Distance of Hospital.</td>
<td>Positive</td>
</tr>
<tr>
<td>EYM&lt;sub&gt;i&lt;/sub&gt;</td>
<td>Education Years of Mother&lt;sub&gt;i&lt;/sub&gt;.</td>
<td>Negative</td>
</tr>
</tbody>
</table>
Hypothesis: Higher EYM, lower will be CMR.

Household Size.

Hypothesis: Higher household size, higher will be IMR and CMR.

Housing and Sanitation Index of Household.

Hypothesis: Higher HSI, lower will be IMR and CMR.

Health Perceptions of Parents

Hypothesis: Higher HPP, lower will be IMR and CMR.

Literacy Rate of Household

Hypothesis: Higher LR, lower will be IMR and CMR.

Logarithm of Annual Household Income.

Hypothesis: Higher LYH, lower will be IMR and CMR.

Maternal Mortality Rate in Household

Hypothesis: Higher MMR, higher will be IMR and CMR.

Number of Births with Skilled Care in Household

Hypothesis: Higher NBSC, lower will be IMR and CMR.

Nutrition and Water Index of Household

Hypothesis: Higher NWI, lower will be IMR and CMR.

Region (Urban=1, Rural=0).

Hypothesis: Higher REG, lower will be IMR and CMR.

In table 2, descriptive analysis has been given.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABI1</td>
<td>1.124</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0.354</td>
</tr>
<tr>
<td>ABI2</td>
<td>1.772</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0.655</td>
</tr>
<tr>
<td>CMR1</td>
<td>0.776</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>1.106</td>
</tr>
<tr>
<td>CMR2</td>
<td>0.676</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>1.083</td>
</tr>
<tr>
<td>DH1</td>
<td>6.765</td>
<td>7</td>
<td>22</td>
<td>1</td>
<td>3.891</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1.480391</td>
<td>0.344835</td>
<td>4.293042</td>
<td>0</td>
</tr>
<tr>
<td>ABI2</td>
<td>-0.04946</td>
<td>0.020973</td>
<td>-2.35827</td>
<td>0.0186</td>
</tr>
<tr>
<td>DH2</td>
<td>0.03823</td>
<td>0.0189</td>
<td>3.40317</td>
<td>0.0589</td>
</tr>
<tr>
<td>EYM2</td>
<td>-0.06432</td>
<td>0.0189</td>
<td>-3.40317</td>
<td>0.0589</td>
</tr>
</tbody>
</table>

Source: Author’s calculations using Eviews 3.1.

The following econometric models were used to estimate determinants of health for the two generations:

\[
IMR_i = \alpha + \beta_1 ABI_i + \beta_2 DH_i + \beta_3 EYM_i + \beta_4 HS_i + \beta_5 HPP_i + \beta_6 HS_I + \beta_7 LR_i + \beta_8 LYHi + \beta_9 MMR_i + \beta_{10} NBSC_i + \beta_{11} NW_i + \beta_{12} REG_i + \epsilon_i \tag{1}
\]

\[
CMR_i = \alpha + \beta_1 ABI_i + \beta_2 DH_i + \beta_3 EYM_i + \beta_4 HS_i + \beta_5 HPP_i + \beta_6 HS_I + \beta_7 LR_i + \beta_8 LYHi + \beta_9 MMR_i + \beta_{10} NBSC_i + \beta_{11} NW_i + \beta_{12} REG_i + \epsilon_i \tag{2}
\]

4 Results and Discussion

We have applied Ordinary Least Square (OLS) method to estimate the determinants of health for two generations.
Table 3 discusses the determinants of 2nd generation’s health outcomes. Second generation household’s infant mortality is dependent variable in this model. The value of $R^2$ is sufficient to believe that overall model is good fit. However, its value is bit greater in perspective of cross-section dataset. Such a value of $R^2$ is due to time gap between first generation and second generation. The value of F-statistics shows that simultaneous effect of all the independent variables is different from zero. Therefore, overall the model to be analyzed here is looking good on statistical parameters.

Now we may turn to the role of independent variables. Firstly, statistical significance of the independent variables distance of hospital (DH2), household size (HS2), housing sand sanitation index (HIS2), literacy rate (LR2), number of births with skilled care (NBSC2), region (REG2) and nutrition and water index (NWI2) are observed to be significant at 1 percent level and average birth interval (ABI2), education years of mother (EYM2), health perception of parents (HPP2) and maternal mortality rate (MMR2) are also found to be significant at 5 percent level. However, log income of household (LYH2) is statistically insignificant. So far as theoretical relationship is concerned it is evident that all the variables of the model have the relationship with the dependent variable as per expectations. ABI2, LR2, LYH2, NBSC2, HPP2, REG2 and HIS2 have negative relationship with infant mortality rate (IMR) of 2nd generation’s household while DH2, HS2 and MMR2 have positive relationship with the regressand. Overall hypothesis of the thesis is well observed in this regression result.

Table: 4
Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>2.998453</td>
<td>0.736328</td>
<td>4.07217</td>
<td>0.0001</td>
</tr>
<tr>
<td>ABI2</td>
<td>-0.11392</td>
<td>0.045632</td>
<td>-2.49649</td>
<td>0.0128</td>
</tr>
<tr>
<td>DH2</td>
<td>0.103209</td>
<td>0.017891</td>
<td>5.768766</td>
<td>0</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EYM2</td>
<td>-0.05241</td>
<td>0.026711</td>
<td>-1.96211</td>
<td>0.0589</td>
</tr>
<tr>
<td>HS2</td>
<td>0.051142</td>
<td>0.016625</td>
<td>3.076211</td>
<td>0.0022</td>
</tr>
<tr>
<td>HSI2</td>
<td>-3.18388</td>
<td>0.157372</td>
<td>-20.2316</td>
<td>0</td>
</tr>
<tr>
<td>HPP2</td>
<td>-0.77352</td>
<td>0.113088</td>
<td>-6.8399</td>
<td>0</td>
</tr>
<tr>
<td>LR2</td>
<td>-0.007466</td>
<td>0.002055</td>
<td>-3.63309</td>
<td>0.0003</td>
</tr>
<tr>
<td>LYH2</td>
<td>-0.079431</td>
<td>0.063061</td>
<td>-1.25959</td>
<td>0.2082</td>
</tr>
<tr>
<td>MMR2</td>
<td>0.24379</td>
<td>0.15677</td>
<td>1.555081</td>
<td>0.1204</td>
</tr>
<tr>
<td>NBSC2</td>
<td>-0.245465</td>
<td>0.031027</td>
<td>-7.91134</td>
<td>0</td>
</tr>
<tr>
<td>NWI2</td>
<td>-0.06683</td>
<td>0.035848</td>
<td>-1.86426</td>
<td>0.0627</td>
</tr>
<tr>
<td>REG2</td>
<td>-0.067009</td>
<td>0.021957</td>
<td>-3.05183</td>
<td>0.0024</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.4941</td>
<td>F-statistic</td>
<td>69.24618</td>
<td>0</td>
</tr>
</tbody>
</table>

Adjusted R-squared 0.486964 Prob.(F-statistic) 0

Source: Author's calculations using Eviews 3.1.

Table 4 illustrates the determinants of 2nd generation's health with child mortality of the household as the explained variable in the model. If we have a look at the statistical significance of all the independent variables, distance of hospital (DH2), household size (HS2), housing and sanitation index (HSI2), health perception of parents (HPP2), literacy rate (LR2), number of births with skilled care (NBSC2) and region (REG2) are observed to be significant at 1 percent level, average birth interval (ABI2) is found to be significant at 5 percent level and education years of mother (EYM2) and nutrition and water index (NWI2) are found to be significant at 10 percent level. However, log income of household (LYH2) and maternal mortality rate (MMR2) are found to be statistically insignificant. So far as theoretical relationship is concerned it is evident that all the variables of the model have the relationship with the dependent variable as per expectations. ABI2, EYM2, LR2, LYH2, NBSC2, NWI2 and REG2 have negative relationship with child mortality rate (CMR) of 2nd generation's household while DH2, HS2 and MMR2 have positive relationship with the regressand.

The value of $R^2$ is sufficient to believe that overall model is good fit. However, its value is bit greater in perspective of cross-section dataset. Such a value of $R^2$ is due to time gap between first generation and second generation. The value of F-statistics shows that simultaneous effect of all the independent variables is different from zero. Therefore, overall the model to be analyzed here is looking good on statistical parameters.

Table 5
Determinants of Health of 1st Generation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1.850732</td>
<td>0.330377</td>
<td>5.601879</td>
<td>0</td>
</tr>
<tr>
<td>ABI1</td>
<td>-0.06701</td>
<td>0.039734</td>
<td>-1.68636</td>
<td>0.0922</td>
</tr>
</tbody>
</table>

Included observations: 1000

Dependent Variable: IMR1
DH1  0.018963  0.00442  4.290271  0
EYM1  -0.04152  0.01318  -3.15023  0.0058
HS1    0.018518  0.008107  2.284199  0.0226
HSI1   -0.05818  0.016703  -3.48345  0.0005
HPP1   -0.01998  0.01124  -1.77758  0.0803
LR1    -0.00479  0.001046  -4.57648  0
LYH1   -0.07506  0.029705  -2.52678  0.0117
MMR1   0.534405  0.055372  9.651177  0
NBSC1  -0.03305  0.039818  -0.83013  0.4067
NWI1  -0.05047  0.017928  -2.81521  0.005
REG1    -0.0033  0.036519  -0.09034  0.928
R-squared  0.445924  F-statistic  57.06084
Adjusted R-squared  0.438109  Prob.(F-statistic)  0

Source: Author’s calculations using Eviews 3.1.

Table 5 discusses the determinants of 1st generation’s health outcomes. First generation household’s infant mortality is dependent variable in this model. The value of R$^2$ is sufficient to believe that overall model is good fit. However, its value is bit greater in perspective of cross-section dataset. Such a value of R$^2$ is due to time gap between first generation and second generation. The value of F-statistics shows that simultaneous effect of all the independent variables is different from zero. Therefore, overall the model to be analyzed here is looking good on statistical parameters.

Now we may turn to the role of independent variables. Firstly, statistical significance of the independent variables distance of hospital (DH1), housing and sanitation index (HSII), health perception of parents (HPP1), literacy rate (LR1), maternal mortality rate (MMR1) and nutrition and water index (NWI1) are observed to be significant at 1 percent level and education years of mother (EYM1), household size (HS1) and log income of household (LYH1) are significant at 5 percent level and average birth interval (ABI1) is significant at 10 percent level while number of births with skilled care (NBSC1) and region (REG1) are statistically insignificant. So far as theoretical relationship is concerned it is evident that all the variables of the model have the relationship with the dependent variable as per expectations. ABI1, LR1, NBSC1, NWI1, REG1 and HSI1 have negative relationship with infant mortality rate (IMR) of 1st generation’s household while DH1, HS1 and MMR1 have positive relationship with the regressand. Overall hypothesis of the thesis is well observed in this regression result.

Table: 6

Regression Results

<table>
<thead>
<tr>
<th>Dependent Variable: CMR1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included observations: 1000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>4.330486</td>
<td>0.703018</td>
<td>6.159851</td>
<td>0</td>
</tr>
</tbody>
</table>
### Estimating Health Determinants of Two Generations: Evidence from Selected Districts of Pakistan

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-Statistic</th>
<th>Prob. (t-Statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABI1</td>
<td>-0.25091</td>
<td>0.087115</td>
<td>-2.88023</td>
<td>0.0041</td>
</tr>
<tr>
<td>DH1</td>
<td>0.062108</td>
<td>0.008442</td>
<td>7.357024</td>
<td>0</td>
</tr>
<tr>
<td>EYM1</td>
<td>-0.01829</td>
<td>0.021493</td>
<td>-0.85111</td>
<td>0.395</td>
</tr>
<tr>
<td>HS1</td>
<td>0.04623</td>
<td>0.017767</td>
<td>2.60196</td>
<td>0.0095</td>
</tr>
<tr>
<td>HSI1</td>
<td>-2.4521</td>
<td>0.10956</td>
<td>-22.3813</td>
<td>0</td>
</tr>
<tr>
<td>HPP1</td>
<td>-0.51671</td>
<td>0.0987</td>
<td>-5.23516</td>
<td>0</td>
</tr>
<tr>
<td>LR1</td>
<td>-0.01003</td>
<td>0.002299</td>
<td>-4.36364</td>
<td>0</td>
</tr>
<tr>
<td>LYH1</td>
<td>-0.17145</td>
<td>0.064772</td>
<td>-2.64704</td>
<td>0.0083</td>
</tr>
<tr>
<td>MMR1</td>
<td>0.996896</td>
<td>0.12141</td>
<td>8.210988</td>
<td>0</td>
</tr>
<tr>
<td>NBSC1</td>
<td>-0.06239</td>
<td>0.082543</td>
<td>-0.75582</td>
<td>0.45</td>
</tr>
<tr>
<td>NWI1</td>
<td>-0.09519</td>
<td>0.039373</td>
<td>-2.41755</td>
<td>0.0159</td>
</tr>
<tr>
<td>REG1</td>
<td>-0.15401</td>
<td>0.036589</td>
<td>-4.20916</td>
<td>0</td>
</tr>
</tbody>
</table>

**R-squared** 0.472487  
**F-statistic** 63.50421  
**Adjusted R-squared** 0.465047  

Source: Author’s calculations using Eviews 3.1.

Table 6 illustrates the determinants of 1st generation’s health with child mortality of the household as the explained variable in the model. If we have a look at the statistical significance of all the independent variables, average birth interval (ABI1) distance of hospital (DH1), household size (HS1), literacy rate (LR1), log income of household (LYH1), maternal mortality rate (MMR1) and percentage of expenditures on health (REG1) are observed to be significant at 1 percent level, number of visits to doctor (NWI1) is found to be significant at 5 percent level. However, education years of mother (EYM1) and number of births with skilled care (NBSC1) are found to be statistically insignificant. So far as theoretical relationship is concerned it is evident that all the variables of the model have the relationship with the dependent variable as per expectations. ABI1, EYM1, LR1, LYH1, NBSC1, NWI1 and REG1 have negative relationship with child mortality rate (CMR) of 1st generation’s household while DH1, HS1 and MMR1 have positive relationship with the regressand.

The value of R² is sufficient to believe that overall model is good fit. However, its value is bit greater in perspective of cross-section dataset. Such a value of R² is due to time gap across generations. The value of F-statistics shows that simultaneous effect of all the independent variables is different from zero. Therefore, overall the model to be analyzed here is looking good on statistical parameters.

4. Conclusion and Policy Implications:

This study estimates determinants of health status for two generations in Pakistan. The evidence of the data of 2000 households proves that average birth interval, distance of hospital, literacy rate of the household, mother’s education, household size, housing and sanitation index, health perceptions of parents, family income, maternal mortality rate, number of births with skilled care, nutrition and water index and rural/urban regions are important health determinants of two generations in Pakistan. These results are consistent with the previous studies, discussed in detail in the first section. Extensive empirical evidence is available to prove that there is significant correlation between health status and
independent variables. This type of analysis opens the door for many different empirical applications.

As the health conditions are tirelessly precarious in the country, huge investments are required in health sector to nurture human capital formation. Access to health facilities should be made available for all population, either living in rural or deprived urban areas. Health facilities will positively affect parental health and perinatal health care, which will result in the improvement of health status of next generation. As the rich class relies on private health sector, developed and fully equipped public health sector will benefit the poor class and their health status will improve. The state-level interventions are vital to accelerate equity and economic efficiency of opportunities and health facilities. Poverty and inequality reduction will result in culmination of malnutrition. The governmental policies should concentrate on preventive and curative health measures simultaneously to enhance the health status and life expectancy in the country.

This study indicates that the education level of a household impacts health status of offspring. Education level should be improved through policy intervention. More focus should be given on female education as educated mother is more conscious about the health of family. The government should take measure for family planning and small families. The government should take measures to enhance living standards of the pubic. The governmental policies and steps are required to improve the quality of housing, sanitation, drinking water and other hygienic conditions. These steps will also uplift health status in Pakistan.

References


Estimating Health Determinants of Two Generations: Evidence from Selected Districts of Pakistan


