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Unlocking the Link: How Information Communication Shapes Life Expectancy and Mortality in Pakistan

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Abstract

The primary goal of this research is to investigate the interaction between information communication technology and health facilities. To achieve this goal, the panel data set is used from 1971 to 2020 from Pakistan's perspective. The study used pooled OLS, fixed effect estimates, and random effect approaches in its analysis. ICT is a broad topic, thus we quantified it using fixed broadband and fixed telephone subscriptions. Similarly, health is assessed using two standard proxies: life expectancy at birth and infant mortality rate.Based on time series data, the study found that information communication technology improved health outcomes significantly. Health and life expectancy will improve as technology progresses, but death rates will fall. As economic technology advances, people connect more and create healthy relationships, improving their health. Information and communication technology improve public health overall.

Keywords: ICT; Mortality Rate; Life Expectancy; Fixed Telephone Subscriptions.

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The primary goal of this research is to investigate the interaction between information communication technology and health facilities. To achieve this goal, the panel data set is used from 1971 to 2020 from Pakistan's perspective. The study used pooled OLS, fixed effect estimates, and random effect approaches in its analysis. ICT is a broad topic, thus we quantified it using fixed broadband and fixed telephone subscriptions. Similarly, health is assessed using two standard proxies: life expectancy at birth and infant mortality rate.Based on time series data, the study found that information communication technology improved health outcomes significantly. Health and life expectancy will improve as technology progresses, but death rates will fall. As economic technology advances, people connect more and create healthy relationships, improving their health. Information and communication technology improve public health overall.

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Introduction

Healthy people are the most critical for enhanced and sustainable development in any economy because they are the driving force behind economic progress. The effects of information communications technology on the healthcare system in industrialized and developing countries have been the subject of much debate in recent years (Bloom and Standing 2008; Lucas 2008). However, little attention has been paid to the

influence of ICT on the healthcare system in South Asia. Healthcare systems are vital for improving residents' well-being. Undeveloped healthcare systems damage the people's social as well as the national economic perspectives. Out of 8 Millennium Development Goals (MDGs), three call for reducing neonatal mortality and enhancing reproductive healthcare services globally. Moreover, for the internal stability of any nation, healthy people play a significant role. It also reduces community loss by preventing premature deaths and chronic diseases.

The health system has improved during the past years, but still, its status differs not only across nations but within nations too. Based on World Health Organization (WHO) statistics, the average life expectancy in Japan is higher than in Malawi, in Japan, the average age of the individual is 83 years, and in Malawi, it is 47 years on average. Now, avery important question arises why are some nations or states healthier than others? Is it depending on high-income or do other factors also matter? It is commonly assumed that 'wealthier is healthier' but on the other hand, some developingnations like Cuba and Costa Rica with low income enjoy a very good health system. So, there is a need to examine the factors other than wealth that contribute to health. GDP growth is a major factor that affects the status of health. Other important factors are water, sanitation, urbanization (Kamiya, 2010; Bayati et al., 2013), education (Messias, 2003; Feinstein et al., 2006; Ross and Wu, 1995), Income (Prichett and Summer, 1996), environmental factors (Faysis and Gutema, 2005; Bayati et al., 2013), health care facilities (Mohan and Mirmirani, 2007; Gilligan and Skrepnek, 2014), poverty (Panye, 2000; Adena and Myck, 2014; Rambotti, 2015) and so forth include which affect the health system. Apart from these, information communications technologies are also considered to be an important factor affecting health (Khatun and Sima, 2015; Lucas Mimbi, 2015; Majeed and Khan, 2018). ICT is a unique idea that provides the best healthcare system services. Using information communication technologies in the health caresystem is not just about the technology but a way to achieve a range of desired results. Information communication technologies help to ensure improved treatment decision-making, safer care, and better quality. Likewise, it also provides the bestresponses to medical needs, info about alternate options, a heightened awareness ofthe health risks, and supports efficient and effective healthcare systems. ICT also aims to reinforce the system to measure the medical services in rural parts, enhancing the health service efficiency, assisting more appropriate care research, enabling collaboration, and coordination, allowing remote counseling, as well as promoting mental health service diffusion.

Numerous studies have been concentrated on assessing the role of information communication technologies in the healthcare system on organizational as well as economic levels in developed and underdeveloped nations (Osei-Bryson and Ko, 2004; Jeremic et al., 2012). Similarly, in developing nations, ICT plays a significant contribution to medical services (Chatley et al., 2006).

Health is considered one of the external dimensions of human resource development (Bankoleet al., 2011). Internet facilities are likely to expedite the distribution of public services including health services to the expectant as well as the nursing mothers. Bukachi and Pukenham Walsh (2007); Bankole et al., (2013**)** indicate that medical workers use internet facilities for different purposes including internet collaboration, access to healthcare service information as well as communication. Information communication technologies can also assist literacy efforts, and easy access the infinite information. Therefore, it is crucial to examine the effects of information communication technologies on the execution of the nation's health system.

The study tries to connect the links between information communication technologies and health outcomes by incorporating different proxies. It explores whether information communication technologies enhance health outcomes ornot. However, there isn't much extensive literature that exists establishing the relationship between ICT and health outcomes. So, the study contributes to the literature from this perspective. The contributions of the present study are discussed as (i) Current research attempts to explore the association between ICT and health to identify whether the technologies reduce or enhance health outcomes or not. (ii) As per our knowledge, this study is the first attempt which explore the relationship of ICT on health in 8 South-Asian economies. (iii) This study used the two basic measures of information communication technologies to capture the effect on health outcomes.

Literature Review

Several studies concentrated on the different factors that

influence health (Mohan and Mirmiran, 2007; Fayissa and Gutema, 2005; Owen and Wu, 2002; Mimbi and Bankole, 2015; Khatun and Sima, 2015; Majeed and Khan, 2018). Income is observed as the main and important determinant for the improvement of health and theeconomy. It is widely assumed that wealthier is healthier. According to the Preston curve, people who are born in high-income or wealthier economies are supposed tohave a long shelf life relative to those who are s` in poor nations. High income leads to better access to education, healthcare services, lodging, and several other factors leading to improved health, low death rates as well as high life expectancy. Pretchett and Summers, (1996) identify the impact of income on life expectancy and mortality rate, in infants and confirm the improved health status because of a rise in income. They also argue that in developing nations, the income elasticityof child mortality is -0.2 by using the technique of instrumental variable. To improve the health of the population, education plays an important role. Messias (2003) found out that income disparities and the illiteracy rate hurt life expectancy whereas GDP growth has a significant and highly positive effect on the life expectancy in Brazil. Likewise, Mohan and Mirmirani (2007) concluded that by investing in education, healthcare facilities improved. Kabir (2008) has established that the supply of physicians, undernourishment, and geographical location are the influential aspects. Moreover, the literacy rate is essential in the high-life-expectancy economies while on the other hand, medium life expectancy nations as well as low life expectancy nations might join this community by investing in education, as well as physician supply and improved nutrition. Wang (2003) focused on the impact of electricity on health in both urban and rural areas due to the increase in vaccination, there is a reduction in mortality rate also while,in the urban- sector, easy access to electricity reduces infant mortality. Kamiya (2010), factors like a rise in GDP and easy access to healthcare facilities are useful in reducing the mortality rate although other variables such as human resources, health financing, etc. are insignificant while establishing the mortality rate. Gilligan and Skrepnek (2014) explored the impact of growth on health in developed and developing nations. Their findings reveal that in developed nations, GDP growth, health spending, and literacy rate affect life expectancy and at the same time, in developing nations, vaccination rate and the physician's intensity determine the life expectancy. Owen and Wu (2002) investigated the impact of international trade on health facilities and found out that due to the trade between economies, the mortality rate will decrease, and life expectancy will increase. They also conclude that due to health inequalities, poor economies have been enjoying more advantages than the advanced nations which leads to improved health facilities.

The literature covered several factors that influence healthcare facilities like governance, poverty, improved sanitation, GDP growth, alcohol consumption, inequality, education, access to safe water, carbon emissions, immunizations, physicians, health expenditures, employment, urbanization, and so on. However, the influence of such variables on healthcare facilities varies depending on the countries, time, different techniques, and different proxies used. As a result, a study to verify health determinants is required.

The major component that plays an important role in enhancing the healthcare system is information communication technologies. Technologies could help to improve health outcomes as well as healthcare facilities in a variety of ways. Broom (2005) investigated the association between the role of the Internet and the relationship between doctors and patients. The findings show that online information has a great impact on men's prostate cancer. Information communication technology innovations brought challenges as well as opportunities to developing nations to strengthen and modernizethe health management information system (HMIS). According to Simba and Mwangu (2004), the health management system has been restricted to domestic and regional levels, leaving most of the healthcare workers in the rural and remote zones due to weak economic policies and telecommunications infrastructure. They also advocate that developing nations have to make premeditated efforts to deal with constraints that threaten to raise the technological gap between the rural majority and the urban minorities by establishing adequate strategies and policies. Chetley et al. (2006) explored the relationship between information communication technologies and healthcare systems in developing nations and concluded that people integrate new ideas, approaches, and information by making sense of them all in terms of their local, economic, cultural, and social processes which will help them better cope with the local conditions. Wald et al., (2007) found that the population's health can be improved by utilizing the Internet. Likewise, a net-friendly therapist can also be effective by fostering a legitimate collaboration with patients which contributes to high-quality health-carefacilities. Mostafa et al. (2010) inspected the relationship between application and services, and e-health that provides both rural and urban prospects of suggested implementations to offer e–healthcare facilities in Bangladesh. It is concluded that

tailored e-health-care solutions would be easily developed specifically for groups and individuals benefiting from an existing array of communication links and telemedical equipment.

In developing nations, Blaya et al., (2010) evaluated the advancement of e-health by employing information communication technologies to administer the treatment of patients. According to them, there is a positive influence of information communication technologies on e-health. They argue that technological systems enhance communication amongst institutions and expedite those patients who could abandon care. Likewise, digital equipment like mobile phones and digital assistants improved the quality and time of the data collection. Panir (2011) illustrates that due to health vulnerability and limited data sources, information communication technologies play a secondary role in accessing medical information. Déglise et al., (2012) examined SMS interventions, compliance with treatment, and surveillance in developing economies. They demonstrate that for disease prevention in developing nations, cell phones play an important role. Moreover, they claim that cell phones provide low-cost to tackle the healthcare system and provide opportunities for the betterment of the health of the population in developing nations. West (2015) investigated the association between health facilities and mobile innovations in Nigeria and found a positive and highly significant impact. Cole et al., (2016) explored the impact of internet on the health facilities. According to their findings, there seems to be little evidence of bad health data quality. Tsaiet al., (2017) have examined the link between technologies and education of nurses and provide significant results. They concluded that an e-learning education system with modules of e-learning enhanced the education related to health-facilities for the nurseswho work in the hospital. All the research that has been examined above uses various measures of health and information communication technologies. Few studies elaborate on the adverse impact of information communication technologies (Kiley (2002); Murray et al., (2003); Tenis et al., (2016). Mostly, we have seen the positive and highly significant impact of information communication technology on health-outcomes (Blaya et al., (2010); Lewis et al., (2012); Cole et al., (2016); Mbizi (2021).

Data and Methodology

Data

We want to investigate the effect of information communication technology on health. Data which is used in our research is taken from world development indicators over time from 1971-2020. Health is our dependent and major variable which is measured through life expectancy and mortality rate in our current research. Likewise, we take ICT as our independent and focused variable. We measured ICT through two basic and common measures including fixed broadband subscription and fixed telephone subscription. Moreover, the current study used Pakistan as a sample in the whole analysis. The following table presents the variables that are included in our research.

Table 1

Variable Description and Data Sources

Variables	Denotedby	Measured in	Sources
Dependent Variable			
Mortality Rate	MR	Per 1000 lives birth	
Focused Variables			
Fixed Broadband Subscription	FBS	Per 100 people	WDI (2021)
Fixed Telephone Subscription	FTS	Per 100 people	WDI (2021)
Control Variables			
GDP per capita	GDPPC	Constant 2010 US dollars	WDI (2021)

School Enrollment, Secondary	SE	Gender Parity Index	WDI (2021)
CO2 Emissions	CO2	Metric tons per capita	WDI (2021)
Immunization	IMN	% of children ages 12-23 months	WDI (2021)
Physicians	PHY	Per 1000 people	WDI (2021)
GDP per capita	GDPPC	Constant 2010 US dollars	WDI (2021)

Empirical Model Specification

We employ the empirical requirements of the model in this segment. Our dependent variable is health which is measured through the two basic proxies of health including life expectancy at birth and the mortality rate. Our independent variable of the current study is information communications technology which is also measured by the two common measures, fixed broadband subscriptions, and fixed telephone subscriptions. The relation between "health and information communication technologies" can be expressed in the panel equation as follows.

$$H_{it} = \alpha_1 GDP_{it} + \varepsilon_{it} + \alpha_2 EDU_{it} + \alpha_3 CO2_{it} + \alpha_4 PHY_{it} + \alpha_5 IMN_{it} + \alpha_6 FBS_{it} + \alpha_7 FTS_{it}$$

Where, 'H' indicates health, which is measured through life expectancy and mortalityrate, and GDP is the growth which is measured by per capita GDP. EDU, CO2, PHY, and IMN are the control variables used in the study and imply education, carbon dioxide emissions, physicians, and immunizations respectively. Likewise, FBS and FTS are the independent control variables which are measures of information communication technologies. FBS is fixed broadband subscriptions and FTS is fixed telephone subscriptions. We used the mortality rate to measure their health in our empirical analysis. Likewise, fixed broadband subscriptions and fixed telephone subscriptions to estimate the information communication technologies. For verifying the association between fixed broadband subscriptions and fixed telephone subscriptions on health, the following equations regressed the infant mortality rate.

$$MRit = (\mathbf{GDP}) + \boldsymbol{\alpha 2}\ (\mathbf{EDU})\mathbf{it} + \boldsymbol{\alpha 3}\ (\boldsymbol{CO2})\mathbf{it} + \boldsymbol{\alpha 4}\ (\mathbf{PHY})\mathbf{it} + \boldsymbol{\alpha 5}\ (\mathbf{IMN})\mathbf{it} + \boldsymbol{\alpha 6}\ (\mathbf{FBS})\mathbf{it} + \boldsymbol{\alpha 7}\ (\mathbf{FTS})\mathbf{it} + \boldsymbol{\mu}\mathbf{it} + \boldsymbol{\varepsilon}\mathbf{it}$$

Where MR is the mortality rate, infant, and GDP is the gross domestic product or the growth. EDU is the education which indicates the school enrollment at the secondary level of both the sexes males and females, CO2 is the carbon emissions, PHY is the physicians and IMN is represented as immunizations. Two focused variables are FBS and FTS.

Econometric Methodology

Now the conducting research study we will go into detail on the econometric techniques used in the analysis. Firstly, we applied pooled ordinary least square estimation, then the fixed and the random effect estimation to the estimated models. The Hausman test is applied to choose between the random and the fixed effect test.

Pooled OLS Method

The time series data set contains multiple degrees of freedom, and it can capture the intricacies of human behavior. Likewise, by pooling data, panel data gives precise outcomes (Hsiao, 2007). Pooled OLS is simply estimated by the OLS regression which specifies the constant coefficient and intercepts assumption. If the modelis correctly estimated but independent variables do not correlate with residuals, then wecan use the ordinary least square to tackle this situation. Our empirical research combines the life expectancy and mortality rate of infants in Pakistan regions with two main and common measures or proxies of information communication technologies. The equations of pooled OLS estimation mortality rate can be written as follows:

$$\mathbf{MRit} = (\mathbf{GDP}) + \boldsymbol{\alpha 2}\ (\mathbf{EDU})\mathbf{it} + \boldsymbol{\alpha 3}\ (\boldsymbol{CO2})\mathbf{it} + \boldsymbol{\alpha 4}\ (\mathbf{PHY})\mathbf{it} + \boldsymbol{\alpha 5}\ (\mathbf{IMN})\mathbf{it} + \boldsymbol{\alpha 6}\ (\mathbf{FBS})\mathbf{it} + \boldsymbol{\alpha 7}\ (\mathbf{FTS})\mathbf{it} + \boldsymbol{\mu}\mathbf{it} + \boldsymbol{\varepsilon}\mathbf{it}$$

Additionally, error terms could be correlated with each country which leads to theautocorrelation problem in the data. The pooled OLS technique assumes the same intercept for all nations and for the cross-sectional data, slope coefficients could be the same which distorts the true picture among the dependent and the independent variables of all the states. Due to this restrictive assumption, we move to other estimation techniquesincluding fixed effect estimation and random

effect estimation.

Fixed Effect Model

The fixed effect estimation technique allows the different intercepts across the countries in which pooled OLS estimation cannot be addressed. It examined the association between dependent as well as independent variables within nations. Fixed effect estimation is also referred to as the least-square dummy variable (LSDV). The models for the fixed effect estimation can be written in the following forms.

$$\mathbf{MRit} = (\mathbf{GDP}) + \boldsymbol{\alpha 2}\ (\mathbf{EDU})\mathbf{it} + \boldsymbol{\alpha 3}\ (\boldsymbol{CO2})\mathbf{it} + \boldsymbol{\alpha 4}\ (\mathbf{PHY})\mathbf{it} + \boldsymbol{\alpha 5}\ (\mathbf{IMN})\mathbf{it} + \boldsymbol{\alpha 6}\ (\mathbf{FBS})\mathbf{it} + \boldsymbol{\alpha 7}\ (\mathbf{FTS})\mathbf{it} + \boldsymbol{\mu}\mathbf{it} + \boldsymbol{\varepsilon}\mathbf{it}$$

In the above equations, 'i' indicates the different intercepts for all the nations because every country has its characteristics. While using the fixed effect technique, a multicollinearity problem may arise.

Random Effect Model

With a huge number of observations, unknown parameters will be affected in fixed effect. So, to address this issue, we used another estimation technique called random effect estimation. The primary benefit of the random effect estimation is that itincludes the time-invariant variables in the analysis. This model is also referred to as the component error model which assumes that the intercept is randomly drawn from the large population. The equations of random effect estimation of mortality rate can be written as follows:

$$\mathrm{MRit} = (\mathbf{GDP}) + \boldsymbol{\alpha 2}\ (\mathbf{EDU})\mathbf{it} + \boldsymbol{\alpha 3}\ (\boldsymbol{CO2})\mathbf{it} + \boldsymbol{\alpha 4}\ (\mathbf{PHY})\mathbf{it} + \boldsymbol{\alpha 5}\ (\mathbf{IMN})\mathbf{it} + \boldsymbol{\alpha 6}\ (\mathbf{FBS})\mathbf{it} + \boldsymbol{\alpha 7}\ (\mathbf{FTS})\mathbf{it} + \boldsymbol{\mu}\mathbf{it} + \boldsymbol{\varepsilon}\mathrm{it}$$

The major benefit of a random effect technique is that it cannot lose the degree of freedom while estimation which we faced in the estimation of fixed effect. Moreover, it is the most appropriate method when the predicted factors correlate to the random intercept term.

The choice between Fixed and Random Effect Model

This is crucial to choose between the fixed effect and random effect estimation techniques. For this purpose, the Hausman test has been introduced in 1978. The main purpose of this test is to clarify the authenticity of fixed and random effect estimation techniques. For choosing the best test between these two, we have used the following hypothesis.

H0 = Random effect estimation is the most appropriate and consistent one.

H1 = Fixed affect estimation is the most appropriate and consistent one.

In the empirical analysis, if the null hypothesis has been rejected and the alternative hypothesis has been accepted, it implies that the results of fixed effect estimation and random effect estimation differ systematically which means fixed effect estimation is the most appropriate and valid technique rather than random effect estimation. In case we reject the alternative hypothesis and accept the null hypothesis, in this scenario, we can say that the estimation of random effect regression would be more authentic and applicable.

Result and Discussions

Table 1 shows that life expectancy is positively correlated with focused variables such as fixed broadband and fixed phone subscriptions, as well as all control variables such as per capita GDP, secondary school enrollment, carbon dioxide emissions, immunizations, and physicians. The positive correlation coefficients between focal and control factors indicate that life expectancy will rise as well. On the other side, infant mortality rates are adversely associated with all variables. It means that the negative correlation coefficients of fixed broadband subscriptions, fixed telephone subscriptions,per capita GDP, school enrollment at the secondary level, carbon dioxide emissions, immunizations, and physicians indicate that it also reduces the infant mortality rate.

Table 2

Correlation Matrix

	Variables	1	2	3	4	5	6	7	8	9
1.	Life Expectancy	1.000								
2.	Infant Mortality	-0.91	1.000							

	Variables	1	2	3	4	5	6	7	8	9
3.	Rate Fixed Broadband subscription	0.737	-0.67	1.000						
4.	Fixed Telephone Subscription	0.602	-0.55	0.277	1.000					
5.	GDP per capita	0.717	-0.63	0.659	0.530	1.000				
6.	School Enrollment, Secondary	0.795	-0.93	0.636	0.596	0.579	1.000			
7.	CO2 Emissions	0.339	-0.31	0.417	0.152	0.714	0.378	1.000		
8.	Immunization	0.855	-0.90	0.583	0.312	0.494	0.769	0.200	1.000	
9.	Physicians	0.367	-0.11	0.410	0.359	0.547	0.079	0.547	-0.03	1.000

Table 2 reported the results of the link test incorporating the infant mortality rate. The probability value of the square term is greater than 0.05 whichmeans that we can reject our null hypothesis. The functional form of our model is correctly estimated.

Table 3

Link Test Results Incorporating Infant Mortality Rate

Link Test			
Model	Coefficient	T- Stats	P- Value
	Infant Mortality Rate (Dependent variable)		
Hat	0.9207	12.96	0.000
Hat- Square	0.0009	1.15	0.255
Constant	1.225109	0.93	0.356

Table 4

Pooled ordinary least square results

Variables		(b) Mortality Rate
Constant		123.8*** (43.24)
Fixed	Telephone	-0.790*
Subscription		(2.12)
Fixed	Broadband	-0.344*
Subscription		(1.86)
GDP per capita		-0.00268***
		(-4.94)
School	Enrollment,	-0.642***
Secondary		(-12.83)
CO2 Emissions		6.079***
		(4.91)
Immunization		-0.486***
		(-12.14)

Variables	(b) Mortality Rate
Physicians	-9.028*** (-3.94)
R-Square	0.9815
F-Statistics	462.49
F-Probability	0.0000
No of observations	69

*Note: t-values are given in parenthesis. *, **, *** corresponds to significance at 10%, 5% and 1% respectively.*

Table 4 shows the findings of the baby mortality rate, indicating that as technology advances, demographic health will improve but infant mortality will decline. Fixed broadband and fixed telephone connections have a major impact on the infant mortality rate. The results are consistent with the theory. The coefficient of fixed telephone subscriptions demonstrates that a 1% increase in fixed telephone subscriptions reduces infant mortality by 0.790 units. In the same way, the coefficient of fixed broadbandsubscriptions shows that a 1% increase in fixed broadband subscriptions will lower the mortality rate of infants by 0.344 units. Similarly, per capita GDP, school enrollment at the secondary level, immunizations, and physicians have a negative but significant impact on the mortality rate of infants. By contrast, carbon emissions have a positive impact on infant mortality which shows that with a 1% increase in carbon emissions, the mortality rate of infants will increase by 6.079 units. Results are highly significant and consistent.

Table 5

Fixed Effect and Random Effect Estimation Result

Variables	Fixed Effect Model	Random Effect Model
	(b)Mortalityrate, infant	(d)Mortalityrate, infant
Fixed BroadbandSubscription	-1.268** (3.04)	-0.790* (2.12)
Fixed TelephoneSubscription	-0.788* (-1.58)	-0.344* (1.86)
GDP per capita	-0.0167*** (-3.91)	-0.00268*** (-4.94)
School Enrollment,Secondary	-0.504*** (-6.51)	-0.642*** (-12.83)
CO2 Emissions	15.91*** (3.92)	6.079*** (4.91)
Immunizations	-0.445*** (-8.19)	-0.486*** (-12.14)
Physicians	-9.828 (-1.92)	-9.028*** (-3.94)
R-Square	0.7809	0.9815
Chi2(7)	------	3237.42
Prob > Chi2	------	0.0000
F-Statistics	112.34	------
F-Probability	0.0000	------
No of Observations	69	69

*Note: t-values are given in parenthesis. *, **, *** corresponds to significance at 10%, 5% and 1%respectively.*

The following table reports the findings of fixed effect estimation as well as random effect estimation. Firstly, we look at the results of the fixed effect estimation technique in columns (b). The major findings of fixed effect estimation indicate a significant impact on infant mortality rate. There is a significant positive link between ICT and life expectancy. We measure ICT by two common measures, fixed broadband subscriptions, and fixed telephone subscriptions. The findings show that there is a significant impact of fixed broadband subscriptions and fixed telephone subscriptions on life expectancy and mortality rates. The results are consistent and correctly estimated according to the literature. Similarly, the control variables contributed to the highly significant results as shown in the following table. Per capita GDP and health have provided a strong relationship as withthe increase in GDP per capita, the health of the public will also increase. Education has such a strong impact on health by providing good jobs and salaries that are interlinked with people's health. Likewise, immunizations and physicians contributed to a highly significant influence onlife

expectancy at birth and mortality rate, in infants. Immunization has a negativebut significant impact on the mortality rate. Carbon emissions have adverse impacts on life expectancy and mortality rate, as they affect health. Now columns (d) provide the findings of random effect estimation. With a huge number of observations, unknown parameters will be affected in fixed

effect. So, to address this issue, we used another estimation technique called random effect estimation. From the findings, it is concluded that fixed broadband subscriptions and fixed telephone subscriptions have a significant impact on life expectancy at birth and infant mortality rates. In contrast, the coefficients in column (d) provided the adverse effects. Outcomes reveal that with the 1% increase in fixed broadband and fixed telephone subscriptions, there will be a reduction in infant mortality rate by 0.790 and 0.344 units respectively. On the other hand, in column (d) all the control variables hurt the mortality rate of infants. It shows that due to a 1% increase in per capita GDP, school enrollment at the secondary level, immunizations, and physicians, there will be a reduction in the mortality rate of infants by 0.00268, 0.642, 0.486, and 9.028 respectively. Carbon emissions have provided unfavorable impacts on the life expectancy and mortality rate of infants as it causes different health issues.

Table 6

Hausman test results as Mortality Rate, Infant as dependent variable

Variable	Chi (5)	P-Value > Chi (5)
Mortality Rate, Infant	-5.38	0.0000

Table 6 outlined the results of the Hausman test of the infant mortality rate, as the dependent variable. The probability value is less than 0.10 which indicates that we couldaccept our alternative hypothesis and reject the null hypothesis. And, also concluded that fixed effect estimation is more appropriate and suitable than the random effect estimation technique.

Conclusion and Future Directions of the Study

Good health is an important component of happiness, as it is associated with a variety of characteristics such as better occupations, family relationships, positive emotions, social connections, and so on. However, it also has an impact on health in the sense that life expectancy increases while death rates decrease. Similarly, excellent health promotes capital development, which is a key driver of economic growth. The status of health varies by region. The findings of the current research underscore the significant impact of information communication technologies (ICT) on public health outcomes, aligning with existing literature that highlights the positive association between technological advancements and improved health indicators such as life expectancy and reduced mortality rates. This echoes previous studies that have identified ICT as a key determinant of population health, emphasizing its role in enhancing healthcare delivery and accessibility. Moreover, the study's identification of carbon emissions as a detrimental factor to public health adds nuance to the literature by emphasizing the need for sustainable technological development. The policy implications derived from this research underscore the importance of governmental intervention in promoting ICT-driven healthcare initiatives, including the implementation

of awareness programs and the expansion of technological infrastructure to ensure equitable access to these services. By bridging empirical findings with existing literature, this study contributes to a growing body of research advocating for the integration of ICT into public health policy and practice.

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