Pakistan Journal of Applied Economics, Vol.29 No.2, (201-242), Winter 2019

HEALTH OUTCOMES OF SOCIAL INCLUSION: Empirical Evidence

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Abstract

This study attempts to provide a comprehensive and deeper understanding of the relationship between health and social inclusion using both cross-sectional and panel data sets for 180 countries from 1990 to 2014. The fixed effect method is used to estimate parameters on the basis of Hausman test. Besides, to deal with endogenous nature of social inclusion Two Stage Least Squares (2SLS) and system GMM are used in cross-sectional and panel data, respectively. In this study four comprehensive measures of social inclusion, namely cohesion, association, safety and trust and gender equality, are used. Health is measured by life expectancy at birth and infant mortality rates. This study confirms that social inclusion has a favorable effect on health. We discover that not all proxies of social inclusion are equally important in determining health status as their impact vary according to health proxy and econometric technique used. Main results (system GMM) are robust to alternative proxies of health and social inclusion and to other determinants of health. The study suggests designing such programs and policies that are not only targeted to improve the quality of life through better health facilities but also focuses on increased social inclusion.

Keywords: Population Health, Life Expectancy, Social Inclusion, Panel Data, System GMM.
JEL Classification: I0, I15, C33, D63, D71.

I. Introduction

Poor health is becoming a critical issue globally, with an increasing percentage of the world population is experiencing physical and mental health problems. Given the effect of ill-health as an important contributor to DALYs (Disability-Adjusted Life Years) and Disabling circumstances, there is dire need to understand the ways in which global as well as national health policies and programs can condense this burden.

Several studies have confirmed the association between poor health and deprivation [Haan, et al. (1987), Anand and Ravallion (1993), Wagstaff (2002), Wen, et al.

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(2003), Grant (2005) and Swinnerton (2006)]. Intuitively, deterioration in health and well-being might result from incidents of lack of access to quality goods and services, which are essential in society. Moreover, lack of participation in various social, political, economic and cultural activities and feelings of low empowerment cause an adverse impact on health and well-being, which in turn leads to further deprivation such as low education, low income and unemployment. According to Berkman and Glass (2000), individuals who are socially disconnected or isolated from others are more likely to die early as compared to those who uphold strong relationships with family, friends and community. Being members of the community of neighbours, friends or family may positively influence both physical and mental health.

These studies are limited in their scope and approach, as most of these studies are qualitative and descriptive [Sen (1999), Wilkinson and Marmot (2003) and Cohen (2004)]. Some of these studies provide evidence using a simple descriptive analysis of the survey data [Payne (2000) and Wilson, et al. (2007)]. These studies generally provide country specific evidence and mainly focus on developed countries. Thus, the findings of these studies cannot be generalized at a larger level. These studies do not address the problem of endogeneity.

In this paper, we focus to disentangle the relationship between health and social inclusion using the data on four proxies of social inclusion taken from indices of social development (ISD) database. These measures are intergroup cohesion, clubs and association, interpersonal safety and trust and gender equality. This is the first study that has used these proxies to measure social inclusion and conducted an empirical investigation covering a large number of countries. In addition, this study attempts to deal with the problem of endogeneity between health and social inclusion using appropriate instruments. Finally, we perform sensitivity analysis to check robustness of the empirical results. In the view of stated problem, this study attempts to answer the following two questions: (1) Does social inclusion lead to better health? (2) Do different measures of social inclusion impact health equally?

The remainder of the paper is organized as follows. Section II presents the literature on health and social inclusion. Section III illustrates the analytical framework. Section IV presents the data and variables used. Section V presents the interpretation and discussion of the results followed by the conclusion and policy recommendation presented in Section VI.

II. Literature Review

Social inclusion and exclusion are inseparable sides of same coin. Social exclusion is a problem while social inclusion is solution; in fact, inclusion is defined in relation to exclusion. The term social exclusion was first used in policy debates in France by Lenoir (1974), who focused on groups at margins of the society. Overtime roots of social exclusion spread to Britain with Peter Townsend's work (1979), who

argued that the concept of poverty is not limited to subsistence but it should include inability of people to participate in society. At global level international labor organization has used term social exclusion in development policies of low income countries in the 1990s.

In recent years, the relationship between health and social exclusion is receiving considerable attention, for example Sen (1999) points out that income of African Americans is higher than those of living in developing countries, but the life expectancy of African Americans is lower. These differences in longevity and well-being are explained by community relations and social arrangements. The foremost difficulty in conducting 'health and exclusion/inclusion'[1] empirical analysis is complexity in defining and measuring social inclusion. Current approaches to quantify social inclusion undergo certain limitations due to lack of (i) common definition, (ii) consensus on inclusion of indicators and dimensions and (iii) data availability across countries.

There are various definitions of social exclusion. One school of thought view social inclusion in terms of 'participation' [Ataland Oyen (1997) and Burchardt, et al. (1999)][2] and some view it in terms of 'access to rights' [Lenoir (1974)]. In the face of international labor mobility and globalization, it is difficult to separate participation and right based approaches, so definitions offered by Levitas, et al. (2007) integrates both. Social exclusion leads to distress and disturbance among individuals, families and communities, which results in poor health, diseases and mortality. Using the poverty and social exclusion survey of 1999 for Britain, Payne (2000) provides descriptive analysis of social exclusion and mental health. The author illustrates that socially excluded people have less interaction with their relatives and friends, which leads to mental stress and depression.

McCulloch (2001) found that people in the lowest category of social capital have a high risk of morbidity while people in the highest category of disorganization have higher rates of health issues. Similarly, Wilkinson and Marmot (2003) argued that social exclusion and isolation are linked with increased untimely deaths and diseases. Individuals are excluded from social networks and support that provide the necessary material and emotional resources in time of hardships. Marmot (2005) argued that social factors are responsible for gross global population health inequalities. Social factors determine both communicable and non-communicable diseases. According to Sagric, et al. (2007) marginalized individuals have less control over resources and their life, which lower self-esteem and confidence, and they may involve in activities which are detrimental for health. Wilson, et al. (2007)'s investigation for Canada revealed that health status of South neighborhoods in Chedoke-Kirkendal Hamilton, Ontario is better than North due to neighborhood social environment, physical environment and community involvement.

[1] Terms inclusion and exclusion are used interchangeably.

[2] According to Burchardt et al. (1999) 'An individual is socially excluded if (a) he or she is geographically resident in a society and (b) he or she does not participate in the normal activities of citizens in that society.'

Social factors are also related to behavioral factors that affect population health outcomes; for example, Shah, et al. (2006) analyzed an aggregate life expectancy production function for 29 OECD countries from 1960 to 1999 and found a positive effect of pharmaceutical consumption on life expectancy. Moreover, their findings suggest that tobacco consumption lowers life expectancy while the consumption of fruit and vegetables increases life expectancy. Cutler, et al. (2006) argued that social conditions are related to infant mortality. They argued that individuals with low social status often die younger than those who have high social status.

Yin-Har Lau and Ridge (2011) attributed suicide and depression in Gypsy Roma and Traveller to racism, social exclusion and bereavement after the death of family members. Similarly, a sample of 612 individuals from Roma, Sivic, et al. (2013) found that social exclusion of Roma population causes worse health status as compared to the general population, they are 5-20 times more likely to experience chronic and infectious diseases caused by stress, poor hygienic conditions and inadequate housing.

Exclusion could be in terms of discrimination, where certain groups are excluded on the basis of gender, age and ethnicity. In this respect, Osmani and Sen (2003) argued that gender inequality leads to ill health through maternal undernourishment, which leads to the prevalence of babies born with underweight. This low birth weight leads to undernourishment in childhood and several diseases in adulthood. Similarly, using logistic regression method on data gathered from 2861 employees in 21 Swedish companies, Sörlin, et al. (2012) investigated the relationship between gender equality and self-perceived health. Results revealed that self-rated gender equality has a positive influence on the health of women, while it has no effect on men's health. Moreover, Erdogan, et al. (2012) in the case study of Turkey from 1968 to 2006, found that decreased gender inequality in education has a favorable effect on health outcomes in the long run.

One solution of social exclusion is integration, cohesiveness and inclusion of disadvantaged groups. A society which increases the skills and abilities of whole population provides equal opportunities to all and promotes the integrated and cohesive social environment is expected to have health. In this regard, Thoits (1995) and Cohen (2004) argued that good social support, networks and relationship with family and friends lead to better health because these social factors provide material and psychosocial resources to cope with stressful circumstances. In addition, social networks generate feelings of being loved, cared, valued and esteemed, which stimulate health promoting behaviors. In contrast, using data for 19 OECD countries, Kennelly, et al. (2003) found that social capital has no statistically significant effect on health.

Kim, et al. (2011) investigated the impact of social trust at country level on self-rated health of individuals. Results indicate that increased social trust leads to better self-rated health. Among individuals aged 15-74 years, the number of deaths declines by more than 287,000 per year if social trust inclines by 20 per cent points. Similarly, Chuang, et al. (2013) examined the impact of social cohesion on individual health

using data on 47,923 individuals from 29 high income countries. They found that social inclusion influences health by increasing participation, providing access to beneficial health resources and developing social relationships. Majeed and Ajaz (2018) examined the impact of social capital on population health using panel data for 61 countries over the time period 1980-2014. They also found that social capital improves population health outcomes in society.

All studies reviewed above, although use different measures of social exclusion and health but lead to the same conclusion that social exclusion has an adverse influence on mental and physical health. While increased social inclusion, social capital, social participation and gender equality, reduce social exclusion and lead to improved health outcomes. In the empirical literature, the relationship between health and social inclusion has been investigated using subjective measures of variables of interest. Nevertheless, most studies do not include large countries in panel data estimation. Moreover, the existing empirical literature on health and social inclusion 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 and panel dataset covering 180 countries from 1990-2014. Second, internal and external instruments are used to deal with the potential problem of endogeneity. Third, various proxies of variables of interest, health and social inclusion are used. Finally, we have extended our investigation to check whether results are sensitive to other determinants of health.

III. Methodology

A nation's Health Production Function depicts information about the health status of that nation. It illustrates the link between inputs and outputs during a specific period. According to Grossman (1972), health is produced by people depending upon their behavior, medical care and the constraints they face. This theoretical Health Production Function is represented in the Equation(1).

$$H = f\ (inputs\ to\ health) \tag{1}$$

where H is individual health output and inputs are factors that determines health such as income, education, health expenditures, health facilities, environment, and lifestyle. This model was developed to study the production function of health at micro level. To convert this model at the macro level, inputs to health are represented in per capita form and are reorganized in three categories; economic, social and environmental factors following Fayissa and Gutema (2005) Equation (2) represent these three categories.

$$H = f\ (Y,S,V) \tag{2}$$

where Y, S and V represent vectors of per capita economic, social and environmental variables, respectively. Several variables come under each vector, but each study has used different variables because of reliable and sufficient data availability and other limitations.

For our empirical investigation here, the variables in economic factors vector include economic growth and health facilities, variable in social factors vector is restricted to education and variable in environmental factors vector include carbon dioxide emissions.

$$H = f\,(\text{Economic growth, Health facilities, Education, } CO_2E) \tag{3}$$

This study intends to discover the other potential factor which may influence health by focusing on social inclusion/exclusion. 'A socially inclusive society is a society where all people feel valued, their differences are respected, their basic needs are met so they can live in dignity' [Cappo (2003)]. Socially excluded people due to various reasons may have less contact with their friends and relatives, which may lead to depression and mental stress. Interaction with relatives, friends and neighbors generates a sense of community, which leads to emotional and mental wellbeing. To take into account the effect of social inclusion on health model, Equation (3) is extended as Equation (4).

$$H = f\,(\text{Growth, Health facilities, Education, } CO_2E, \text{ Social inclusion}) \tag{4}$$

In this analysis, we have used life expectancy and infant mortality as proxies of health. To measure social inclusion, four proxies of social inclusion – intergroup cohesion, clubs and association, interpersonal safety and trust and gender equality – are used.

The above relationships between 'health and social inclusion' can be written in the form of panel equations as follows. Establishing a link between social inclusion and health log-log functional form is used because with log it is easy to interpret estimated coefficients, represented by Equation (5).

$$lnH_{it} = \beta_{it} + \beta_2 lnY_{it} + \beta_3 lnHF_{it} + \beta_4 lnEDU_{it} + \beta_5 lnC0_2E_{it} + \beta_6 lnSI_{it} + \varepsilon_{it} \tag{5}$$

where,

i = countries 1,2,3,…180,
t = Time period 1990 to 2014

ln is natural logarithm, *H* is health status measured by life expectancy and infant mortality, *lnY* is economic growth, *HF* is health facilities, *EDU* is education, CO_2E is carbon dioxide emission, *SI* is social inclusion.

1. Econometric Techniques Used

In cross-sectional data analysis, we first estimated our model by using ordinary least squares (OLS). OLS estimates will be consistent and efficient if the assumption of zero conditional mean holds. This assumption violates in the presence of endogeneity.

A variable is endogenous if the relationship between the explanatory variable and error term is not zero. In our case, social inclusion (i.e., cohesion, association, trust and gender equality) is endogenous if Cov (cohesion, μ) $\neq 0$, Cov (association, μ) $\neq 0$, Cov (trust, μ) $\neq 0$ and Cov (gender equality, μ) $\neq 0$. In order to take into account the problem of endogeneity we have used instrumental variable technique. Although the most common solution of handling endogeneity is to apply 2SLS, but this method is appropriate only in the absence of heteroschadesticity. In addition problem of serial correlation also arises in panel data because of the presence of time series component in the data. To deal with all these issues, a dynamic model is used which includes lagged dependent variable. Here we have employed system GMM developed by Arrelano and Bond (1991).The system GMM is applied by taking lag of the dependent variable (health) on right hand side of equations and by instrumenting endogenous variables (cohesion, association, trust and gender equality) with one period lag values of endogenous variables and exogenous instruments.

IV. Data

Panel data is used to investigate the impact of social inclusion on health covers 180 countries from1990 to 2014. Data is taken from 1990 as there is no data on the ISD website before 1990 and five-year intervals because changes in health outcomes evolve over time [Owen and Wu (2002)] and data for social inclusion is at the five-year interval. Table A-1 in the Appendix provides a summary of variables, definitions and data sources.

1. Dependent Variable

In this study, life expectancy at birth and infant mortality are used as dependent variables. Life expectancy refers to 'life expectancy at birth, total (years)' and infant mortality is measured by 'mortality rate, infant (per 1,000 live births)'. The data on these variables is derived from the World Bank's (WDI) online database 2016.

2. Independent Variable

Our focused independent variable is social inclusion. Data on social inclusion proxies is obtained from indices of social development (ISD) dataset (2014). ISD provides the data for six proxies' namely: civic activism, clubs and associations, intergroup

cohesion, interpersonal safety and trust, gender equality and minorities' inclusion. This study uses the following four measures:

a) Clubs and Associations (CAA)

People are at greater adverse risk where communities' ties are fragile because they will have less network support in the event of natural disaster and hardship. According to Wilson, et al. (2007) health status is positively influenced by neighborhood social and physical environment, community involvement and participation in organizations/clubs.

Social associations shared through networks of family, friends, colleagues and other relationships influence health in several ways. For instance, social networks provide moral support which makes it possible to cope with insecurities and vulnerabilities arising from day-to-day life problems. Moreover, social support reduces stress and depression. In this way, moral support helps to limit the emergence of infectious and chronic diseases. In addition to moral support, social networks provide material resources which allow individuals to purchase medicines in time of hardship. Social networks provide access to health related information and education and discourage health detrimental behaviors such as smoking [Miller, et al. (2006) and Poder and He (2010)].

Participation in networks also influences psychological well-being. Membership in social networks may produce psychological states such as sense of belonging, identity, purpose and security. These positive states, in turn, lead to better mental health due to greater motivation for self-care. In addition, participation in social networks and community organizations increases the probability of accessing moral and material support, protecting against distress. Social support reduces the negative reaction to stressful events [Kawachi and Berkman (2001)]. It is noteworthy that social networks do not always exert a favorable influence on health outcomes but may also exact heavy costs and burdens when gossip and intimidation are used to control behavior, or when reciprocity is required by other members. These costs may lead to bitterness, stress and criminal behavior [Kunitz (2004)].

b) Intergroup Cohesion (IC)

It refers to the relation of respect and cooperation between groups in society. Where this collaboration breaks, there is a possibility that conflictual acts may arise. Social cohesion influences health by providing equal opportunity to participate in the community's activities. Social cohesion may impact health positively through re-allocation of health and social resources. Individuals in a cohesive society are likely to invest more in public infrastructure such as health services, social welfare and education, which reduce health disparities and increase equal access to health care facilities. Social cohesion facilitates the diffusion of health related information and reduces risky behavior through

social norms. A cohesive society provides mutual respect and social support, which can offset the unfavorable consequences of stress [Chuang, et al. (2013)].
Furthermore, connected and well organized groups are more successful in lobbying. Social capital may help to synchronize people's efforts to lobby community authorities to attain health-promoting infrastructure, goods, traffic regulations, green areas and sports facilities [Rocco and Suhrcke (2012)].

c) Interpersonal Security and Trust (IST)

Interpersonal security and trust exist to the extent people in society could rely on strangers (meet very first time). Where it is high, cost of collective action and social organization declines. According to McCulloch (2001), people in the highest category of social capital had less risk of morbidity.

Higher interpersonal trust leads to quicker diffusion of health enhancing innovations through customary information channels. When people trust each other they are more likely to take an enterprise and collective action with expectation that their action will be reciprocated by others in future. In addition, communities where social trust is high, parents can exercise informal social control over the deviant health behavior of each other's children [Kawachi and Berkman (2000)].

d) Gender Equality (GE)

It refers to the extent to which men and women face equal constraints and opportunities within family, society, and workplace. According to Osmani and Sen (2003) and Erdogan, et al. (2012) gender inequality leads to ill health.

Women are expected to have higher life expectancy than men, but they are more prone to poor-health during their lives. Gender inequality, in terms of income, education, access to rights and other opportunities, not only hurts women but exerts a high economic cost on whole society by influencing the health of both females and males. Women are often forced to take a low salary which leads to poverty and poor health.

Women's role in reproduction affects their health. The deprivation of women in terms of health care and nutrition (material deprivation) leads to poor health of their children (i.e. low birth weight). Low birth weight, in turn, leads to undernourishment in childhood and several ailments in adulthood [Osmani and Sen (2003)].

Equal opportunities in education and employment for females create favorable health outcomes. The educated girls are more likely to engage in economic activity, which leads to better living standards and improved health outcomes. In addition, educated women are less likely to consume goods that have a negative impact on health. They have better knowledge about health care for themselves and their families. Educated mothers have healthier children because they have better information on health care which in turn reduces the likelihood of diseases and child mortality. In addition,

education influences parents' preferences regarding family size and child health [Erdogan, et al. (2012), Khan and Majeed (2018)].

All these variables are expected to have a positive effect on health.

3. Control Variables

a) Economic Growth

Economic growth is one of the key factors playing an important role in determining health status. Increase in economic growth leads to an increase in individual income, which results in access to an adequate diet, housing, education and health services leading to better health [Fayissa and Gutema (2005), Kamiya (2010), Bayati, et al. (2013), and Majeed and Gillani (2017). This study uses log of 'GDP per capita (constant 2005 US$)' data from World Bank's (WDI) online database 2016 to measure economic growth. We expect a positive (negative) coefficient of economic growth with life expectancy (infant mortality).

b) Health Care Facilities

An important determinant of health is health facilities. This study uses physician's supply measured by 'physicians (per 1,000 people)' for life expectancy regression and immunization measured by 'immunization, measles (% of children ages 12-23 months)' for infant mortality regression. If number of physicians is high, then access to health facilities and services will be better because people would have to wait for less seeking treatment and medical attention. Similarly, if number of children immunized against measles increases, then children dying before their first birthday will decline. Data sources for these variables are the World Bank (WDI) online database 2016, and we expect a positive sign for physicians and negative for immunization.

c) Education

Education is assumed to play an important role in improving health status. Well educated people can have good jobs and thus high income. Besides, educated person is aware of health related information and avoid risky behavior. In addition to men education, female education also has a vital role in determining child and family health [Majeed and Khan (2019)]. In our research, we have used female education when health is measured by infant mortality and total education when health is measured by life expectancy. Education variable is measured by 'school enrollment, secondary (% gross)' and is collected from World Bank (WDI) online database 2016. We expect positive coefficient of education for life expectancy regression while negative for infant mortality.

d) CO_2 Emission

Carbon dioxide pollution results in extensive continuing changes in our environment, which threatens the wellbeing and health of current and upcoming generations. This environmental variable is measured by 'CO_2 emissions (metric tons per capita)' and is taken from World Bank (WDI) online database 2016. We expect a negative (positive) coefficient of CO_2 emission for life expectancy (infant mortality) because increased air pollution leads to health hazards.

4. Instrumental Variables

In order to deal with potential endogeneity, this study uses two stage least squares in cross-sectional data and System GMM in panel data. Potential endogenous variable (cohesion, association, trust and gender equality) is instrumented by instruments. Instruments used are initial values, civil liberties ethno-linguistic fractionalization and religion. Justification is given in the result section.

V. Results and Discussion

1. Descriptive Statistics

Table 1 shows the summary statistic for health, social exclusion measures and other independent variables. Here summary statistic of only dependent variable health and focused independent variable social exclusion is discussed. The Minimum

TABLE 1

Summary Statistics of Data Full Sample N=180

Variables	Observations	Mean	Std. Dev.	Min	Max
Life Expectancy	180	67.479	9.489	41.754	81.315
Infant Mortality	177	37.329	31.764	3.028	132.284
Economic Growth	180	8.022	1.586	5.087	11.177
CO_2 Emission	180	4.672	6.527	0.029	51.932
Total Education	180	69.942	30.125	9.548	141.360
Female Education	178	69.928	32.359	7.115	140.804
Physicians	180	1.420	1.342	0.019	5.805
Immunization	176	82.690	14.256	32.440	99.000
Cohesion	153	0.613	0.076	0.305	0.742
Associations	106	0.500	0.099	0.230	0.857
Safety and Trust	149	0.486	0.095	0.268	0.678
Gender Equality	179	0.698	0.084	0.433	0.926

Source: Authors' estimation.

average life expectancy is 41.754 years is in the case of Sierra Leone and the maximum average life expectancy is 81.315 years, is in the case of Japan. Iceland has minimum average infant mortality 3.028 (per 1,000 live births in a given year) and maximum infant mortality 132.284 (per 1,000 live births) belongs to Sierra Leone. The mean value of average life expectancy and infant mortality is 67.47 (years) and 37.329 (per 1,000 live births), respectively and the dispersion from means value is 9.489 (years) and 31.764 (per 1,000 live births), respectively.

The minimum average intergroup cohesion 0.305 is of Iraq and the maximum value is 0.742 for Ireland. Madagascar has a minimum value of average clubs and association 0.230, while Cambodia has a maximum value of 0.857. The minimum value of average interpersonal safety and trust is 0.268 that belongs to Papua New Guinea and the maximum value 0.678 belongs to Qatar. Average gender equality is minimum (0.433) in Afghanistan and the maximum (0.926) in Aruba. The mean value of average intergroup cohesion, clubs and association, trust and gender equality is 0.613, 0.500, 0.486 and 0.698, respectively and the dispersion from mean values is 0.076, 0.099, 0.095 and 0.084, respectively.

2. Graphical Analysis between Health and Social Exclusion

The graphical relationship between life expectancy and social exclusion is depicted in Figure 1 to Figure 4. Life expectancy is positively related to all proxies of social inclusion that is intergroup cohesion, clubs and association, interpersonal safety and trust and gender equality. Figures B-1 to B-4 in the Appendix show rela-

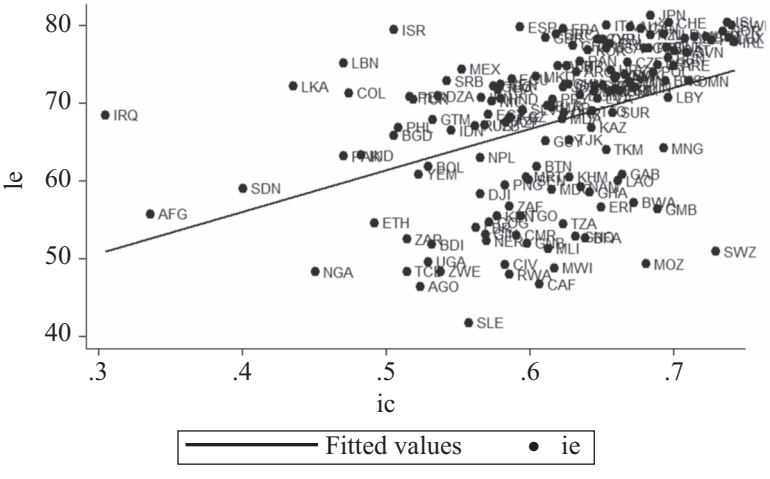

FIGURE 1

Relation between Life Expectancy and Intergroup Cohesion

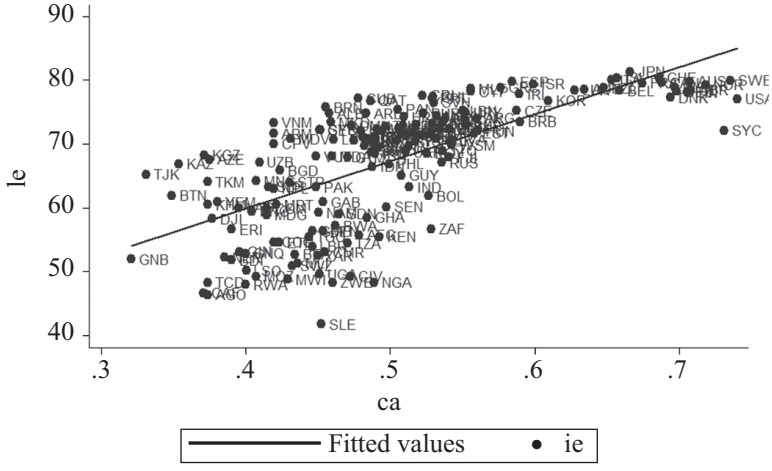

FIGURE 2

Relation between Life Expectancy, Clubs and Association

tionship between infant mortality and 4 measures of social inclusion. Infant mortality is negatively related to all proxies of social inclusion means as intergroup cohesion, clubs and association, trust and gender equality increases, infant mortality decreases.

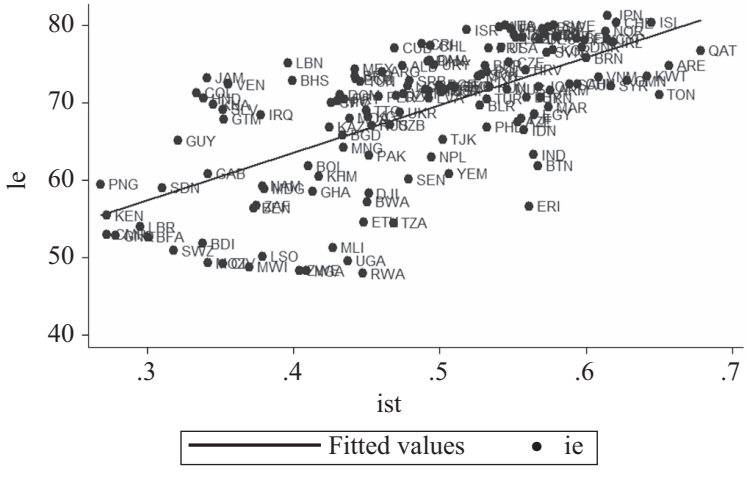

FIGURE 3

Relation between Life Expectancy, Safety and Trust

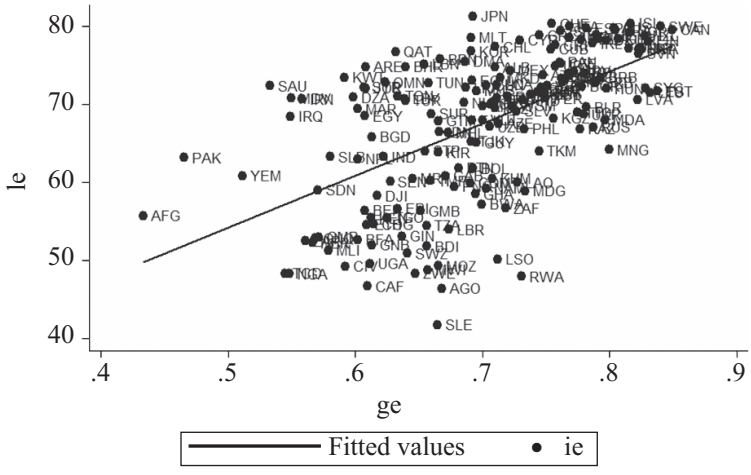

FIGURE 4

Relation between Life Expectancy and Gender Equality

3. Empirical Results and Interpretation

Before proceeding towards estimations, we present some pre-estimation tests. First, using a link test of functional form we find that the model is correctly specified. Second, an examination of the VIF test indicates that there is no problem of multi-collinearity. Third, examination of Breusch-Pagan test reveals that there is a problem of heteroscedasticity. These results are reported at the end of Table 2. We have used robust regression to deal with the problem of heteroscedasticity.

a) Cross-Sectional Regression Analysis

Table 2 and A-2 (Appendix) present estimation results obtained from ordinary least squares using life expectancy and infant mortality as health proxies, respectively.

Column 3 of Table 2 shows that if there is 1 per cent increase in interpersonal safety and trust than on average life expectancy will increase by 0.126 per cent and this finding is significant at 1 per cent level of significance. This finding is consistent with the theory of social capital and health. The theoretical literature suggests that when people have good social relationships and trust each other they find help in hard times. The social networks provide material and emotional resources that help to ameliorate anxiety, ill-mental health and fear of personal and property rights tyranny. Consequently, physical health tends to improve of those individuals who are having social relationships [Payne (2000); Wilson, et al. (2007); and Tran, et al. (2015)]. Columns 1, 2 and 4 of Table 2 show that intergroup cohesion, clubs and association and gender

TABLE 2

Cross-Sectional OLS Results of Life Expectancy and Social Inclusion

Variables	Dependent Variable is Life Expectancy (LE)							
	(1)		(2)		(3)		(4)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Economic Growth	0.0293***	(0.007)	0.0392***	(0.009)	0.0301***	(0.006)	0.0328***	(0.007)
CO_2 Emission	-0.01	(0.010)	-0.0282**	(0.014)	-0.0217**	(0.009)	-0.0175*	(0.009)
Education	0.0806***	(0.030)	0.065	(0.041)	0.0840***	(0.025)	0.0954***	(0.024)
Physicians	0.0464***	(0.010)	0.0580***	(0.015)	0.0403***	(0.009)	0.0442***	(0.008)
Cohesion	-0.024	(0.048)						
Association			0.0083	(0.037)				
Trust					0.126***	(0.035)		
Gender Equality							-0.0118	(0.050)
Constant	3.642***	(0.138)	3.660***	(0.207)	3.741***	(0.117)	3.569***	(0.117)
Observations[3]	153		106		149		179	
R-Squared	0.808		0.817		0.822		0.803	
Functional form (hat sq p-value)	0.838		0.426		0.126		0.593	
Multicollinearity (Mean VIF)	5.15		5.75		4.5		4.81	
Heteroscedasticity(P >chi2)	0.0000		0.0000		0.0000		0.0000	

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form.

[3] Observations for each indicator of social inclusion vary because of data availability limitations. The largest sample size was possible in the case of 'gender equality' as a measure of social inclusion while sample size reduces for other measures due to unavailability of data series.

equality have a statistically insignificant effect on life expectancy. It means that some other factors such as income, access to health facilities, education and environmental situation account for most of the explanation of dependent variable life expectancy. Another possible reason could be that dependent variables used in the empirical analysis are much broader. For instance, social exclusion affects mental deficiency and prevalence of mental morbidity; however, these measures have not been employed in the analysis due to the data availability limitations.

Table A-2 in the Appendix shows the effect of social inclusion on health using infant mortality as health proxy. With infant mortality, we obtain somewhat better results, trust and gender equality have negative and significant coefficients indicating that 1 per cent increase in these variables causes infant mortality to decline by 0.861 and 1.21 per cent, respectively. These results are consistent with theory. According to Kim, et al. (2011) higher social trust leads to improved self- rated health. They argue that 'collective action across a country may mobilize to enact health-promoting policies with potential benefits to all citizens'. Similarly, communities with greater gender inequality are not healthy for women and men [Kawachi, et al. (1999)].

Regarding control variable, we find that increased economic growth leads to improved health, implying that individual will have better health if he/she has more income to spend on quality food, health care, and housing. CO_2 emission has adverse influence on health with most proxies. Education has favorable influence on health because educated people have a greater chance to get a good job, high income besides having the capability to practicing healthy diet and avoid unhealthy behavior. Physicians have a statistical significant positive effect on life expectancy, indicating that if physicians' supply increases, life expectancy will increase because of less waiting time, increased availability and accessibility. Similarly, immunization has negative and significant effect on infant mortality. This result is consistent with Mondal, et al. (2009) finding that immunized children have less chances of experiencing several diseases. Immunization reduces the risk associated with neonatal, post-neonatal and infant mortality.

In summary, cross-sectional OLS results reveal that all measures of social inclusion are not contributing to health (it is limitations of our study to explore the reasons behind it and future analysis can address this issue). The only trust has a significant impact on health when life expectancy is used to measure health, while with infant mortality gender equality also becomes significant. In addition, improved economic growth, education and health facilities lead to better health outcomes, while increased air pollution adversely influences health.

In our model, issue of endogeneity is likely to arise due to (i) simultaneous linkages between health and social inclusion indicators; cohesion, association, safety and trust and gender equality and (ii) there could be problem of omitted variable bias. Thus to tackle potential endogeneity, we have re-estimated our model by two-stage least squares method. This study uses initial cohesion and ethno-linguistic fractionalization as instruments for cohesion. Initial association and ethno linguistic fractionalization

are used as instruments of association. Initial trust and religion dummy are used as instruments for safety and trust. Finally, initial gender equality and civil liberties are used as instruments for gender equality.

Dollar and Gatti (1999) argued that civil liberties and religious variables belong to gender equations, so they use them as instruments for gender inequality. For them, to a large degree, gender inequality could be explained by characteristics of society and religious preferences. If culture is a vital determinant of gender equality, religious affiliation could be an instrument. Similarly, civil liberty is a good instrument for gender equality as it reacts to society's characteristics concerning human rights. Knack and Keefer (1997) have used ethno linguistic groups as an instrumental variable for trust/social capital. Trust or social capital will be less in polarized societies (through ethnic, linguistic or religious divisions). They found that less social polarization is linked with the building of trust and cooperative norms. La Porta, et al. (1997) have instrumented trust/social capital with religious fractionalization, according to them hierarchical religions deter horizontal ties and trust formation among people. In their analysis, they found negative (correlation coefficient ─ 0.61) relationship between hierarchical religion dominance (Catholic) and trust.

Table 3 reports the results extracted from the second stage regression of 2SLS. In first stage we regress instrumental variables on social inclusion and in the second stage we regress predicted value of social inclusion on health. Results obtained from 2SLS are almost similar to OLS. As in OLS the only trust is significant in 2SLS, indicating that 1 per cent increase in interpersonal safety and trust on average causes life expectancy to increases by 0.134 per cent. The only difference between OLS and 2SLS is that cohesion becomes positive but remains insignificant (that was negative in OLS). We find that OLS tends to underestimate the effects of all proxies of social inclusion except association.

All control variables; economic growth, CO_2 emission, education and health facilities have a significant impact on life expectancy. The signs of control variables are also consistent with theory. The validity of the instrument for social inclusion is checked by Sargan and Basmann tests, the results reveal that instruments are valid in association and trust as p-values are greater than 0.05.

Table A-3 in the Appendix shows the effect of social inclusion on health using infant mortality as health measure and same sets of instruments. Results from 2SLS indicate that 1 per cent increase in trust and gender equality leads to 0.57 and 1.2 percent decrease in infant mortality, respectively.

b) Panel Data Regression Analysis

Hausman test suggests that fixed effects model as compared to random effects model is more appropriate in our case, as P-value is less than 0.01 regardless of the proxy used for social inclusion and health. The results obtained from Hausman test are given in appendix.

TABLE 3

Cross-sectional 2SLS Results of Life Expectancy and Social Inclusion

Variables	Dependent Variable is Life Expectancy (LE)							
	(1)		(2)		(3)		(4)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Eco. Growth	0.00936	(0.010)	0.0331***	(0.011)	0.0290***	(0.006)	0.0327***	(0.006)
CO_2 Emission	-0.00452	(0.012)	-0.0300*	(0.017)	-0.0196**	(0.009)	-0.0179*	(0.009)
Education	0.0749**	(0.031)	0.0653	(0.041)	0.0856***	(0.024)	0.0954***	(0.025)
Physicians	0.0638***	(0.013)	0.0684***	(0.016)	0.0372***	(0.009)	0.0466***	(0.009)
Cohesion	0.063	(0.087)						
Association			0.00571	(0.043)				
Trust					0.134***	(0.036)		
Gender Equality							-0.0542	(0.058)
Constant	3.880***	(0.161)	3.716***	(0.204)	3.747***	(0.116)	3.554***	(0.126)
Observations	153		106		149		179	
R-Squared	0.808		0.817		0.822		0.803	
Over id test								
Score	p = 0.0049		p = 0.1500		p = 0.8984		p = 0.0176	
Endogeneity test								
Robust score	p = 0.6965		p = 0.7350		p = 0.7808		p = 0.2502	
Robust reg.	p = 0.7053		p = 0.7401		p = 0.7854		p = 0.2595	

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form.

Table 4 presents estimated results extracted from fixed effects regression method when life expectancy is used to measure health. Three out of four proxies of social inclusion have expected signs and are significant. The estimated coefficients of intergroup cohesion, association and gender equality have a positive sign and statistically significant effect on life expectancy. It implies that one percent incline in intergroup cohesion, association and gender equality on average leads to 0.0347, 0.0260 and 0.0489 per cent increase in life expectancy holding other variables constant.

Regarding control variables, we find that economic growth and education have positive and significant coefficients irrespective of social inclusion proxy used. CO_2 emission has an expected sign, but it is significant with only two proxies, while physicians have a statistically insignificant effect on life expectancy.

Table A-4 in the Appendix displays the results obtained from the fixed effects method when infant mortality is used as proxy of health. Columns 2, 3 and 5 show that estimated coefficients of cohesion, association and gender equality have expected negative sign, and are statistically significant indicating that one percent increase in these variables leads to 0.164, 0.191 and 0.371 per cent decline in infant mortality, respectively. Regarding control variables, we find that all variables have expected and significant effect on infant mortality.

Overall, we find the same results with both life-expectancy and infant mortality that is intergroup cohesion, association and gender equality have expected and significant effect on health irrespective of health measures.

Since in our case both heteroscedasticity and endogeneity are present; system GMM is used to deal with both the problems. We have instrumented endogenous variables (cohesion, association, trust and gender equality) with a lag of endogenous variables, economic growth and some external instruments like time dummies, regional dummies, ethno-linguistic fractionalization (for cohesion and association), religion (for trust) and civil (for gender equality). Hansen test confirms the validity of instruments used. Lagged life expectancy has a positive and significant effect on health, which confirms the evidence of convergence.

Result from Table 5 clearly show that an increase in social inclusion (i.e., increase in intergroup cohesion, safety and trust, clubs and association and gender equality) is linked with increased life expectancy, and this effect is statistically significant. The estimated coefficients of these variables show that a one per cent increase in intergroup cohesion, association, trust and gender equality increases life expectancy by 0.0392, 0.0661, 0.0459, and 0.0325per cent, respectively. Thus irrespective of proxy used, increased social inclusion has favorable effect on health.

Estimated coefficients in Table 5 (a) in Appendix confirm the previously obtained result that is increase in social inclusion leads to a decline in infant mortality. Estimated coefficients show that infant mortality decreases by 0.130, 0.135, 0.333 and 0.373 per cent due to 1 per cent increase in cohesion, association, trust and gender equality.

TABLE 4

Fixed Effect Results of Life Expectancy and Social Inclusion

Variables	Dependent Variable is Life Expectancy (LE)							
	(1)		(2)		(3)		(4)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Eco. Growth	0.0835***	(0.014)	0.0737***	(0.011)	0.0723***	(0.011)	0.0774***	(0.013)
CO_2 Emission	-0.027	(0.017)	-0.009	(0.013)	-0.0256*	(0.014)	-0.0301**	(0.015)
Education	0.111***	(0.014)	0.0971***	(0.015)	0.0968***	(0.017)	0.112***	(0.011)
Physicians	-0.003	(0.009)	0.012	(0.011)	0.007	(0.008)	-0.001	(0.006)
Cohesion	0.0347**	(0.014)						
Association			0.0260*	(0.013)				
Trust					(0.026)	(0.020)		
Gender Equality							0.0489***	(0.015)
Constant	3.123**	(0.110)	3.234***	(0.091)	3.234***	(0.091)	3.164***	(0.115)
Observations[4]	469		399		445		684	
R-Squared	0.638		0.560		0.600		0.483	
Countries	143		101		139		176	

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form.

[4] In the case of panel data set, largest sample is available for gender equality measure (176 countries) while sample size reduces in the case of other measures of social inclusion. Moreover, observations for all points of time for all countries are not available and therefore the panel data turns out to unbalance panel. The maximum observations (time period * countries) 684 are available for gender equality while numbers of observation drop for other measures of social inclusion.

TABLE 5

System GMM Results of Life Expectancy and Social Inclusion

Variables	Dependent Variable is Life Expectancy (LE)							
	(1)		(2)		(3)		(4)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Lag LE	0.826***	(0.0933)	0.906***	(0.0422)	0.930***	-0.087	1.081***	(0.0564)
Eco. Growth	0.00516**	(0.0025)	0.0048***	(0.001)	0.00528*	(0.0030)	0.00414**	(0.0017)
CO_2 Emission	-0.0427**	(0.0168)	-0.039***	(0.0101)	-0.0192*	(0.0105)	-0.027***	(0.0082)
Education	0.0319	(0.0225)	0.0548***	(0.0207)	0.0623**	(0.0255)	0.0109	(0.0137)
Physicians	0.0339*	(0.0182)	0.0186*	(0.0101)	-0.0108	(0.0068)	0.00112	(0.00852)
Cohesion	0.0661**	(0.028)						
Association			0.0392***	(0.0105)				
Trust					0.0459***	(0.0149)		
Gender Equality							0.0325**	(0.0129)
Constant	0.679*	(0.374)	0.238	(0.145)	0.0899	(0.367)	-0.346	(0.219)
Observations	296		249		310		517	
Countries	108		82		126		161	
Instruments	33		33		29		29	
AR1 (Pr> z)	0.90		0.219		0.193		0.711	
AR2 (Pr> z)	0.093		0.858		0.564		0.182	
Hansen test	0.296		0.187		0.243		0.053	

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form.

Regarding other variables, we find that with both life expectancy and infant mortality all variables have expected and significant impact on health status, indicating that increase in economic growth, education and physicians tend to increase (decrease) life expectancy (infant mortality), while an increase in CO_2 emission has adverse impact on health.

Thus from the above findings, we may conclude that irrespective of social inclusion and health proxy used, social inclusion has a positive influence on health. In addition, economic development, CO_2 emission, education and health facilities play a vital role in health status determination.

c) Sensitivity Analysis

Next, we added additional determinants of health into baseline model to check whether results obtained are robust. Table 6 presents a summary of the results obtained when we take into account additional determinants of health namely access to water, health expenditures, age dependency ratio, employment, undernourishment, and urbanization. While the effect of these additional determinants on life expectancy is given in Table A-6 in Appendix.

From Table 6 it is clear that when additional determinants of health are added one by one, all indicators of social inclusion (cohesion, association, trust and gender equality) maintain their positive sign. All indicators except cohesion remain significant with almost all determinants.

TABLE 6

Summary of Sensitivity Analysis Results of Life Expectancy and Social Inclusion

Variables	Dependent Variable is Life Expectancy (LE)					
	Water	Health exp.	Age dependency	Employment	Undernourishment	Urbanization
Cohesion	0.0672**	0.0371	0.0436**	0.012	0.0886	0.0597*
	(0.0284)	(0.0257)	(0.0212)	(0.0322)	(0.0775)	(0.0353)
Association	0.0434***	0.0179**	0.0335**	0.063***	0.0138	0.0306***
	(0.0102)	(0.0075)	(0.0139)	(0.0109)	(0.0086)	(0.0092)
Trust	0.0444***	0.0445**	0.048***	0.0319**	0.0124	0.0402***
	(0.0142)	(0.0177)	(0.0148)	(0.0145)	(0.0166)	(0.0146)
Gender Equality	0.0296**	0.0115	0.0237**	0.0275**	0.0503***	0.0294**
	(0.0129)	(0.0144)	(0.0114)	(0.0111)	(0.0176)	(0.0137)

Source: Authors' estimation.

*Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form. (c) Coefficients indicate what happens to impact of social inclusion on life expectancy when additional determinants of health are included in model.*

Table A-6 in Appendix confirms that water, health expenditures and employment are positively associated with life expectancy, indicating that increase in these factors will lead to better health. Similarly, age dependency ratio and undernourishment have expected signs, decreasing life expectancy. While urbanization has mixed signs, both signs are supported by the theory: living in urban areas could improve health by providing access to health and other services or may deteriorate health because of increased pollution, noise and traffic.

Table A-7 in Appendix shows the results with infant mortality, all proxies of social inclusion remain negative and maintain significance with most determinants of health. Table (A-8) in Appendix confirms that health expenditures, employment and under nourishment are negatively associated with infant mortality, indicating that an increase in these factors will control infant mortality. Table A-9 and Table A-10 in Appendix show the results with HIV, an additional control of population health outcomes. The effect of HIV on health is negative and significant in all models, whereas the effect of all measures of social inclusion remains similar to baseline findings. We can conclude that our results regarding the positive (negative) effect of cohesion, association, trust and gender equality are robust to the inclusion of various determinants of health.

VI. Conclusion

In this study, we attempt to extend the existing literature on determinants of health by empirically investigating the impact of social inclusion on health using estimation techniques suitable in cross-sectional and panel data, which deals with endogenous nature of social inclusion. We have employed a theoretical model given by Grossman (1972) using environmental and socioeconomic factors as inputs to health. Data on several proxies of variables of interest is taken for 180 developing and developed countries overtime period 1990-2014. Several conclusions, which can be drawn from this study, are summarized below:

This study confirms that increased social inclusion in terms of lower gender inequality, greater social cohesion and higher trust improves population health. It is because social inclusiveness leads to good relationships and healthy behaviors among people, thereby improving their health and longevity. It is interesting to mention that all measures of social inclusion are not equally important in influencing health outcomes. In both cross sectional and panel techniques, we find that the impact of trust and gender equality on health is stronger than intergroup cohesion and association. In addition, we find that all control variables have an expected and statistically significant impact on health indicating that economic growth, education and health facilities have favorable effect on health, while CO_2 emission has an adverse impact on health.

The results of sensitivity analysis reveal that all measures of social inclusion are not robust to the inclusion of other determinants of health. When life expectancy is used to trust association and gender equality is robust with most determinants, while

with infant mortality only trust remains significant when other variables are included. Our study reveals that besides other determinants of health, social inclusion plays an essential role in the determination of population health.

This study undergoes several limitations: First, life expectancy and infant mortality are used as measures of health while chronic diseases are ignored. Life expectancy does not consider the quality of life but considers the only quantity of life. Thus, there is a need to construct a single and comprehensive measure of health, covering both quality and quantity of life. Second, social exclusion influences not only physical health but also mental health; however, health indicators used as dependent variables in this study are much broader than measures of mental illness. The data availability limitations restricted the analysis for broader measures of population health. Third, there are various indicators of social inclusion/exclusion but these are specific to the European region; there exist no comprehensive and globally used measures of social inclusion/exclusion. There is a need to develop measures of social inclusion/exclusion that could be used in international comparison. Fourth, in the case of different measures of social inclusion data series are not available for all cross sectional units and therefore, sample size varies for each measure. In future, further research can be conducted using large and up-to date dataset. Finally, findings of this study need to be considered with caution as these findings are based on cross-country analysis which may not be valid for a specific country. Whereas the findings of this study can be generalized globally, heterogeneity across countries can also limit the implications of these findings. Future research may extend this analysis to country specific case studies to have an in-depth understanding of the links between social inclusion and health outcomes and to take care of potential heterogeneity of a country.

The findings of this study suggest important policy implications policymakers to design policies which ensure social inclusiveness in the society to improves population health by promoting healthy behavior, providing care in times of hardship, spreading health information to prevent diseases, and facilitating interactions to lower mental stress. Policies which ensure equal fundamental rights and social protection to all marginalized individuals and groups to reduce conflicts and insurgency in society which can help to improve social inclusion. In a market economy, strong welfare regimes are necessary to safeguard the interests of marginalized individuals.

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APPENDIX-A

TABLE A-1

Summary of Variables, Definitions and Data Sources

Variables	Definition of variables	Source
Dependent Variables		
Life expectancy	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	WDI (2016)[5]
Infant mortality	Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year.	WDI (2016)
Independent Variables (Control Variables)		
GDP per capita	GDP per capita is gross domestic product divided by mid year population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	WDI (2016)
Physicians	Physicians include generalist and specialist medical practitioners.	WDI (2016)
Immunization, measles	Child immunization measures the percentage of children ages 12-23 months who received vaccinations before 12 months or at any time before the survey.	WDI (2016)
Secondary school enrollment	Total enrollment in secondary education, regardless of age, expressed as a percentage of the population of official secondary education age.	WDI (2016)
CO_2 emissions	Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.	WDI (2016)
Different Measures of Focused Variables (Social Inclusion)		
Clubs and associations	defined as membership in local voluntary associations	ISD (2014)[6]
Intergroup cohesion	which measures ethnic and sectarian tensions, and discrimination	ISD (2014)
Safety and trust	focusing on perceptions and incidences of crime and personal transgressions	ISD (2014)

[5] World Bank online Database.
[6] Indices of Social Development Database.

TABLE A-1 *(Continued)*

Summary of Variables, Definitions and Data Sources

Variables	Definition of variables	Source
Gender equality	Reflecting gender discrimination in home, work and public life.	ISD (2014)
Instrumental Variables		
Civil liberties	Until 2003, countries whose combined average ratings for Civil Liberties fell between 1.0 and 2.5 were designated 'Free' between 3.0 and 5.5 'Partly Free', and between 5.5 and 7.0 'Not Free'.	Freedom house (2015)
Ethno linguistic Frac.	Average value of five different indices of ethno linguistic fractionalization. The five component indices are (1) index of ethnolinguistic fractionalization (2) probability of two randomly selected speaking different languages (3) probability of two randomly selected individual do not speak same language (4) % of population not speaking same language and (5) % of population not speaking the most widely used language.	La Porta, et al. (1999)
Religion	Identifies the percentage of the population of each country that belonged to the three most widely spread religions in the world in 1980. The three religions are identified here: (1) roman catholic (2) protestant and (3) muslim. The residual is called 'other religions'	La Porta, et al. (1999)

Source: Authors' estimation.

TABLE A-2

Cross-Sectional OLS Results of Infant Mortality and Social Inclusion

Variables	Dependent Variable is Infant Mortality (IM)							
	(1)		(2)		(3)		(4)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Eco. Growth	-0.560***	(0.044)	-0.564***	(0.049)	-0.502***	(0.038)	-0.511***	(0.042)
CO_2 Emission	0.202***	(0.056)	0.077	(0.070)	0.189***	(0.050)	0.122**	(0.053)
Female Education	-0.486***	(0.118)	-0.277**	(0.110)	-0.459***	(0.106)	-0.298***	(0.108)
Immunization	-0.677**	(0.262)	-0.595	(0.386)	-0.617**	(0.278)	-0.446*	(0.239)
Cohesion	0.056	(0.285)						
Association			0.093	(0.176)				
Trust					-0.861***	(0.188)		
Gender Equality							-1.212***	(0.310)
Constant	12.49***	(1.275)	11.40***	(1.640)	11.00***	(1.181)	9.924***	(1.163)
Observations[7]	151		104		145		174	
R-Squared	0.860		0.886		0.871		0.863	

Source: Authors' estimation.
Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form.

[7] Observations vary in Table 2 and A-2 (Appendix) for two reasons. First, the proxy of health outcome varies in both tables. In Table 2 life expectancy is a dependent variable while in Table A-2 (Appendix) infant mortality is a dependent variable. In the case of infant mortality sample slightly reduces from 179 to 174. Second, sample size reduces for different measures of social inclusion due to unavailability of data series.

TABLE A-3

Cross-Sectional 2SLS Results of Infant Mortality and Social Inclusion

Variables	Dependent Variable is Infant Mortality (IM)							
	(1)		(2)		(3)		(4)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Eco. Growth	-0.591***	(0.054)	-0.643***	(0.049)	-0.516***	(0.040)	-0.508***	(0.039)
CO_2 Emission	0.216***	(0.057)	0.135*	(0.071)	0.191***	(0.047)	0.131***	(0.045)
Female Education	-0.454***	(0.119)	-0.198	(0.149)	-0.469***	(0.106)	-0.330***	(0.098)
Immunization	-0.547*	(0.286)	-0.530*	(0.294)	-0.696**	(0.276)	-0.389*	(0.234)
Cohesion	-0.133	(0.450)						
Association			-0.129	(0.204)				
Trust					-0.571***	(0.214)		
Gender Equality							-1.210***	(0.388)
Constant	11.98***	(1.347)	11.28***	(1.240)	11.72***	(1.180)	9.777***	(1.117)
Observations	122		86		142		172	
R-Squared	0.885		0.913		0.870		0.865	
Over id test								
Sargan	p = 0.0013		p = 0.0150		p = 0.0056		p = 0.3041	
Basmann	p = 0.0011		p = 0.0157		p = 0.0055		p = 0.3126	
Endogeneity test								
Durbin (score)	p = 0.6619		p = 0.9212		p = 0.0148		p = 0.8961	
Wu-Hausman	p = 0.6717		p = 0.9247		p = 0.0165		p = 0.8984	

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form.

TABLE A-4(i)

Fixed Effect Results of Infant Mortality and Social Inclusion

Variables	Dependent Variable is Infant Mortality (IM)							
	(1)		(2)		(3)		(4)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Eco. Growth	-0.950***	(0.086)	-1.070***	(0.100)	-1.020***	(0.101)	-0.906***	(0.071)
CO_2 Emission	0.199***	(0.072)	0.397***	(0.096)	0.328***	(0.104)	0.283***	(0.070)
Female Education	-0.272***	(0.048)	-0.274***	(0.059)	-0.215***	(0.057)	-0.264***	(0.039)
Immunization	-0.313***	(0.078)	-0.562***	(0.135)	-0.491***	(0.157)	-0.296***	(0.078)
Cohesion	-0.164***	(0.059)						
Association			-0.191**	(0.092)				
Trust					0.142*	(0.084)		
Gender Equality							-0.371***	(0.082)
Constant	12.96***	(0.711)	14.94***	(0.938)	14.25***	(1.041)	12.42***	(0.579)
Observations[8]	487		416		467		713	
R-Squared	0.733		0.771		0.749		0.704	
Countries	147		102		142		174	

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form.

[8] Observations (time period * countries) are 487, 416, 467 and 713 with cohesion, association, trust and gender equality respectively, and numbers of countries are 143, 101, 139 and 176 with cohesion, association, trust and gender equality respectively.

TABLE A-4(ii)

Hausman Test Result

When Life Expectancy is Used to Measure Health		
Social Exclusion Proxy	**Chi2(5)**	**Outcome**
Intergroup Cohesion	chi2(5) = 48.41 Prob>chi2 = 0.0000	Fixed Effect
Clubs sand Association	chi2(5) = 25.79 Prob>chi2 = 0.0001	Fixed Effect
Interpersonal Security and Trust	chi2(5) = 300.46 Prob>chi2 = 0.0000	Fixed Effect
Gender Equality	chi2(5) = 33.40 Prob>chi2 = 0.0000	Fixed Effect
When Infant Mortality is Used to Measure Health		
Intergroup Cohesion	chi2(5)= 44.64 Prob>chi2 = 0.0000	Fixed Effect
Clubs and Association	chi2(5) = 69.66 Prob>chi2 = 0.0000	Fixed Effect
Interpersonal Security and Trust	chi2(5) = 26.74 Prob>chi2 = 0.0001	Fixed Effect
Gender Equality	chi2(5) = 64.70 Prob>chi2 = 0.0000	Fixed Effect

Source: Authors' estimation.

TABLE A-5

System GMM Results of Infant Mortality and Social Inclusion

Variables	Dependent Variable is Infant Mortality (IM)							
	(1)		(2)		(3)		(4)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Lag IM	0.00392	(0.0027)	0.00700**	(0.0031)	0.0118*	(0.0061)	-0.00156	(0.0038)
Eco. Growth	-1.126***	(0.136)	-1.307***	(0.0966)	-0.877***	(0.127)	-0.700***	(0.146)
CO_2 Emission	0.434***	(0.0934)	0.615***	(0.0811)	0.393***	(0.102)	0.398***	(0.105)
Female Education	-0.0068**	(0.0032)	-0.00315	(0.0023)	-0.00916*	(0.0051)	-0.0263***	(0.0041)
Immunization	-0.385***	(0.149)	-0.867***	(0.323)	-0.305	(0.6)	0.348	(0.271)
Cohesion	-0.130**	(0.0574)						
Association			-0.135*	(0.0693)				
Trust					-0.333***	(0.102)		
Gender Equality							-0.373***	(0.1060)
Constant	14.87***	(1.261)	18.12***	(1.703)	12.03***	(3.104)	9.409***	(1.849)
Observations	301		263		324		544	
Countries	108		82		126		161	
Instruments	30		30		30		30	
AR1 (Pr > z)	0.023		0.046		0.01		0.051	
AR2 (Pr > z)	0.601		0.553		0.98		0.589	
Hansen test	0.04		0.126		0.072		0.105	

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form.

TABLE A-6

Summary of Sensitivity Analysis Results: Effect of Additional Determinants of Health on Life Expectancy

Variables	Dependent Variable is Life Expectancy (LE)			
	Cohesion as social inclusion proxy	Association as social inclusion proxy	Trust as social inclusion proxy	Gender equality as social inclusion proxy
Water	0.0626	0.117**	0.00323	0.0303
	(0.0671)	(0.0508)	(0.0774)	(0.0441)
Health Exp.	0.0254***	0.0160***	0.0361**	0.0172***
	(0.00888)	(0.00326)	(0.0149)	(0.00642)
Age Dependency Ratio	-0.196**	-0.00143	0.0337	-0.0402
	(0.0920)	(0.0283)	(0.0506)	(0.0332)
Employment	0.324***	-0.0795***	0.131**	0.0816**
	(0.116)	(0.0221)	(0.0601)	(0.0319)
Undernourishment	-0.0564*	-0.0328***	-0.0287*	-0.0320**
	(0.0288)	(0.0104)	(0.0159)	(0.0149)
Urbanization	-0.00825	-0.00722	-0.00713	0.0153*
	(0.0122)	(0.00664)	(0.00769)	(0.00816)

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form. (c) Coefficients indicate percentage change in life expectancy due to 1% change in additional determinates of health (like water, health expenditures, dependency ratio, employment, undernourishment and urbanization), with different all four proxies of social inclusion.

TABLE A-7

Sensitivity Analysis Summary Results of
Infant Mortality and Social Inclusion

Variables	Dependent Variable is Infant Mortality (IM)					
	Water	Health exp.	Age dependency	Employ-ment	Undernour-ishment	Urbaniza-tion
Cohesion	-0.153**	-0.148***	-0.158***	-0.0047	-0.0779*	-0.105
	(0.062)	(0.0542)	(0.0565)	(0.0518)	(0.0412)	(0.0745)
Association	-0.168**	-0.0927	-0.14	-0.189*	-0.202***	-0.531***
	(0.0836)	(0.0878)	(0.102)	(0.0974)	(0.0346)	(0.116)
Trust	-0.33***	-0.445***	-0.254**	-0.347***	-0.204***	-0.392***
	(0.0952)	(0.0652)	(0.113)	(0.122)	(0.0559)	(0.0933)
Gender Equality	-0.294**	-0.12	-0.392***	-0.490***	-0.120**	-0.154
	(0.124)	(0.0990)	(0.113)	(0.0995)	(0.0558)	(0.124)

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form. (c) Coefficients indicate what happens to impact of social inclusion on infant mortality when additional determinants of health are included in model.

TABLE A-8

Summary of Sensitivity Analysis Results: Effect of Additional Determinants of Health on Infant Mortality

Variables	Dependent Variable is Infant Mortality (IM)			
	Cohesion as social inclusion proxy	Association as social inclusion proxy	Trust as social inclusion proxy	Gender equality as social inclusion proxy
Water	0.800**	0.602	0.335	1.456**
	(0.329)	(0.578)	(0.840)	(0.589)
Health Exp.	-0.350***	0.0935	-0.493***	-0.472***
	(0.0932)	(0.141)	(0.0822)	(0.123)
Age Dependency Ratio	0.125	0.0315	-0.117	0.231
	(0.297)	(0.326)	(0.365)	(0.387)
Employment	-0.698**	0.309	1.771***	0.0109
	(0.299)	(0.313)	(0.572)	(0.452)
Undernourishment	-0.0571	0.188***	0.0415	-0.117
	(0.0598)	(0.0466)	(0.107)	(0.0922)
Urbanization	0.139***	0.165***	0.183***	0.275***
	(0.0520)	(0.0466)	(0.0498)	(0.0745)

Source: Authors' estimation.

Note: (a) Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 (b) All variables are in log form. (c) Coefficients indicate percentage change infantmortality due to 1% change in additional determinates of health (like water, health expenditures, dependency ratio, employment, undernourishment and urbanization), with different all four proxies of social inclusion.

TABLE A-9

Summary of Sensitivity Analysis Results: Effect of HIV on Life Expectancy

Variables	(1) Cohesion	(2) Associations	(3) Trust	(4) Gender Equality
Economic Growth	0.0357***	0.0464***	0.0435***	0.0329***
	(0.00561)	(0.00545)	(0.00499)	(0.00427)
CO_2 Emission	-0.00943	-0.0386***	-0.0251***	-0.00501
	(0.00683)	(0.00735)	(0.00702)	(0.00537)
Education	0.0849***	0.0887***	0.0724***	0.0797***
	(0.01090)	(0.01460)	(0.01150)	(0.00962)
Physicians	0.0117**	0.0166***	0.0127***	0.00760*
	(0.00532)	(0.00591)	(0.00486)	(0.00447)
Social Inclusion	0.0958***	-0.00724	-0.022	0.126***
	(0.0208)	(0.0184)	(0.0235)	(0.0305)
HIV	-0.0395***	-0.0415***	-0.0409***	-0.0380***
	(0.00345)	(0.00404)	(0.00465)	(0.00323)
Constant	3.611***	3.462***	3.540***	3.636***
	(0.0704)	(0.0790)	(0.0660)	(0.0602)
Observations	291	212	238	414
R-squared	0.812	0.815	0.783	0.802

Source: Authors' estimation.
Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

TABLE A-10

Summary of Sensitivity Analysis Results: Effect of HIV on Infant Mortality

Variables	(1) Cohesion	(2) Associations	(3) Trust	(4) Gender Equality
Economic Growth	-0.470***	-0.514***	-0.498***	-0.466***
	(0.0431)	(0.0389)	(0.0362)	(0.0281)
CO_2 Emission	0.162***	0.147***	0.157***	0.155***
	(0.0404)	(0.0479)	(0.0431)	(0.0289)
Female Education	-0.327***	-0.299***	-0.289***	-0.240***
	(0.0541)	(0.0775)	(0.0700)	(0.0380)
Immunization	-0.456***	-0.778***	-0.812***	-0.465***
	(0.110)	(0.170)	(0.208)	(0.092)
Social Inclusion	-0.567***	0.00272	-0.270**	-1.101***
	(0.134)	(0.123)	(0.117)	(0.151)
HIV	0.135***	0.109***	0.114***	0.124***
	(0.0182)	(0.0216)	(0.0220)	(0.0139)
Constant	9.960***	11.90***	11.64***	9.514***
	(0.569)	(0.693)	(0.926)	(0.476)
Observations	308	229	258	437
R-squared	0.804	0.82	0.806	0.841

Source: Authors' estimation.
Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

APPENDIX-B

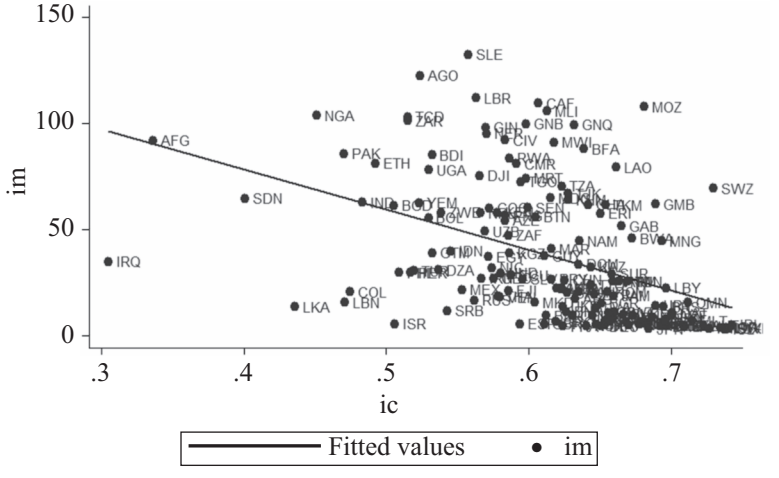

FIGURE B-1

Relation between Infant Mortality and Intergroup Cohesion

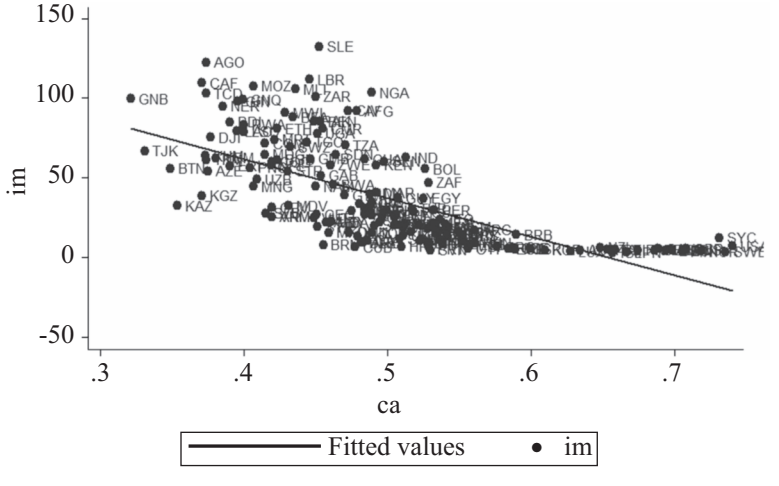

FIGURE B-2

Relation between Infant Mortality, Clubs and Association

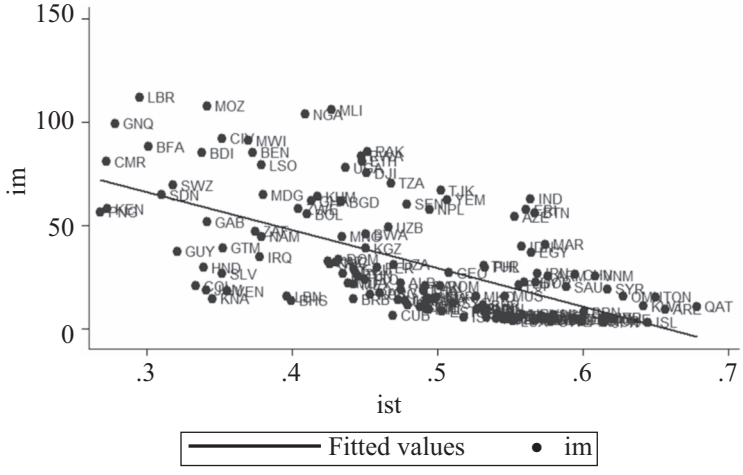

FIGURE B-3

Relation between Infant Mortality, Safety and Trust

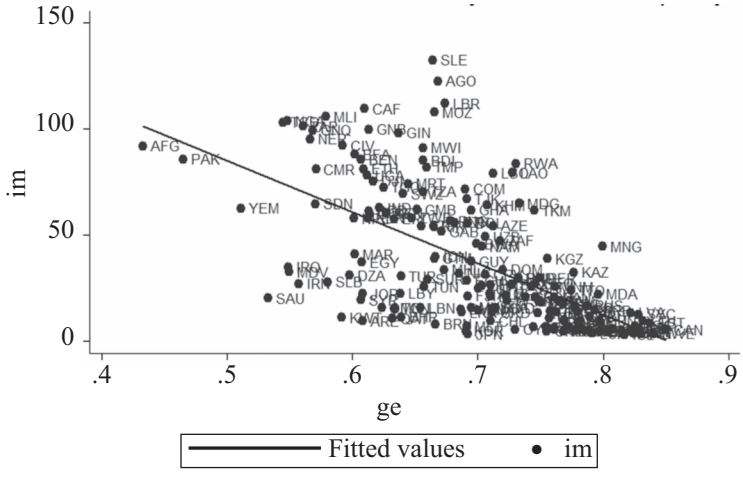

FIGURE B-4

Relation between Infant Mortality and Gender Equality