Social Capital as a Determinant of Population Health Outcomes: A Global Perspective

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Abstract

This study contributes to the health literature by decomposing health outcomes into three dimensions that are physical health, mental health and well-being of individuals. Where physical health is measured using life expectancy, infant mortality and self-rated health indicators while mental health is measured using stress index and addition of smoking in both males and females. Finally, well-being is measured using the index of happiness. The empirical analysis is conducted using OLS and GMM for 61 countries from 1980 to 2014. Overall results indicate that social capital is positively associated with all dimensions of health outcomes as high trusting individuals report better health outcomes in comparison to low trusting individuals. The results also reveal that the impact of social capital on mental health is stronger than the impact on physical health. Moreover, social capital is more conducive for controlling stress index than producing happiness. The main message of this research is that social capital has the power to influence diverse dimensions of population health. Therefore, the public policies need to focus on social indicators to overcome health disease burden.

Keywords: life expectancy, infant mortality, social capital, social wellbeing self-rated health, stress index, trusting individuals, CO_2 emissions, improved sanitation.

1. Introduction

Social science researchers have long been interested in answering the question that why some nations prosper and have effective institutions and law-abiding and healthy citizens while many other nations do not. Recently, researchers are increasingly paying attention to the concept of social capital as a likely reason. The role of social capital has been viewed essential for better performance of the government and the stability of democracy, for the control of crimes and more recently, for achieving better population health outcomes.

Social relationships and social support have powerful effects on physical and mental health. Health is maintained at the local level in the surroundings of everyday life, neighborhoods and communities where people across ages live, communicate, work, study, and play. Improved health cannot be attained without social connections and citizen involvement as health literacy and harness of knowledge improve through these networks and social connections (Kawachi et al., 1999). An increasing number of researches consider that not

only the physical resources and medical amenities but also other social elements improve the health of individuals (Kim, 2007).

The concept of social capital is multidimensional and many researchers have used different terms loosely to explain this concept. For instance, social networks (Gottlieb and Green, 1984; Lubben, 1988; O'malley et al., 2012), social relationships (House et al., 1988; Cohen, 2004; Umberson and Montez, 2010), social support (Cohen and Wills, 1985; Berkman and Glass, 2000; Uchino, 2006; Hakulinen et al., 2016), social ties (Seeman, 1996; Berkman and Glass, 2000; Kawachi and Berkman,2001), social integration (Seeman, 1996; Cohen et al., 2000; Leedahl et al., 2014; Matos et al., 2017) and social connections (Small et al., 2011; Seepala et al., 2013; Holt-Lunstad et al., 2017).

Social capital can also be considered as a cognitive measure (includes ethics, value systems, religious beliefs, social cohesion ant trust) which can be subjectively defined and a structural component (density of social relationships, social participation and networks) which can be objectively verified (Harpham et al., 2002; Harpham, 2008). The study of social networking dates back to Durkheim's work on the association between society and health. Then the idea of social capital evolved through sociology (Bourdieu, 1980; Coleman, 1988) and flourished over the fields of social sciences, economics, education, political science and health.

The role of social capital as a prominent determinant of health is gaining attention following the publication of Putnam et al. (1993). In this respect, Kawachi et al. (1997) conducted the first study to observe the relationships of social capital, income inequality and mortality, confirming the strong relationship among these. The structure of society specifically social networks (Islam et al., 2006), others support (Cohen et al., 2000), and the value of social connections appear as strong predictors of health and wellbeing (Kiecolt-Glaser and Newton, 2001). Social capital as a resource refers to moral and material support. The relationships shared through networks provide a moral support and make it possible to fight against daily life difficulties. It contributes to limit the emergence of chronic diseases (Berkman and Syme, 1979; House et al., 1988; Berkman, 1995; Kawachi et al., 1996; Brunner, 1997; McCulloch, 2001; Wilkinson, 2002). The material support also facilitates once in the face of a temporary job loss which reduces the level of stress (Cohen et al., 2004).

How social capital affects health? Different studies explain a variety of pathways to answer this question. In this regard, different researchers use several proxies of health separately; including life expectancy, infant mortality, self-rated health and depressive measure (Kawachi et al., 1997, Kennedy et al., 1996; Kennelly et al., 2003; Choi, 2014). The relationship of social capital with mortality is first time developed by Kawachi et al. (1997), where they explain three ways through which social capital can affect individual health. Firstly, the formal and informal social networks related to social capital provide access to information and education about health and their facilities. The study also addresses cultural customs which are harmful to health such as smoking and advance preclusion efforts. Secondly, social capital may stimulus health policies through co-operative action

to plan improved health care delivery services. Finally, the support systems linked with social capital may provide a source of self-confidence and mutual respect.

To our knowledge, this is the first study of its kind which uses a variety of objective measures (life expectancy, infant mortality, smoking) and subjective measures (self-rated health, stress index, happiness, life satisfaction) of health using the definition of World Health Organization in its 1948 constitution that health is a "state of complete physical, mental and social wellbeing and not merely the absence of disease or informality." To find the relationship between health and social capital studies use subjective measures of health and in few cases mortality and life expectancy have been taken as health indicators. But no one study analyzed the subjective and objective measures of health together. Secondly, social trust has multiple effects on health outcomes, we use variety of health indicators to check whether effect is promising and strong.

We use life expectancy, infant mortality and self-rated health as proxies of physical health, smoking and stress as measures of mental health and happiness as indicator of social well-being. The main contribution of our study is stress index which is the combination of several questions on life events taken from World Values Survey (2014). We have made PCA of these questions, the detail is provided in the data section. To capture the social capital, we used social trust as a proxy which is constructed by making averages of three questions taken from World Values Survey (2014) that includes most people can be trusted, trust on families and trust on neighbors.

As there is a strong causality between health and social capital (Xue and Reed, 2016), so endogeneity problem also exists in our study. To tackle the problem of endogeneity, studies use a number of instruments including religiosity, crime victimization, population density, elevation and legal origin (Collier, 1998; La Porta et al., 1999; Bruckner and Largey, 2008; Schultz et al., 2008). In the present study following the existing literature, we use victimization of crime and religiosity as an instrument of social capital.

Rest of the study is organized as follows: Section 2 presents literature on social capital and health. Section 3 focuses on theoretical expectations. Section 4 gives variable description and empirical strategy of model. Empirical investigation is discussed in Section 5. Finally, Section 6 provides conclusion.

2. Literature Review

Since the era of 1990s, social capital gained much attention and literature has focused on three main areas of disputes that how one defines, measures and analyses social capital. All definitions of social capital refer directly or indirectly to social connections or social networks. Despite some disagreements on how it should be defined, social capital is commonly implied to cover a blend of norms, trust and social networking that enables coordination and collaboration of individuals in a community (Putnam, 1995; D'Hombres et al., 2010).

Studies show that communities which have strong social capital tend to have more powerful social, economic and health outcomes (Berry, 2010; Mohnen et al., 2014). But the results of social capital and health are not same always depending upon sample, indicators of health and the way in which it is measured (Mansyur et al., 2008; Moore et

al., 2009; Lee, 2017). The relationship between health and social capital has multiple channels. On the one hand, Olsen and Dahl (2007), Schultz et al. (2008), and Carpiano and Fitterer (2014) assert a positive relationship between health and social capital. On the other side, Giordano and Lindstrom (2011) find that there is no association. While in the case of social participation, Xue and Reed (2016) find evidence of a positive connotation with health. Snelgrove et al. (2009) find insignificant relationship.

The cognitive aspect of social capital can be measured through three measures generalized trust, particularized trust and reciprocity (Abbot and Freeth, 2008). On the other hand, social trust also used as a cognitive measure and gain much attention, it is theorized in terms of generalized trust, particularized trust and strategic trust (Smith, 2013). The literature evidences that generalized trust (Rocco et al., 2014; Lee, 2017) and particularized trust are the most common social capital measures in health literature. Glanville and Paxton (2007) assert that generalized trust, or what Putnam calls thin trust is the individual perception of trustworthiness of an average person in general. Generalized trust is the individual perception of trustworthiness to social environment (Moore and Kawachi, 2017). Whereas, particularized trust or thick trust is the trust level of specific interpersonal persons like trust on neighbors. Extensive research documented a positive association between generalized trust (Rocco, 2014), particularized trust and health. Whereas some studies assert that particularize trust has more powerful effect on health as compared to generalized trust (Glanville and Story, 2018)

The literature asserts that trust is the main ingredient of social capital (Fukuyama, 1995; Kawachi and Berkman, 2000) in contrast to the Putnam (1995), claim that social participation is the core of social capital and social trust is the consequence of social capital. In health sciences, social capital and social trust have considerable role. The positive association between health and social trust is examined in several studies (Fukuyama, 1995; Kawachi and Berkman, 2000; Poortinga, 2006; Kim and Kawachi, 2007; Schultz et al., 2008; Habibov and Afandi, 2011).

Kawachi and Berkman (2000) give mechanisms through which social capital is linked with health. The study explains that the quicker acceptance of health-promoting innovations lead to improves interpersonal trust in neighborhood. Trust between neighbors is an important element for social work and co-operative action. For instance, trough community involvements and resident's altruistic actions benefit others in future. Kim and Kawachi (2007) also mention that high trusting individuals report poorer health when residing in low-trust communities while with low trust individuals do not report better health in high trusting communities (Erickson, 2011).

In favor of positive relationship between social trust and health, the literature argues that increased level of social trust provides social support, health promoting behavior (outdoor exercise and social collaboration) and additional resources which may reduce the effect of high stress, depression and mental illness (Kessler, 1997; Subramanian et al., 2002; Mckenzie, 2008; Giordano and Lindstorm, 2011; Frank et al., 2014; Kawachi and Berkman, 2014).

In contrast, a negative relationship between social trust and health also exist (Riumallo-Herl et al., 2014; Feng et al., 2016) depending upon place of residential location or any other setting. The negative impact of social capital on health mediates through factors such as restrictions on individual freedom, excess claims on group members and exclusion of outsiders. Another study on Chinese community by Feng et al. (2016) asserted that trust is a key for good health at both individual as well as society level but the relationship between two concepts are different. The study stated that social trust derived from trust on stranger (in-group) is positively related with health outcome whereas social trust derived from most people trusted (out-group) is negatively related with health outcome. This may be due to the fact that Chinese has low level of trust on stranger which prevents them to cooperate, to become a tolerant society, a lively social community, which depress the social quality of individuals' life and hence report bad health. Portes (1998) conceptualize that developing countries have strong intra- community ties which lead to boost traditional norms and confine individual freedom restricting them to get health care facilities (Islam et al., 2006).

All studies reviewed above, although use different proxies of social capital and health, analyzed that social capital has beneficial impact on health and in very few cases has inverse relationship. In the empirical literature, relationship between health and social capital has been analyzed using subjective measures of variables and in some cases mortality has been taken as health indicators. But no one study analyzed the subjective and objective measures of health together. Moreover, the existing empirical literature on health and social capital suffers from endogeneity problem as most studies use the OLS method, which provides biased results.

This study extends the existing literature in several ways: First, this study is conducted by using a rich cross-country dataset covering 61 countries from 1980-2014. Second, internal and external instrument are used to deal with potential endogeneity problem of social capital and health. Third, in this analysis various proxies of health are used to capture the possible impact of social capital on health in this regards the definition of World Health Organization is considered. Finally, we have extended our investigation to check whether results are sensitive to other possible determinants of health and development level.

2. Methodology

To analyze the impact of social capital on health, this study incorporates different indicators of health outcome. These indicators include life expectancy, infant mortality and self-rated health to capture physical health outcome, mental health includes indicators of smoking (female and male) and an index of stress. Moreover, the indicator of wellbeing is also included which is measured through happiness.

Several studies investigate that health can be viewed as one of the important forms of human capital but till 1972 no study could construct a model of the demand for health capital itself. Grossman (1972) formulated a production function for good health, as consumers demand good health when they purchase medical services. According to Grossman (1972), the Health Production Function for utility is the function of individual inputs and medical care services.

$$Health = f(X, M) \dots\dots\dots\dots\dots\dots (A)$$

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In the above equation 'X' is the vector of individual inputs and 'M' is the vector of medical inputs, many economists define individual inputs into a number of ways (Grossman, 1972; Fayissa and Gutema, 2005; Kamiya, 2010; Bayati et al., 2013). According to these studies, the vector 'X' can also be decomposed into economic, social and environmental factors.

$$Health = f(S, EC, EN, M) \dots \dots \dots \dots . (B)$$

Here 'S' stands for social variables, economic variable captured through 'EC' and environmental variable depicts by 'EN'. The economic factors include GDP, health expenditure, variables representing social factors are education, and population while environmental factor includes urbanization and carbon dioxide emissions. Income, urbanization, education, health care spending, and input like number of physician, access to safe drinking water are major determinants of health outcome. Various studies attempt to find the comparative importance of income, education and occupation for health outcome mainly for mortality and life expectancy (Winkleby et al., 1992; Stronks, 1997; Wolfson et al., 1999).

Despite these factors, social capital as a determinant of health has also gained much attention of many economists after the publication of Putnam (1993). Kawachi et al. (1997) conducted the first study to examine the relationships of social capital, income inequality and mortality, confirming that there is a strong relationship between income inequality and social cohesion, so disinvestment in social capital leads to increase in mortality.

Bolin et al. (2003) and Schultz et al. (2008) extended the Grossman theory of health by constructing a theoretical model of health (produced by family) and social capital. This model depicts that household invests in health and social capital instantaneously, so the direct returns from the investment in social capital are utility gain from social interactions but indirectly it increases household resources (moral and material). In its simple form, Bolin et al. (2003) present household utility from consumption of commodities, health, and social capital as a function of health of each family member. In this regard health is also a function of social capital.

$$Health = f(S, EC, EN, SC) \dots \dots \dots \dots . \dots \dots . . (C)$$

In the light of above discussion, we formulate an econometric model, which is well depicting our methodological framework.

$$Health_i = \alpha_i + \alpha_1 X_i + \alpha_2 SC_i + u_i \dots \dots \dots \dots (3)$$

In the above equation health is measured through physical health, mental health and wellbeing. These indicators include life expectancy infant mortality and self-rated health to capture physical health, mental health includes indicators of smoking and an index of stress while indicator of wellbeing is measured through happiness. Health is a function of vector 'X' which includes social, economic and environmental factors and the function of social capital (SC). This study uses social trust as a proxy of social capital.

2.1 Physical Health

$$Life\ Expectancy_i = \alpha_i + \alpha_1 X_i + \alpha_2 SC_i + u_i \dots \dots (3.1)$$

$$Infant\ Mortality_i = \alpha_i + \alpha_1 X_i + \alpha_2 SC_i + u_i \dots \dots (3.2)$$

$$Self\ Rated\ Health_i = \alpha_i + \alpha_1 X_i + \alpha_2 SC_i + u_i \ldots \ldots \ldots (3.3)$$

We use life expectancy, infant mortality and self-rated health as indicators of physical health. Whereas vector "X" includes real GDP education, immunization CO2 emissions, urbanization, improved sanitation, gender and marital status.

2.2 Mental Health

$$Smoking\ Male_i = \alpha_i + \alpha_1 X_i + \alpha_2 SC_i + u_i \ldots \ldots \ldots \ldots \ldots . (3.4)$$

$$Smoking\ Female_i = \alpha_i + \alpha_1 X_i + \alpha_2 SC_i + u_i \ldots \ldots \ldots \ldots (3.5)$$

$$Stress\ Index_i = \alpha_i + \alpha_1 X_i + \alpha_2 SC_i + u_i \ldots \ldots \ldots . \ldots \ldots \ldots (3.6)$$

To capture the effect of social capital on mental health, we use smoking male, smoking female and stress index as indicators of mental health.

2.3 Social-Wellbeing

$$Happiness_i = \alpha_i + \alpha_1 X_i + \alpha_2 SC_i + u_i \ldots \ldots \ldots \ldots \ldots . . \ldots \ldots (3.7)$$

Happiness is taken as an indicator of wellbeing.

To find the causal relationship between health and social capital, Younsi and Chakroun (2016) use trust as a proxy of social capital and find a reverse causality in social capital and health. Study finds that social capital at an individual level has a positive and prominent effect on health and same in the case of health on social capital. Their study also suggests that people take an active part in social activities with good health, while on other side population with poor health may see its health getting worse faster because of the missing beneficial outcome of social capital. In order to tackle with potential endogeneity, the study used number of instruments. In the present study, the endogenous variable is social capital. Schultz (2008) asserts that causality could run in the other direction that health could affect social capital, as health and social capital are both forms of human capital and are affected by many of the same factors, so impact on one may also has effect on other, it has been difficult to determine both causality and direction of causality. This study uses system GMM in cross-sectional data as our data has problem of endogeneity as well. Potential endogenous variable (social capital) is instrumented by various suitable internal and external instruments. These instruments are initial values, victim of crime and importance of religion in life.

3. Data

Cross sectional analysis is used to investigate the relationship of social capital and other variables with health outcomes at a given period of time. It gives us a snapshot of health-related features of population at a given time. In the present study, outcome variable is health and focused variable is social capital. Cross-country data is derived for all countries across the world to provide a global perspective of empirical analysis. However, many countries have been screed due to unavailability of the data. Focused variable social capital was available only for 98 countries. Therefore initial screening left us with 98 countries. Since this study uses diverse dimension of health outcomes, the data series for some dimensions of health such as mental health were missing. In the next step, therefore, we

matched the countries which have the data for both focused and outcome variables. This procedure left us a final sample of 61 countries.

To analyze the effect of social capital on health we follow the World Health Organization definition on health. According to World Health Organization in its 1948 constitution health is a "state of complete physical mental and social wellbeing and not merely the absence of disease or informality". In our analysis we use life expectancy, infant mortality and self-rated health as proxies of physical health, whereas smoking and an index of stress are used as proxies of mental health and happiness is used as a proxy of social wellbeing.

The data on life expectancy at birth and infant mortality is derived from World Bank (WDI) online database 2016. The data on self-rated health is derived from World Values Survey (2014). The self-rated health question is four-point scale question reveals that "how would you describe your state of health these days? Would you say it is very good, good, fair, or poor?" In our analysis, we take option 'good' to predict the self-rated health outcome.

The data on smoking is taken from World Bank (WDI) online database 2016.Whereas the variable of stress is measured by using the averages through nine questions of World Values Survey (2014). To measure the variable of stress we took the inspiration of Cohen (1985) work of "Stress, Social Support and Buffering Hypothesis". The study explains that various stressful events related to life increase our stress level. These events include problem with spouse or children, financial difficulties, occupational worries like job, unemployment, legal problem or dissatisfaction with life. These questions include: "How secure you feel these days in your neighborhood". In the present study we take the value of 'not at all secure'. Another question is, "Where you live, are you satisfied or dissatisfied with the quality of health care"? We took the value of 'dissatisfied with the quality of health care'. Next question is related to confidence on government. We took the value of 'no confidence at all'. "How often you or your family feel unsafe from crime in your own home". We took the answer of 'often crime'. "How often you and your family gone without enough food to eat"? In this study we took the value of 'often no food'. "How satisfied are you with financial situation of household"? "How satisfied are you with your life as a whole in these days"? In both questions, we took the value of 'very dissatisfied'. "To what degree are you worried about the financial situations and losing job or not finding job"? "To what degree are you worried about not being able to give your children a good education"? The value of 'very much worries' are taken in our analysis.

To capture the social capital, we use social trust variable. Three questions are asked to build a variable of social trust. These questions are taken from World Values Survey (2014), the first questions asked is "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people"? Second question is related to how much you trust your family "How much you trust people of various groups"? "Could you tell me for each whether you trust completely, somewhat, not very much or not at all?" and third question comprises that how much you trust your neighbors. "Could you tell me for each whether you trust completely, somewhat, not very much or not at all"? In this regard, we only took positive and most correlated terms to make an index of social trust.

In addition, several control variables are also used in the study, following previous studies which examine determinants of health. Economic growth is an important determinant which has an influential effect on health. According to Waldmann (1992), rich countries have higher life expectancy while lower level of infant mortality. As high-income level provides easy access to consumption of high quality goods, improve housing status and medical service which have favorable effect on health outcome (Fayissa, 2005). Recent analysis is used log of "GDP per capita at constant US$ to measure economic growth.

Another representative of economic factor is medical inputs, it considers health expenditures, number of physicians (per 1000 people), number of nurses (per 1,000people), immunization (immunization of measles % of children ages 12-23 months). Improved health care facilities lead to improve health outcome. Data on all variables are taken from World Bank (WDI) online database 2016.

The variables under social factors consider education, improved water and improved sanitation. We use school enrolment, primary-female school enrolment (% gross) as a proxy of education. Improved sanitation facilities measured as a percentage of population with access. Improved water source is measured as a percentage of population with access. According to Grossman (1972) education has a strong influence on our daily life decision including decision of job, selection of a healthy diet, and deterrents of unhealthy habits and best allocation of health care facilities which ultimately affect health and quality of life. Hence, we expect a positive coefficient of school enrolment rate.

To capture the effect of environmental factors on health, we used share of the total population living in urban area in each country and carbon dioxide emissions (kilo ton per capita). The sign of urbanization is not predetermining, Thornton (2002) indicates that urbanization is more linked to (bulk of) pollution and congestion that has destructive effect on health, on the other side it is suggested that in urban zones clinics are cheaper and more cost effective. So depending on the two sides of effect it is hard to decide the net effect. The extensive use of carbon dioxide omission is also harmful for nature as well health. Data is taken from World Bank (WDI) online database 2016.

Socioeconomic status has also been linked with health outcome (Meara, 2001) and behavioral patterns such as smoking and drinking as well. In our analysis socio demographic (age, gender, marital status) and socio-economic (employment status, income scales) characteristics are considered. Data on these variables is derived from World Values Survey (2014).

4. Empirical Estimations

This section provides interpretation and discussion of cross sectional results. Table1 reports cross sectional OLS results of trust and health indicators that are physical health proxies, mental health proxies and wellbeing proxy. The OLS estimates of physical health show trust is positively associated with health outcomes at five percent level of significance. Trust is positively associated with life expectancy (1.503) and self-rated health (2.38) and negatively associated with infant mortality (4.60). These results confirm our prior expectation and consistent with theoretical expectations that high level of trust promotes physical health (Elger, 2010; Feng et al., 2016; Lee, 2017), strong trust inhibits anxiety and depression which in turn lead to better physical health outcomes.

Similarly control variables show the same pattern, urbanization has a negative and significant impact on life expectancy (0.946), which shows that increased urbanization has adverse effect on life expectancy. This finding is consistent with Thornton (2002) who argues that urbanization is associated with pollution and overcrowding that adversely affect health outcomes. The impact of gender on life expectancy is positive (0.376) and statistically significant at 10 percent level of significance. If women and men in their life-course have the similar conditions, opportunities and also understand their full rights, then they have potential to be healthy. In the same way, improved sanitation has positive (0.233) and statistically significant effect on life expectancy. Safe clean water and improved sanitation is crucial for better health outcomes as unavailability of these things spreads the diseases and damages the quality of life which in turn reduces the life expectancy (Cingolani et al., 2015).

In the case of infant mortality, education is negatively (3.07) and significantly associated with health (Drabo, 2010; Majeed and Gillani, 2017) which shows that education is the major component of health. Immunization has negative (0.42) and significant impact on infant mortality confirming the results that immunized child has less chances of death and immunization reduces the hazard associated with neonatal, post-neonatal and infant mortality. Thus, an effective immunization policy plays a crucial role in health care system (Leipziger et al., 2003; Mondal et al., 2009; Majeed and Khan, 2018). CO_2 emissions have negative effect on infant mortality. The coefficient of urbanization is positive and significant shows that increased urbanization has adverse effect on health. The result is consistent with Thornton (2002) that urbanization is associated with pollution and congestion that adversely affect health outcome. The improved sanitation has negative and significant association with infant mortality while in the case of self-rated health it has positive effect. Self-Rated health has negative relationship with marital status (married).

Table 1: Cross Sectional Results of Health and Trust

Variables	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (7)
	Physical Health			*Mental Health*			*Wellbeing*
	Life Expectancy	Infant Mortality	Self-Rated Health	Smoking Male	Smoking Female	Stress Index	Happiness
Trust	1.503**	-4.604**	2.328**	-3.691*	-0.177	-1.776*	1.716
	(0.640)	(1.777)	(1.083)	(2.016)	(1.321)	(0.994)	(2.097)
Real GDP	0.0460	0.0447	-1.289	1.097	7.354***	-2.696**	0.465
	(0.294)	(0.816)	(1.304)	(0.852)	(1.411)	(1.236)	(1.292)
Education	0.131	-3.069*	0.407	-0.00003	-0.00002	0.000018	3.002*
	(0.569)	(1.578)	(0.902)	(0.000031)	(0.00002)	(0.000017)	(1.760)
Immunization	0.00537	-0.420**	-0.0977	0.194	0.0605	-0.135	-0.423*
	(0.0731)	(0.202)	(0.115)	(0.224)	(0.134)	(0.106)	(0.226)
CO2 Emissions	0.0709	-0.467*	-0.0761	-0.725*	-0.542*	-0.0148	0.521**
	(0.0886)	(0.245)	(0.153)	(0.419)	(0.290)	(0.157)	(0.259)
Urbanization	-0.946**	3.472***	-0.00007	0.00002	-0.171	-0.0719	-0.000015
	(0.453)	(1.255)	(0.00001)	(0.00003)	(1.052)	(0.684)	(0.000035)
Improved Sanitation	0.233***	-0.573***	0.154*	0.207	-0.132	0.156*	0.0751
	(0.0468)	(0.130)	(0.0870)	(0.134)	(0.0970)	(0.0789)	(0.144)
Gender	0.376*	-0.967*	0.653**	-0.307	-0.354	-0.415	0.132
	(0.203)	(0.556)	(0.319)	(0.709)	(0.584)	(0.288)	(0.594)
Married	0.0360	0.0890	-0.142*	0.155	1.188**	-0.0117	-0.124
	(0.0485)	(0.133)	(0.0843)	(0.155)	(0.570)	(0.0733)	(0.153)
Constant	30.55**	164.5***	51.95***	11.17	-28.14	57.22***	30.22
	(11.76)	(32.21)	(16.52)	(41.59)	(30.52)	(20.94)	(48.17)
Observations	60	61	61	51	54	60	61
R-squared	0.788	0.850	0.283	0.381	0.661	0.315	0.213
Link Test	0.436	0.308	0.345	0.704	0.397	0.693	0.645
Multicollinearity	2.02	2.02	2.58	2.07	2.74	2.03	2.43
Heteroscedasticity	0.0063	0.0296	0.3294	0.2103	0.5467	0.8355	0.9347
Normality	0.59	0.0722	0.3836	0.00004	.0145	.2183	.7332

*significant at 10%, **significant at 5%, ***significant at 1%

Columns 4-6 of Table 1 describe OLS estimates of mental health and show that trust is negatively associated with smoking male, smoking female and stress variable whereas smoking male (3.69) and stress (1.776) have significant relationship with trust and smoking female has insignificant relationship. The results justify our theoretical expectation that increased level of trust reduces the smoking pattern of male and also worries and depression. When individual enters gatherings, and interact with others on the expectation of trust, he feels more relaxed in sharing ideas and discussion about life which reduces the

insecurity and anxiety. Individual with low trust increases the worries which is an uncontrolled phenomenon and understood as a chain of thoughts and images which negatively affect mental health (Lindström and Janzon, 2007). In the same lines, CO2 emissions have negative and significant effect on smoking male and female and insignificant on stress. Results show that a high level of income is positively associated with smoking of females (Hills et al., 2003) show that higher level of income increases stress level. On the other hand, stress indicator is negatively associated with income that a high level of income improves mental health.

In case of wellbeing OLS estimates show that happiness is insignificantly associated with social trust. This confirms that social capital increases one's happiness not community-level happiness (Helliwell and Putnam, 2004). The estimates also show that education has positive effect whereas immunization and CO_2 emissions have negative effect on happiness and wellbeing. Higher education level leads to more employment and provides higher incomes to enjoy daily life, these individuals report more happiness level (Cunado and Gracia, 2012). The negative relationship of CO_2 emissions with happiness is consistent with Majeed and Mumtaz (2017).

Finally, post estimation tests have applied to assess the quality of empirical results drawn. These diagnostic tests show that model is correctly specified and there is no chance of multicollinearity and heteroscedasticity. Similarly, data normality is also confirmed by Jarque-Bera Test.

To see if the effect of social capital on health outcome is causal and to tackle the potential effect of endogeneity, we are using GMM approach. The instruments must be uncorrelated with error term and also they should not have any direct effect on dependent variable rather it effects it via instrumented variable which in our case is social capital. Another assumption is that a valid instrument should be correlated with independent variable which in this case is measures of social capital. We are using initial values of social capital and control variables and also external instruments. Since these initial values fulfil above two conditions: uncorrelated with health. So we are using GMM approach to confirm our baseline findings.

Table 2: GMM Results of Health and Trust

Variables	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (7)
	Physical Health			*Mental Health*			*Wellbeing*
	Life Expectancy	Infant Mortality	Self-Rated Health	Smoking Male	Smoking Female	Stress Index	Happiness
Trust	4.919***	-12.17***	5.041*	-11.52**	-6.067*	-5.688***	5.664*
	(1.713)	(4.060)	(2.650)	(4.727)	(3.621)	(1.695)	(3.388)
Real GDP	-0.169	-0.00185	-1.920	0.993	8.051***	0.573	0.0938
	(0.321)	(0.881)	(1.675)	(0.849)	(1.540)	(0.423)	(0.640)
Education	1.227*	-5.504***	1.161	-3.526**	-2.565***	-1.240*	0.0929
	(0.682)	(1.674)	(0.914)	(1.540)	(0.976)	(0.743)	(1.245)
Immunization	0.132	-0.594***	-0.164*	-0.174	-0.00616	-0.200	0.266*
	(0.0887)	(0.207)	(0.0917)	(0.430)	(0.216)	(0.170)	(0.144)
CO_2 Emissions	-0.514***	0.638*	-0.0160	-0.204	-0.0846	0.000341	-0.506
	(0.156)	(0.365)	(0.183)	(0.518)	(0.338)	(0.201)	(0.446)
Urbanization	-2.706***	6.967***	-0.000018*	0.000016	-0.000017	1.564**	1.743
	(0.788)	(2.159)	(0.000098)	(0.00002)	(0.001)	(0.791)	(1.243)
Improved Sanitation	0.152***	-0.442***	0.178*	0.414***	-0.0914	0.0369	0.180*
	(0.0525)	(0.169)	(0.0926)	(0.130)	(0.122)	(0.0490)	(0.106)
Gender	0.897***	-1.975**	-0.537*	0.406	-0.902*	0.158	2.146***
	(0.251)	(0.952)	(0.275)	(1.054)	(0.497)	(0.338)	(0.641)
Married	0.00424	0.185	-0.0687	0.517**	-0.0142	-0.167**	1.991***
	(0.0520)	(0.151)	(0.105)	(0.206)	(0.0734)	(0.0744)	(0.676)
Constant	5.370	210.5***	83.60***	-16.06	13.02	32.41	-103.4***
	(15.42)	(48.36)	(18.55)	(44.91)	(25.04)	(27.88)	(36.68)
Observations	42	42	45	36	52	42	56
R-squared	0.745	0.815	0.163	0.172	0.494	0.216	0.325
Estat-Overid	0.723	0.967	0.086	0.076	0.131	0.224	0.244

*significant at 10%, **significant at 5%, ***significant at 1%

External instruments include victim of a crime and religiosity factor or importance of religion in life. We used victim of crime as our instrument, an indicator of whether the respondent or any members of his or her family had been victim of a crime in the last 12 months. Our first rationale to select this instrument was based on the fact that being the victim of a crime is a strong predictor of social capital (Harpham, 2008). Studies also suggest that victim of a crime may not be completely exogenous and it can depend on many factors such as age, gender and place of residence, conditional on controlling for these and other demographic factor (Riumallo-Herl et al., 2014). Other studies find that religiosity is also an important determinant of social capital. Studies also find a positive relation between social trust and religion/church attendance (Ellison and George, 1994; Glaeser et al., 1999). Thus, the instrumental variables are theorized to be highly correlated with social capital

measures and uncorrelated with unobserved variables that may have effect on health and has no relationship with error term in the health status equation.

Table 2 shows the GMM estimates of trust and health proxies using initial value of trust, victim of crime and religiosity as instruments of trust. The results confirm our initial findings and strengthen our baseline judgments that trust has positive and significant effect on health.

Columns 1-3 of Table 2 show that coefficient of trust is highly and positively significant effect on health outcomes. In column 1, trust is positively associated with life expectancy (4.92). This shows that individual perceptions of trustworthiness on others reduce the chances of stress which ultimately leads to enhanced health outcome. The coefficients of education (1.23) and gender (0.89) have positive relation with life expectancy, whereas the coefficients of CO_2 emissions (0.51) and urbanization (2.71) have negative association with life expectancy.

Column 2 representing GMM results of infant mortality shows that trust is negatively (12.2) and significantly associated with infant mortality. This shows that high trustworthiness of mothers reduces the chances of infant mortality. In the same line education, immunization, improved sanitation and gender have negative and significant effect on infant mortality, while urbanization and CO_2 emissions have positive and significant effect on infant mortality. The column 3 of Table 2 explains the GMM results of self-rated health, the coefficient of trust is positive (5.04) and significant and the control variables have same results as discussed earlier.

Columns 4-6 of Table 2 present the result of mental health proxies. In column 4, trust is negatively and significantly associated with smoking male. The results show that high level of trust reduces the worries and depression that lowers the smoking pattern of male which ultimately improves mental health. The control variables have same pattern; education has negative effect on smoking male. High schooling levels and literacy lower the smoking pattern among individuals (Crone et al., 2003). Improved sanitation and marital status have positive influence on smoking male.

In column 5, GMM estimates of smoking female show that trust has negative relation with smoking female same as in case of male smoking. Whereas income is positively associated with smoking female and education and gender are negatively associated with smoking female.

Column 6 reports the GMM estimates of stress variable, in the same manners of male and female smoking the stress variable has same pattern that a high level of trust on others leads to lower level stress level. GMM estimates of Table 2 show that trust have strong impact on all three measures of health confirming that individual trustworthiness on others in their area reduces the chances of stress which ultimately improve health outcomes. Other estimates are also consistent with our prior results.

Column 7 reports the GMM estimates of wellbeing. Trust variable has significant and positive association with happiness which is consistent with prior expectations that a high level of trust increases the happiness level of individuals (Kuroki, 2011). The parameter

estimates on stress and happiness indicators indicate that social capital has more power to reduce stress index than to improve happiness level. This finding implies that social capital is more important to cope with the mental health related problems.

Table 3 reports the results of developed countries of the world. All measures of physical health indicators have significant and consistent relationship with social capital. In the case of mental health indicators the level of significance does not remain valid while the direction of relationship remains consistent.

Table 4 reports the results of developing countries. The baseline results remain intact in the case of developing countries. All seven indicators of health coefficient show that health outcome is significantly associated with trust. Out of seven indicators three indicators (life expectancy, self-rated health and happiness) have significant positive relationship with trust. The remaining indicators of health (infant mortality, smoking male, smoking female, stress index) have significant negative relationship with trust. These finding makes a contrasting view that is in the case of developing countries social capital has strong effect on health as compared to developed countries.

Table 3: Trust and Health in Developed Economies

Variables	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (7)
	Physical Health			*Mental Health*			*Wellbeing*
	Life Expectancy	Infant Mortality	Self-Rated Health	Smoking Male	Smoking Female	Stress Index	Happiness
Trust	6.438**	-13.34***	5.689*	-5.231	-6.358	-8.581	6.264
	(2.907)	(5.082)	(3.420)	(5.216)	(6.656)	(7.908)	(6.013)
Real GDP	-0.158	-0.116	0.458	0.359	6.921***	0.926*	0.168
	(0.366)	(0.862)	(1.705)	(0.889)	(1.662)	(0.523)	(0.690)
Education	2.703	-9.897	7.722	34.22	-6.009	-9.049	-8.557
	(9.219)	(25.42)	(14.66)	(31.97)	(6.733)	(11.31)	(6.726)
Immunization	0.125	-0.550***	-0.163*	0.0817	0.113	-0.239	0.250
	(0.0986)	(0.202)	(0.0859)	(0.275)	(0.175)	(0.229)	(0.165)
CO_2 Emissions	-0.607***	0.611	-0.251*	-0.303	-0.0684	0.0164	-0.241
	(0.205)	(0.474)	(0.148)	(0.362)	(0.430)	(0.386)	(0.430)
Urbanization	-3.083***	6.862***	-0.00009	-0.00006	-0.00009	1.801	2.150*
	(0.846)	(2.116)	(0.00006)	(0.00006)	(0.00008)	(1.529)	(1.272)
Improved Sanitation	0.178***	-0.501***	0.0896	0.123	-0.120	0.0266	0.276**
	(0.0643)	(0.174)	(0.126)	(0.200)	(0.129)	(0.0964)	(0.108)
Gender	1.209***	-2.486***	-0.527*	0.898	-1.222**	-0.505	2.658***
	(0.358)	(0.938)	(0.293)	(0.954)	(0.558)	(0.614)	(0.681)
Married	-0.0320	0.283	-0.0443	0.849***	-0.0673	-0.135	2.021***
	(0.0775)	(0.205)	(0.140)	(0.211)	(0.105)	(0.111)	(0.577)
Constant	-14.02	249.2**	40.72	-229.1	47.21	99.44	-96.55**
	(49.11)	(122.0)	(76.56)	(162.2)	(38.77)	(71.93)	(38.01)
Observations	41	41	44	35	51	41	55
R-squared	0.628	0.807	0.055	0.449	0.423		0.323

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Thus, social capital is more productive in developing countries as compared to developed countries. There are very few studies which explain the conceptualization of social capital and health in developing countries (De Silva et al., 2005; Nilsson et al., 2006; Frumence et al., 2011). According to United Nations Report (2011) the developing countries get benefit from social capital as they have low income, high economic vulnerability and lower available human resources. Improved social capital in these countries indorse the use of health care facilities with greater access, information, knowledge and by engendering resources from family and friends (Harpham et al., 2002; Story, 2013).

Table 4: Trust and Health in Developing Economies

Variables	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (7)
	Physical Health			*Mental Health*			*Wellbeing*
	Life Expectancy	Infant Mortality	Self-Rated Health	Smoking Male	Smoking Female	Stress Index	Happiness
Trust	4.531***	-10.85***	7.041**	-10.80**	-6.704*	-6.286***	7.936**
	(1.379)	(3.111)	(3.261)	(4.565)	(3.844)	(1.819)	(3.952)
Real GDP	-0.194	0.0582	-1.536	0.556	8.351***	0.698	-0.328
	(0.283)	(0.756)	(1.877)	(1.103)	(1.590)	(0.468)	(0.742)
Education	6.067	-20.21	16.24	13.04	-4.829	-2.015	-10.81
	(6.880)	(21.34)	(12.99)	(35.09)	(6.523)	(10.94)	(7.541)
Immunization	0.134*	-0.603***	-0.111	-0.0597	-0.0241	-0.257	0.389*
	(0.0745)	(0.173)	(0.110)	(0.474)	(0.222)	(0.184)	(0.201)
CO2 Emissions	-0.475***	0.539	0.0207	-0.235	-0.110	0.0648	-0.739
	(0.137)	(0.338)	(0.198)	(0.482)	(0.346)	(0.203)	(0.466)
Urbanization	-2.502***	6.242***	-0.00004**	0.00007	0.00008	1.551**	1.932*
	(0.659)	(1.752)	(0.00005)	(0.00002)	(0.00004)	(0.769)	(1.099)
Improved Sanitation	0.141***	-0.411**	0.0583	0.317	-0.0795	0.0571	0.207*
	(0.0539)	(0.174)	(0.123)	(0.227)	(0.126)	(0.0684)	(0.120)
Gender	0.852***	-1.764*	-0.550*	0.430	-0.935*	0.141	2.684***
	(0.217)	(0.929)	(0.294)	(1.046)	(0.490)	(0.346)	(0.706)
Married	0.0114	0.152	-0.00438	0.627**	-0.0180	-0.149*	2.546***
	(0.0550)	(0.172)	(0.131)	(0.249)	(0.0858)	(0.0848)	(0.779)
Constant	-14.92	269.7***	12.82	-99.75	23.51	38.17	-93.35**
	(34.28)	(95.59)	(67.63)	(177.2)	(29.86)	(59.93)	(37.90)
Observations	41	41	44	35	51	41	55
R-squared	0.767	0.839		0.234	0.474	0.061	0.214

*** p<0.01, ** p<0.05, * p<0.1

Now we perform sensitivity analysis to check the robustness of our baseline results and confirm our empirical analysis regarding positive and significant impact of social capital on health with the help of other potential determinants. Table 5 presents the summary results of variables when we include other potential determinants of population health in our analysis. The other possible determinants are health expenditures, improved water,

trade, physician and hospital per bed. Table 5 clearly depicts that life expectancy is positively and significantly associated with all these variables. Health expenditures, improved water, trade, physician and hospital per bed all have negative and significant relation with infant mortality. Self-rated health has positive and significant relation with all determinants except hospital per bed. Smoking male has negative and significant association with improved water, physician and hospital per bed whereas insignificant relation with health expenditures and trade. Improved water is the only determinant which has significant negative relation with smoking female. In case of happiness no one determinant has significant relation.

Table 5: Summary of Sensitivity Analysis Results of Health Outcomes and Trust

Variables	Health Expenditure	Improved Water	Trade	Physician	Hospital Per Bed
Life Expectancy	5.007***	5.893**	4.420***	4.876***	4.715***
	(1.730)	(2.740)	(1.370)	(1.676)	(1.697)
Infant Mortality	-11.50***	-9.635*	-11.08***	-12.28***	-11.91***
	(3.506)	(5.033)	(3.142)	(4.066)	(3.968)
Self-Rated Health	6.257**	5.110*	4.688**	5.004*	1.552
	(2.764)	(2.650)	(2.170)	(2.903)	(1.987)
Smoking Male	-7.688	-10.95**	-2.432	-11.54***	-12.34**
	(5.491)	(4.261)	(2.129)	(4.402)	(5.076)
Smoking Female	-4.633	-6.033*	-4.533	-3.324	-8.340**
	(3.039)	(3.560)	(3.279)	(3.858)	(3.663)
Happiness	4.920	5.246	4.257	3.539	4.627
	(4.667)	(4.885)	(3.351)	(2.842)	(3.270)

*significant at 10%, **significant at 5%, ***significant at 1%

5. Conclusion

Social networks, social connections and the support from others appear as strong predictors of health and wellbeing. This study extends the health literature in relation to social capital using diverse dimensions of health outcomes. The empirical analysis is based on OLS and GMM estimation techniques over the period of 1980-2014 for 61 countries. The novelty of this study is that it disaggregates health outcomes into three dimensions that are physical health, mental health and well-being.

The empirical estimates confirm prior theoretical expectations that social capital has a powerful effect on diverse dimensions of population health. This research reconfirms that social capital cannot be overlooked by public policies which aiming at improvement of population health conditions. This research emphasizes on achieving better mental health indicators through social capital. For instance, addition to smoking which is detrimental to health can be controlled by improving social capital. Similarly, the indicator of stress which causes a potential loss of health can be managed through improving social capital. Our results reveal that the impact of social capital is more conducive in the case of stress index

as compared to happiness. It implies that appropriate awareness needs to be created about the strength of social capital to avoid health losses as a result of stress.

Moreover, our control variables show theoretically consist and significant results. The control on economic growth, health facilities and child immunization cause favourable effects on population health, whereas CO_2 emissions and urbanization cause adverse impact of health.

6. Research Limitation

The limitations of the study are: sample size is small due to missing data in the case of trust and some of health indicators. Moreover, this study is limited to the use of one proxy of social capital. Thirdly, study only covers cross-sectional analysis while longitudinal data provides more accurate estimates about outcome variables by pooling data so there is a need of longitudinal data analysis of social trust and health. This research shows that empirical results are sensitive to development stage of the sampled countries. However, potential factors creating such sensitivity are not analyzed in this study. Moreover, the results can vary depending upon the region of sampled counties such as Middle East and North Africa (MENA) or SAARC countries.

7. Future Research Recommendation

Although study shows that social capital is a prominent determinant of health but less attention has been paid to the concept that some other social and environmental factors which can mediate this effect. So there is a need of structural equation modeling to find these mediating effects. Moreover, future research needs to provide regional empirical evidence such as analysis of Middle East and North Africa (MENA) or SAARC countries, as it is not yet empirically investigated well by other researchers around the world/region.

8. Contribution of the Study

Poor social networks and support have negative impact on physical responses and bring anxiety within the body. There has been an on-going debate on the importance of social connections for health. Last few decades witnessed, there has been an increasing interest in the social determinants for health. The role of social capital as a determinant of health is gaining attention following the publication of Putnam et al. (1993). This study uses multiple constructs of health (physical, mental and well-being) to gain a better understanding of whether social capital affects health outcomes equally.

The empirical literature on health and social capital is largely based on broader measures of health outcomes namely life expectancy and infant mortality. To the best of our knowledge, this is the first study of its kind that uses both objective and subjective measures of health outcomes and specifically stress index using several questions related to life events.

9. Policy Implications

Results suggest that social trust is an important ingredient to shape a better healthy community as explained by numerous studies (Fukuyama, 1995; Kawachi and Berkman, 2000; Poortinga, 2006; Kim and Kawachi, 2007; Schultz et al., 2008; Habibov and Afandi,

2011). In this regards trust based health policies would be beneficial for healthy environment. The findings suggest that different policy intervention should be aimed to improve primarily individual social capital. In doing so, they achieve a double effect: on the one hand, directly improve individual health, and on the other hand, contribute to community social capital. As many studies mention that high trusting individuals report worse health when residing in low-trust communities while low trusting individuals do not report better health in high trusting communities.

The results also suggest that considering non-income factors such as CO_2 emissions and literacy may help in improving health outcomes. Moreover, governments could make policies that promote social inclusion and discourage exclusion, by promoting gender equality, political, cultural and social activities.

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