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

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PAPER INFO	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.

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.

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[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

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[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 heath 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]

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[4] https://www.ruralhealthinfo.org/

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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

Variables of Models (Determinants of Health For Two Generations) and Their Definition

Variable	Definition	Hypothesized Relationship
DEPENDENT VARIABLES		
IMR_i	Infant Mortality Rate of Household$_i$.	Dependent Variable
CMR_i	Child Mortality Rate of Household$_i$.	Dependent Variable
INDEPENDENT VARIABLES		
ABI_i	Average Birth Interval of Children of Household$_i$ Hypothesis: Higher ABI_i, lower will be IMR_i and CMR_i.	Negative
DH_i	Distance of Hospital. Hypothesis: Higher distance of hospital, higher will be IMR_i and CMR_i.	Positive
EYM_i	Education Years of Mother$_i$.	Negative

	Hypothesis: Higher EYM_i, lower will be CMR_i.	
HS_i	Household$_i$ Size.	Positive
	Hypothesis: Higher household size, higher will be IMR_i and CMR_i.	
HSI_i	Housing and Sanitation Index of Household$_i$.	Negative
	Hypothesis: Higher HSI, lower will be IMR_i and CMR_i.	
HPP_i	Health Perceptions of Parents$_i$	Negative
	Hypothesis: Higher HPP_i, lower will be IMR_i and CMR_i.	
LR_i	Literacy Rate of Household$_i$.	Negative
	Hypothesis: Higher LR_i, lower will be IMR_i and CMR_i.	
LYH_i	Logarithm of Annual Household$_i$ Income.	Negative
	Hypothesis: Higher LYH_i, lower will be IMR_i and CMR_i.	
MMR_i	Maternal Mortality Rate in Household$_i$.	Positive
	Hypothesis: Higher MMR_i, higher will be IMR_i and CMR_i.	
$NBSC_i$	Number of Births with Skilled Care in Household$_i$	Negative
	Hypothesis: Higher $NBSC_i$, lower will be IMR_i and CMR_i.	
NWI_i	Nutrition and Water Index of Household$_i$.	Negative
	Hypothesis: Higher NWI_i, lower will be IMR_i and CMR_i.	
REG_i	Region (Urban=1, Rural=0).	Negative

In table 2, descriptive analysis has been given.

Table: 2

Descriptive Statistics of Dependent and Independent Variables

Variables	Mean	Median	Maximum	Minimum	Std. Dev.
ABI1	1.124	1	3	1	0.354
ABI2	1.772	2	4	0	0.655
CMR1	0.776	0	5	0	1.106
CMR2	0.676	0	4	0	1.083
DH1	6.765	7	22	1	3.891

DH2	3.168	3	13	1	1.753
EYM1	0.742	0	8	0	2.321
EYM2	3.193	1	14	0	3.499
HS1	6.756	7	14	5	4.988
HS2	5.144	5	9	4	4.201
HPP1	0.467	0	1	0	0.162
HPP2	0.512	0	1	0	0.201
IMR1	0.296	0	2	0	0.492
IMR2	0.257	0	2	0	0.468
LR1	35.026	33.33	100	0	16.907
LR1	49.275	50	100	0	16.801
MMR1	0.075	0	1	0	0.264
MMR2	0.042	0	1	0	0.199
NBSC1	0.265	0	3	0	0.451
NBSC2	2.492	3	6	0	1.503
YH1	690868.1	469250	5055500	55000	638533.2
YH2	985731.5	837500	5080500	101000	767876.4

Source: Author's calculations using Eviews 3.1.

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

$IMR_i = a + \beta_1 ABI_i + \beta_2 DH_i + \beta_3 EYM_i + \beta_4 HS_i + \beta_5 HPP_i + \beta_6 HSI_i + \beta_7 LR_i + \beta_8 LYH_i + \beta_9 MMR_i + \beta_{10} NBSC_i + \beta_{11} NWI_i + \beta_{12} REG_i + \varepsilon_i$ --- (1)

$CMR_i = a + \beta_1 ABI_i + \beta_2 DH_i + \beta_3 EYM_i + \beta_4 HS_i + \beta_5 HSI_i + \beta_6 HPP_i + \beta_7 LR_i + \beta_8 LYH_i + \beta_9 MMR_i + \beta_{10} NBSC_i + \beta_{11} NWI_i + \beta_{12} REG_i + \varepsilon_i$ --- (2)

4 Results and Discussion

We have applied Ordinary Least Square (OLS) method to estimate the determinants of health for two generations.

Table: 3

Determinants of Health of 2nd Generation

Dependent Variable: IMR2

Included observations: 1000

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.480391	0.344835	4.293042	0
ABI2	-0.04946	0.020973	-2.35827	0.0186
DH2	0.03823	0.008362	4.571873	0.0045
EYM2	-0.06432	0.0189	-3.40317	0.0589

HS2	0.020629	0.007626	2.705088	0.007
HPP2	-0.14013	0.026278	-5.3326	0.0139
HSI2	-0.02874	0.009844	-2.91954	0.0036
LR2	-0.00293	0.000931	-3.14715	0.0017
LYH2	-0.04338	0.029401	-1.47546	0.1405
MMR2	0.161141	0.071893	2.2414	0.0253
NBSC2	-0.084	0.015318	-5.48374	0
NWI2	-0.17352	0.013088	-13.2579	0
REG2	-0.10757	0.033735	-3.18868	0.0015
R-squared	0.433229	F-statistic		54.19459
Adjusted R-squared	0.425235	Prob.(F-statistic)		0

Source: Author's calculations using Eviews 3.1.

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 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 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 HSI2 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

Dependent Variable: CMR2

Included observations: 1000

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.998453	0.736328	4.07217	0.0001
ABI2	-0.11392	0.045632	-2.49649	0.0128
DH2	0.103209	0.017891	5.768766	0

EYM2	-0.05241	0.026711	-1.96211	0.0589
HS2	0.051142	0.016625	3.076211	0.0022
HSI2	-3.18388	0.157372	-20.2316	0
HPP2	-0.77352	0.113088	-6.8399	0
LR2	-0.007466	0.002055	-3.63309	0.0003
LYH2	-0.079431	0.063061	-1.25959	0.2082
MMR2	0.24379	0.15677	1.555081	0.1204
NBSC2	-0.245465	0.031027	-7.91134	0
NWI2	-0.06683	0.035848	-1.86426	0.0627
REG2	-0.067009	0.021957	-3.05183	0.0024
R-squared	0.4941	F-statistic		69.24618
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

Dependent Variable: IMR1

Included observations: 1000

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.850732	0.330377	5.601879	0
ABI1	-0.06701	0.039734	-1.68636	0.0922

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DH1	0.018963	0.00442	4.290271	0
EYM1	-0.04152	0.01318	-3.15023	0.0349
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	0.0058
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 (HSI1), 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

Dependent Variable: CMR1

Included observations: 1000

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.330486	0.703018	6.159851	0

ABI1	-0.25091	0.087115	-2.88023	0.0041
DH1	0.062108	0.008442	7.357024	0
EYM1	-0.01829	0.021493	-0.85111	0.395
HS1	0.04623	0.017767	2.60196	0.0095
HSI1	-2.4521	0.10956	-22.3813	0
HPP1	-0.51671	0.0987	-5.23516	0
LR1	-0.01003	0.002299	-4.36364	0
LYH1	-0.17145	0.064772	-2.64704	0.0083
MMR1	0.996896	0.12141	8.210988	0
NBSC1	-0.06239	0.082543	-0.75582	0.45
NWI1	-0.09519	0.039373	-2.41755	0.0159
REG1	-0.15401	0.036589	-4.20916	0
R-squared	0.472487	F-statistic		63.50421
Adjusted R-squared	0.465047	Prob.(F-statistic)		0

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 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 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

Abbas, I., Batool, S., & Zahra, K. (2020). Intergenerational transmission of health: Evidence from selected districts of Pakistan. *Journal of Contemporary Macroeconomic Issues, 1* (1), 44-56.

Akram, N., Padda, I., &Khan, M. (2008). The long term impact of health on economic growth in Pakistan. *The Pakistan Development Review, 47*(4), 487-500.

Alderman, H., & Garcia, M. (1993). *Poverty, household food security, and nutrition in rural Pakistan* (Vol. 96). International Food Policy Research Institute, Washington, D.C.

Alderman, H., & Garcia, M. (1994). Food security and health security: Explaining the levels of nutritional status in Pakistan. *Economic Development and Cultural Change*, *42*(3), 485-507.

Ali, S., Sharif Chaudhry, I., & Farooq, F. (2012). Human capital formation and economic growth in Pakistan. *Pakistan Journal of Social Sciences (PJSS)*, *32*(1).

Amir M. (2017, April 26). Health issues. *Pakistan Today*.

Andriessen, J. W., Brunekreef, B., & Roemer, W. (1998). Home dampness and respiratory health status in european children. *Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology*, *28*(10), 1191-1200.

Apouey, B., & Geoffard, P. Y. (2013). Family income and child health in the UK. *Journal of health economics*, *32*(4), 715-727.

Australian Institute of Health and Welfare 2016. Australia's health series no. 15. *Cat. no. AUS*, *199*.

Becher, H., Müller, O., Jahn, A., Gbangou, A., Kynast-Wolf, G., & Kouyaté, B. (2004). Risk factors of infant and child mortality in rural Burkina Faso. *Bulletin of the World Health Organization*, *82*, 265-273. Bhutta, Z. A., Darmstadt, G. L., & Ransom, E. I. (2003).

Using evidence to save newborn lives: policy perspectives on newborn health. Washington. *Population Reference Bureau*.

Breierova, L., & Duflo, E. (2004). *The impact of education on fertility and child mortality: Do fathers really matter less than mothers?* (No. w10513). National bureau of economic research.

Case, A., Lubotsky, D., & Paxson, C. (2002). Economic status and health in childhood: The origins of the gradient. *American Economic Review*, *92*(5), 1308-1334.

Chou, S. Y., Liu, J. T., Grossman, M., & Joyce, T. (2010). Parental education and child health: evidence from a natural experiment in Taiwan. *American Economic Journal: Applied Economics*, *2*(1), 33-61.

Conde-Agudelo, A., Rosas-Bermudez, A., Castaño, F., & Norton, M. H. (2012). Effects of birth spacing on maternal, perinatal, infant, and child health: a systematic review of causal mechanisms. *Studies in family planning*, *43*(2), 93-114.

Cunha, F., Heckman, J., 2007. The technology of skill formation. *American Economic Review. 97*(2), 31–47.

Currie, J., & Stabile, M. (2003). Socioeconomic status and child health: why is the relationship stronger for older children?. *American Economic Review*, *93*(5), 1813-1823.

Currie, A., Shields, M. A., & Price, S. W. (2007). The child health/family income gradient: Evidence from England. *Journal of health economics*, *26*(2), 213-232.

Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. *Journal of economic literature*, *47*(1), 87-122.

Dauda, R. S. (2011). "Health as a component of Human Capital Formation: Does it Matter for the Growth of the Nigerian Economy?" Canadian Social Science Vol. 7 (4): pp. 207-218.

Fullman, N., Yearwood, J., Abay, S. M., Abbafati, C., Abd-Allah, F., Abdela, J. & Abraha, H. N. (2018). Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016. *The Lancet*, *391*(10136), 2236-2271

Gagnet, C. (2005). *World Bank Annual Report 2005* (No. 32403, pp. 1-68). The World Bank.

Galobardes, B., Shaw, M., Lawlor, D. A., & Lynch, J. W. (2006). Indicators of socioeconomic position. *Journal of epidemiology and community health*, *60*(2), 95.

Government of Pakistan. (2019-20). Economic Survey of Pakistan. Finance Division, Islamabad, Pakistan. Retrieved from http://www.finance.gov.pk

Grossman, M. (1972 a). "On the Concept of Health Capital and the Demand for Health." Journal of Political Economy Vol. 80(2): pp. 223-255.

Grossman, M. (1972 b). "The Demand for Health: A Theoretical and Empirical Investigation." New York: Columbia University Press for the National Bureau of Economic Research.

Hafeez, M. (2014). Poor Healthcare in Pakistan. *Harvard International Review*, *35*(4), 52.

Kelly, Y., Bartley, M. (2010). *Parental and child health. In: Children of the 21st century: the first five years 2*, pp. 249–272.

Khan, A., & Bhutta, Z. A. (2001). Maternal health and malnutrition in Pakistan: a situational analysis. *Karachi: Agha Khan University and UNICEF.*

Khan, M. M., & Reza, H. (1998). Gender differences in nonfatal suicidal behavior in Pakistan: Significance of sociocultural factors. *Suicide and Life-Threatening Behavior*, *28*(1), 62-68.

Khan, M. M., & Heuvel, W. V. (2005). Description and content analysis of the National Health Policy of Pakistan. *Asia Pacific Journal of Public Health, accepted pending revisions.*

Khan, M. M., Van Dijk, J. P., & Van den Heuvel, W. (2005). The impact of economic and socio-cultural context upon health policy outcome in Pakistan. *Eastern Mediterranean Health Journal, accepted pending revisions.*

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

Kletke, P. R., Marder, W. D., & Willke, R. J. (1991). A projection of the primary care physician population in metropolitan and nonmetropolitan areas. In *Conference Proceedings. Primary Care Research. Theory and Methods. Rockville, MD: USDHHS, PHS, ACHPR.*

Kruk, E. (2012). Parental Income and the Dynamics of Health Inequality in Early Childhood-Evidence from the United Kingdom. *Health Economics.*

Kuehnle, D. (2014). The causal effect of family income on child health in the UK. *Journal of health economics*, *36*, 137-150.

Luby, S. P., Agboatwalla, M., Painter, J., Altaf, A., Billhimer, W. L., & Hoekstra, R. M. (2004). Effect of intensive handwashing promotion on childhood diarrhea in high-risk communities in Pakistan: a randomized controlled trial. *Jama*, *291*(21), 2547-2554.

Lynch, J., & Smith, G. D. (2005). A life course approach to chronic disease epidemiology. *Annu. Rev. Public Health*, *26*, 1-35.

Mackenbach, J. P. (2015). Socioeconomic inequalities in health in high-income countries: the facts and the options. *Oxford textbook of global public health*, *6*.

Mallett, S., Bentley, R., Baker, E., Mason, K., Keys, D., Kolar, V., & Krnjacki, L. (2011). Precarious housing and health inequalities: what are the links. *Melbourne: Hanover Welfare Services, University of Melbourne, University of Adelaide, Melbourne Citymission, Australia.*

Marmot, M., Allen, J., Bell, R., Bloomer, E., & Goldblatt, P. (2012). WHO European review of social determinants of health and the health divide. *The lancet*, *380*(9846), 1011-1029.

McGibbon, E., Etowa, J., & McPherson, C. (2008). Health-care access as a social determinant of health. *Canadian Nurse*, *104*(7).

Millman, M. (Ed.). (1993). *Access to health care in America*. National Academies Press.

National Rural Health Association. (1992). Study of models to meet rural health care needs through mobilization of health professions education and services resources (Volume I). *Kansas City, MO: National Rural Health Association.*

Peat, J. K., Dickerson, J., & Li, J. (1998). Effects of damp and mould in the home on respiratory health: a review of the literature. *Allergy*, *53*(2), 120-128.

Propper, C., Rigg, J., & Burgess, S. (2007). Child health: evidence on the roles of family income and maternal mental health from a UK birth cohort. *Health Economics*, *16*(11), 1245-1269.

Rehman, S. Rehman, M. O. & Ahmed, T. (2004). Diseases Causing Biochemical Changes During Pregnancy in the Population of Karachi. *Pakistan Journal of Pharmaceutical Sciences*, *17*(2), pp. 125-127.

Reinhold, S., & Jürges, H. (2012). Parental income and child health in Germany. *Health economics*, *21*(5), 562-579.

Rutstein, S. O. (2005). Effects of preceding birth intervals on neonatal, infant and under-five years mortality and nutritional status in developing countries: evidence from the demographic and health surveys. *International Journal of Gynecology & Obstetrics*, *89*, S7-S24.

Schultz, T. P. (2010). Health human capital and economic development. *Journal of African Economies*, *19*(3), 12-80.

Schultz, T. W. (1961). Investment in human capital. *The American economic review*, 1-17.

Van Nostrand, J. F. (1993). Common beliefs about the rural elderly; what do national data tell us?.

Waxman, A. (2003). Corruption in health services. Conference Paper. The 11th International Anti-Corruption Conference. Seoul, 2003:" Different Cultures, Common Values. *Seoul. IACC.*

Whitworth, A., & Stephenson, R. (2002). Birth spacing, sibling rivalry and child mortality in India. *Social science & medicine*, *55*(12), 2107-2119.

World Bank Annual Report 2005. "*Addressing Worldwide Poverty.*" Washington D.C. www.worldbank.org.

World Health Organization. (1998). The World Health Report 1998. *"Life in the 21st Century: A Vision for All."* Geneva, Switzerland.

World Health Organization. (2007). *Report of a WHO technical consultation on birth spacing:* Geneva, Switzerland.