



Economic Inequality in Social Cohesion Among Older Adults in Low and Middle-Income Countries

Shekhar Chauhan¹ · Mohammad Hifz Ur Rahman² · Abdul Jaleel³ · Ratna Patel⁴

Accepted: 20 June 2021 / Published online: 3 July 2021

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

Abstract

Though a continued increase in life expectancy is a significant public health achievement, keeping older adults active and maintaining their well-being is challenging. Active aging requires physical health, mental health, functional independence, economic stability, social participation, and spiritual identification. Among all these factors, social cohesion has significant importance, but there is a dearth of studies focusing on older adults' social cohesion. Thus, the present study focuses on the level of social cohesion among older adults and its variation among the different economic classes. This article uses data from the Study on Global AGEing and Adult Health (SAGE) conducted in China, Ghana, India, Mexico, Russia, and South Africa during 2007–10. Social cohesion scores have been constructed using Item Response Theory Partial Credit Model. Also, bivariate analysis, concentration curves, concentration indices, and multivariate regressions have been used for the analysis presented in this paper. This study confirms the strong predictive power of age, wealth, education, and working status of older adults on their social cohesion across the countries. Higher social non-cohesion is found among the economically poor older adults in Mexico, Russia, India, and China. In contrast, it is just opposite in the case of older adults in South Africa. Governments should develop policies to foster a society with a high level of social inclusion, social capital, and social diversity, to achieve further advancement in social cohesion.

Keywords Social cohesion · Economic inequality · Older adults · Multi-country analysis

✉ Mohammad Hifz Ur Rahman
mhifzurrahman@gmail.com

Extended author information available on the last page of the article

Introduction

Understanding the factors that are associated with healthy aging have been deemed as a critically important issue. However, as older adults do not directly contribute to the economy, they remain at the bottom of the governments' and researchers' priority list (Srivastava & Kumar, 2015). This lack of serious focus on older adults' issues can lead to severe consequences, especially in developing and underdeveloped societies. Across the world, older adults have poorer health outcomes, lesser health care utilization, higher health risk factors, more barriers to social cohesion, and lower quality of life than younger adults (He et al., 2012). All the targets and policies of achieving social and economic equality will not be possible to meet if the older adults' concerns are not addressed (WHO & World Bank, 2011). There is also a growing concern that discussion around aging tends to get stuck on rights and opportunities, where there is a lackluster consensus, resulting in the failure of any active policy proposal or/and successful implementation process. As a result, the disadvantages of older adults do not change. Hence, they tend to be marginalized, stigmatized, and feel isolated from many parts of social and public policy, as well as the labor markets and health-care systems.

Social cohesion is defined as a state of affairs concerning both the vertical and horizontal interactions among society members. It is characterized by a set of attitudes and norms that includes trust, a sense of belonging, the willingness to participate and help, and related behavioral manifestations (Chan et al., 2006). Green et al. (2009) referred to social cohesion as "the property by which the whole society, and individuals within, are bound together through the action of specific attitudes, behaviors, rules, and institutions, which rely on consensus rather than pure coercion." However, most recent research measured social cohesion through trust and association participation (Jeannotte et al., 2002). Therefore, social cohesion refers to the elements that bring and hold people together and aim to reduce the associated risks factors varying from health to social well-being. Although there has been a large amount of work established, the beneficial effects of cohesion on health and well-being, the vagueness of its definition, and the inability of current measurements to capture the full meaning of the concept is a problem (WHO, 2002). One of the challenges is quantifying social cohesion, although it is apparent and experienced easily. According to Rowe and Kahn (1997), high social cohesion is a prominent indicator of successful aging. Further, the social cohesion of the geriatric population has been deemed a critically important public health issue. Given this, of late, the literature on aging and social cohesion is gaining momentum. A detailed description of social cohesion and critical analysis of the existing discourse on aging and social cohesion has been presented below.

Social cohesion has elements viz. belonging (to be part of, and to experience, a sense of affiliation) to the community and the larger society. It involves processes of identification and acceptance within a community and broader society; inclusion (to be included on an equal basis in all social activities and rights and to have equal access to all life opportunities, and it is opposite is an exclusion),

participation (unhindered participation means active involvement in the community and social activities, programs and events, and this is opposite to non-involvement), and recognition (to recognize, acknowledge and value differences without discrimination).

Social cohesiveness has been a topic of interest in sociology and psychology as well as in mental health and, more recently, in public health (Hyppa & Maki, 2001). The relationship between social cohesion and the well-being of older adults has intrigued many researchers (Musick et al., 1999) and research from a variety of disciplines such as sociology (Kawachi, 1999), health geography, community psychology, (Phongsavan et al., 2006), and social epidemiology (Ziersch et al., 2005) had offered different perspectives on how social cohesion affect the health of the older population. Their results indicated that social cohesion is associated with psychological well-being as well as physical health. Therefore, the concept of social cohesion has now started receiving greater attention and recognition in geriatrics. It is also established that individuals' and societies' social and environmental contexts can influence health risks and act as protective factors (Snelgrove et al., 2009). In this context, a growing body of research has focused on social cohesion as a determinant of the well-being of older adults (Rahman & Singh, 2019a, 2019b). The research found that communities with higher levels of social cohesion- characterized by closely-knit social relationships among community people with strong mutual trust and reciprocity-have been linked to better health outcomes, including lower mortality rates and higher self-rated health (Ichida et al., 2009; Inoue et al., 2013). Thus, many policymakers regard social cohesion as a solution to the increasing health inequality (Rahman & Singh, 2019a, 2019b), recognizing the role of social cohesion in gaining access to the social environment (Snelgrove et al., 2009) and in facilitating social interaction that protects the elderly individual's functional loss (Hyppa & Maki, 2001).

Though a continued improvement in life expectancy is a significant public health achievement, keeping older adults active and ensuring their well-being is challenging. Physical health, mental health, functional independence, economic stability, social participation, and spiritual identification are the fundamentals of active aging (Matsubayashi & Okumiya, 2012). While the role of socio-economic factors influencing older adults' well-being is well studied and recognized, the role of meaningful social life in the life of older adults remains neglected. Moreover, inequalities are drastically becoming one of the foremost challenges that the world faces due to the disparities between the rich and the poor, especially in developing countries. While the world is facing growing social and economic inequalities between societies, there are fundamental upheavals that are starting to weaken social cohesion. Recent studies have shown that inequalities are accompanied by a reduction in social cohesion, specifically in interpersonal trust between different groups, resulting from economic inequality and inequality of opportunities (Rothstein & Uslaner, 2005).

Therefore, this study conceptualizes social cohesion as a proxy of a 'meaningful social life' and how it is connected with older adults' economic conditions in low- and middle-income countries viz. China, Ghana, India, Mexico, Russia, and South Africa. This paper attempts to examine the level of social cohesion and investigate the rich-poor inequalities in older adults' social cohesion. Our study aimed

at examining the level of social cohesion among older adults in six selected low and middle-income countries. Our study also attempted to examine socio-economic inequality in the prevalence of social cohesion among older adults in the six selected countries. This analysis is to inform strategies to improve older adults' quality of life by ensuring a protective social environment.

Data and Methods

Data and Sampling

The present study uses data from the 'Study on Global AGEing and Adult Health' (SAGE) surveys conducted in six countries—China, India, Ghana, Mexico, Russia, and South Africa during 2007–2010. SAGE is a longitudinal, cross sequential, household face-to-face survey. The current survey is the first baseline for the SAGE survey program in these countries. The goals of SAGE are to provide a better understanding of the effects of aging on well-being, examine the health status of individuals aged 50 and above years and changes, trends, and pattern that occur over time, and to improve the capacity of researchers to analyze the effects of social, economic, health care and policy changes on current and future health. SAGE aims to improve the empirical evidence based on older adults' health and well-being and aging in developing countries through the provision of reliable, valid, and cross-nationally comparable data for examining health differences across individuals, countries, and regions through providing validated health measurement methods. SAGE data collection domains include self-reported assessments of health linked to anchoring vignettes for improved comparability across individuals, communities, and populations; assessment of perceptions of well-being and quality of life; self-reported assessment of functioning with measured performance test on a range of different health domains; biomarkers; and introduction of longitudinal study design to allow for dynamic examination of changes in health expectations and experience over the life course and investigation of the compression of morbidity in aging populations. SAGE interviewed 34,143 older persons (50 years or older) in selected countries. The segregation of the samples was: 13,158 in China, 4305 in Ghana, 6560 in India, 2301 in Mexico, 3938 in Russia, and 3836 in South Africa. A multistage stratified clustered sample design has been used uniformly in all the countries included in the SAGE.

Outcome variable

Outcome Variable: Social Cohesion

The outcome of interest in the present study is social cohesion. The SAGE survey covers a detailed perspective of the social cohesion of the sampled population. Social cohesion is defined as a cohesive society that works towards all its members' well-being, fights exclusion and marginalization, creates a sense of belonging,

promotes trust, and offers its members the opportunity of upward mobility (OECD, 2012).

The measures of social cohesion included questions about how often participants engaged in a particular social activity in the last 12 months, including – attendance at a public meeting discussing local affairs; personally meeting a community leader; attending any group meeting (club, union, society, organization); working with other people in the neighborhood to improve or fix something; having friends visit their home; being in the home of or hosting someone from a different neighborhood; socializing with co-workers outside work; attending religious services and; leaving the house to attend meetings, activities, visit family or friends. The subject responded to each item according to the response options "never," "once or twice per year," "once or twice per month," "once or twice per week," or "daily," coded numerically from 1 ("never") to 5 ("daily").

The social cohesion score has been generated using An Item Response Theory (IRT) Partial Credit Model (PCM) to describe the prevalence of social cohesion in the populations. The explanation of the method has been discussed below and has been taken from (Zheng & Rabe-Hesketh, 2007).

The PCM (Masters & Wright, 1997) is an extension of the Rasch model (Masters, 1982) to polytomous items with ordered response categories 1, , 5 for the item (or a question) *i*. The PCM stipulates the likelihood of replying in the *j*th category of item *i* for person *n* as a function of the person’s ability θ_n and step parameters δ_{ij} ($j > 1$)

$$Pr(x_{in} = j | \theta_n) = \frac{\exp \sum_{l=1}^j (\theta_n - \delta_{il})}{\sum_{k=1}^{m_i} \exp \sum_{l=1}^k (\theta_n - \delta_{il})} \quad j = 1, \dots, \dots, \dots, 5 \tag{1}$$

where, $\sum_{l=1}^1 (\theta_n - \delta_{il}) = 0$. This is a particular case of a multinomial logit model, namely, an adjacent category logit model (Agresti, 2003) with:

$$\ln \frac{Pr(x_{in} = j | \theta_n)}{Pr(x_{in} = j - 1 | \theta_n)} = \theta_n - \delta_{ij} \tag{2}$$

The parameter δ_{ij} is recognized as the step difficulty related to category *j* of item *i*. It signifies the added trouble when moving the stage from category *j* - 1 to category *j* (Embretson & Reise, 2000; Wilson, 2004).

A two-parameter logit (2PL) PCM (Muraki, 1992) can also be indicated by comprising a slope parameter, λ_i , that permits each item to have unlike discrimination. In the PCM, the linear predictors v_{ijn} denotes the logarithm of the numerators of the response probabilities:

$$Pr(x_{in} = j | \theta_n) = \frac{\exp(v_{ijn})}{\sum_{k=1}^{m_i} \exp(v_{ikn})} \quad j = 1, \dots, \dots, \dots, 5 \tag{3}$$

Grounded on the method described above, the social cohesion score has been created for every older adult and ranges between 100 (complete cohesion) and 0 (no cohesion).

Independent Variables

We consider the following variables to be potential confounders of social cohesion: age, sex, marital status, educational attainment, working status, wealth quintiles, place of residence (urban/rural), household structure, religion (minority v/s majority).

Statistical Analysis

This paper carries out the analysis at three levels vis-a-vis univariate, bivariate, and multivariate. Bivariate estimates have been generated using suitable sampling weights. For making non-spurious and robust inferences, ordinary least square (OLS) regression analysis has been performed. The multivariate analyses have been performed in two steps – 1), for assessing the relationship between social cohesion and economic status, the data have been pooled for the selected countries included in the study to perform a pooled regression and have also controlled for the country effects accompanied by other academically relevant demographic and socio-economic factors; and 2), we run the regressions model distinctly for each country to know how this association differs across the demographic and socio-economic characteristics through the countries.

Further, we have used the rich-poor ratio, defined as the ratio between the mean social cohesion score among the richest and the mean social cohesion score among the poorest wealth quintile groups, to summarize the economic inequalities in the distribution of mean social cohesion score. If the rich-poor ratio has a value of 1, it indicates that the mean social cohesion score is the same for the poorest and the richest; but if the rich-poor ratio is greater than 1, the poorest are less likely to have a higher mean social cohesion score.

Moreover, we estimated concentration curves (CC) and concentration indices (CI) to depict the inequalities in the distribution of social cohesion by economic status (Kakwani et al., 1997). A concentration index for social cohesion results from a concentration curve. This curve plots the cumulative proportion of older adults, ranked by socio-economic status 'x,' against the cumulative proportion of socially non-cohesive older adults 'y.' If all the older adults, irrespective of their economic status 'x,' have the same 'y,' the concentration curve would coincide with the line of equality. The concentration curve lies above the diagonal if 'y' is larger among the poorer older adults and vice versa. The higher the distance of the curve from the diagonal, the higher the economic inequality. A concentration index is a measure of socio-economic inequality and is defined as twice the area between the concentration curve and diagonal, and it varies between -1 to 1 (Wagstaff & Doorslaer, 2004). The closer the value to 1 (absolute), the distribution of social non-cohesion is more unequal, and the closer the value to 0, the more equal is the distribution of social non-cohesion. We have also adjusted the concentration indices for socio-economic and demographic variables. The analysis of the study was performed using STATA 14.0

Findings

Table 1 describes the participants' characteristics. Among the older adults, the proportion of oldest-old (70+) was around 33 percent in Ghana, 29 percent in Russia, 26 percent in Mexico, and 20 percent in India and South Africa. Among older

Table 1 Selected socioeconomic and demographic characteristics of older adults in selected countries, 2007–2010

	China	Ghana	India	Mexico	Russia	South Africa
Sample Size N	13158	4305	6560	2301	3938	3836
	%	%	%	%	%	%
Age						
50–59	44.93	39.74	48.61	48.05	44.14	49.90
60–69	31.86	27.50	30.89	25.59	26.73	30.60
70+	23.20	32.76	20.50	26.36	29.13	19.50
Sex						
Male	49.75	52.45	50.99	46.80	41.91	44.10
Female	50.25	47.55	49.01	53.20	58.09	55.90
Marital Status						
currently married	84.79	58.17	76.93	68.16	56.55	49.54
widowed	12.28	26.36	21.85	15.03	26.37	23.47
others	2.93	15.47	1.22	16.81	17.08	26.99
Educational Attainment						
No formal education	24.42	55.50	51.78	20.82	3.77	39.82
Up to primary	24.89	8.28	19.03	36.58	5.22	17.15
Above primary to secondary	36.60	27.00	19.10	33.20	35.60	29.60
Above secondary	14.10	9.20	10.10	9.40	57.40	13.40
Work Status						
Never worked	8.94	1.61	27.00	38.49	0.43	14.69
Currently working	43.64	69.09	43.17	37.40	42.35	30.06
Currently not working	47.43	29.29	29.83	24.11	57.22	55.24
wealth Quintile						
Poorest	16.27	18.24	18.18	15.30	13.32	20.71
Poorer	18.13	19.09	19.50	24.71	17.13	19.89
Middle	20.49	20.46	18.79	16.79	19.56	18.23
Richer	23.36	20.66	19.64	16.61	22.15	19.83
Richest	21.75	21.56	23.90	26.60	27.85	21.34
Residence						
Urban	47.35	41.09	28.91	78.80	70.08	64.90
Rural	52.65	58.91	71.09	21.20	29.92	35.10
Household Structure						
Nuclear	67.48	33.84	22.97	10.44	72.69	43.33
Non-nuclear	32.52	66.16	77.03	89.56	27.31	56.67
Religion						
Majority	93.24	69.56	84.30	91.37	75.31	86.14
Minority	6.76	30.44	15.70	8.63	24.69	13.86

adults, females outnumbered males in Russia (Female: 58.09%; Male: 41.91%), South Africa (Female: 55.90%; Male: 44.10%), and Mexico (Female: 53.20%; Male: 46.80%). More than one-fourth of older adults in Russia (26.37%) and Ghana (26.36%) were widowed. More than half of the older adults in Ghana (55.50%) and India (51.78%) had no formal education, and the number of uneducated older adults were least in Russia (3.77%). The proportion of currently working older adults was 69 percent in Ghana and around 43% in China and India. One in every five older adults in China, South Africa, and Ghana belonged to the lowest wealth quintile. A large majority of older adults in India (71%) live in rural areas. The proportion of older adults living in rural areas was 59% and 53%, respectively, in Ghana and China. A substantial proportion of older adults in Russia (73%), China (67%), and South Africa (43%) belonged to nuclear families.

Figure 1 shows the mean social cohesion score for older adults living in the six countries. The mean social cohesion score was highest in Ghana (45) and the lowest in Mexico (33). Russia and South Africa stand at the second and third positions with a mean social cohesion score of 42 and 40, respectively. The mean social cohesion score for the older adults in China and India was 37 and 35, respectively. Overall, older adults of Ghana, Russia, and South Africa had higher social cohesion than the older adults of China, India, and Mexico.

As mentioned earlier, in this study, we have captured economic inequality in social cohesion (measured in terms of mean social cohesion score) using rich-poor ratios (mean social cohesion score of richest/ mean social cohesion score of poorest wealth quintile), concentration curves, and concentration indices. Figure 2 depicts the rich-poor ratio of mean social cohesion score among the older adults in the six selected low and middle-income countries. All values of the rich-poor ratio, which are higher than one, indicate that social cohesion is lower among the economically disadvantaged section of the older adults. In all the countries except South Africa, economic inequality exists in social cohesion against the poor. The highest rich-poor ratio is observed in Mexico and Russia (1.3), thus portraying the

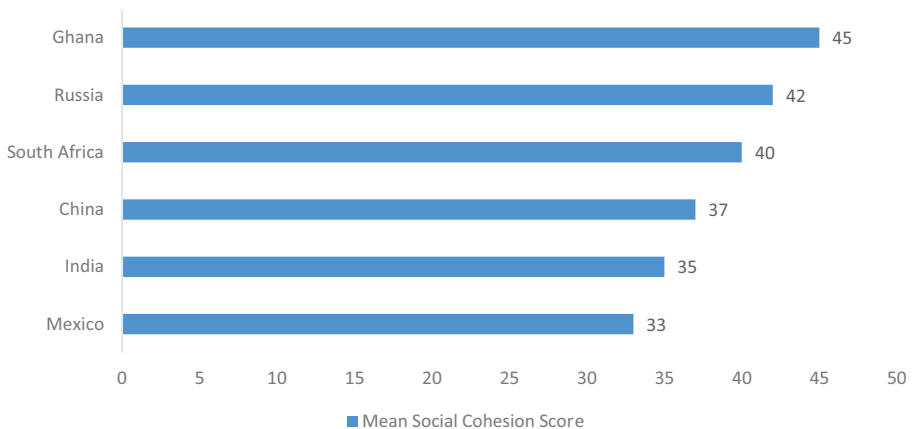


Fig. 1 Mean social cohesion score among older adults in six selected countries during 2007–10

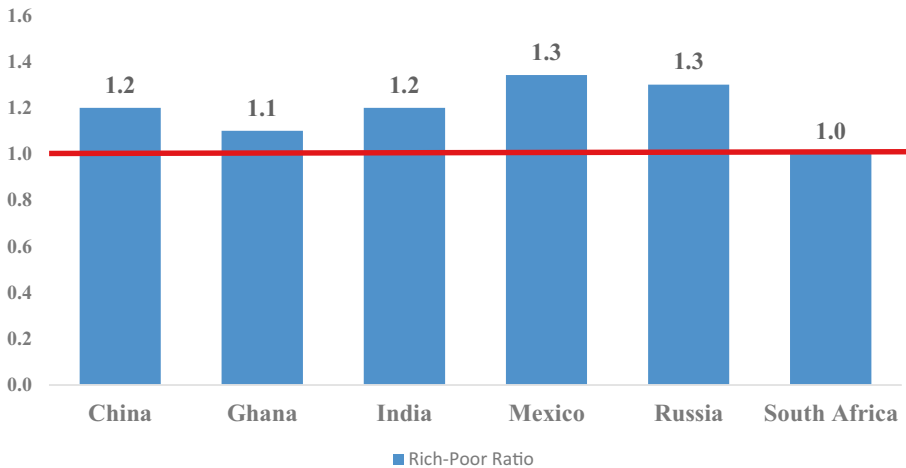


Fig. 2 Rich-Poor ratio of mean social cohesion score among older adults of selected countries during 2007–10

enormous economic inequality in social cohesion among the older adults of Mexico and Russia.

Figure 3 presents concentration curves portraying economic inequality in older adults' social cohesion in the selected countries. Our aim of plotting concentration curves was to assess whether the social cohesion is more towards economically advantageous or economically backward older adults. Suppose everyone, irrespective of their economic status, has the same value of social cohesion. In that case, the concentration curve will be a 45^o line, running from the bottom left-hand corner to the top right-hand corner (line of equality). If the social non-cohesion takes higher values amongst economically less vibrant older adults, the concentration curve will lie above the line of equality. The further the curve is below the line of equality, social non-cohesion is more concentrated amongst the economically advantageous older adults. In Ghana and South Africa, inequality of being socially non-cohesive was minimum as the concentration curve is very close to the line of equality. In Russia, Mexico, China, and India, the concentration curve is well above the line of equality, showing the concentration of social non-cohesion amongst the poor older adults. In short, stark inequality exists in Russia, Mexico, China, and India, where social non-cohesion among older adults was more concentrated among economically less advantaged groups.

Table 2 presents the result of the Ordinary Least Squares regression model estimating the effects of various background characteristics on social cohesion scores in selected countries. With an increase in wealth, a consistent increase in social cohesion is noticed for older adults in China and India. As compared to older adults who never worked, a significantly higher social cohesion is observed for those currently working in all the countries. The social cohesion score is 30 percent higher among those currently working compared to those who never worked in Ghana. Education is found to have a strong predictive

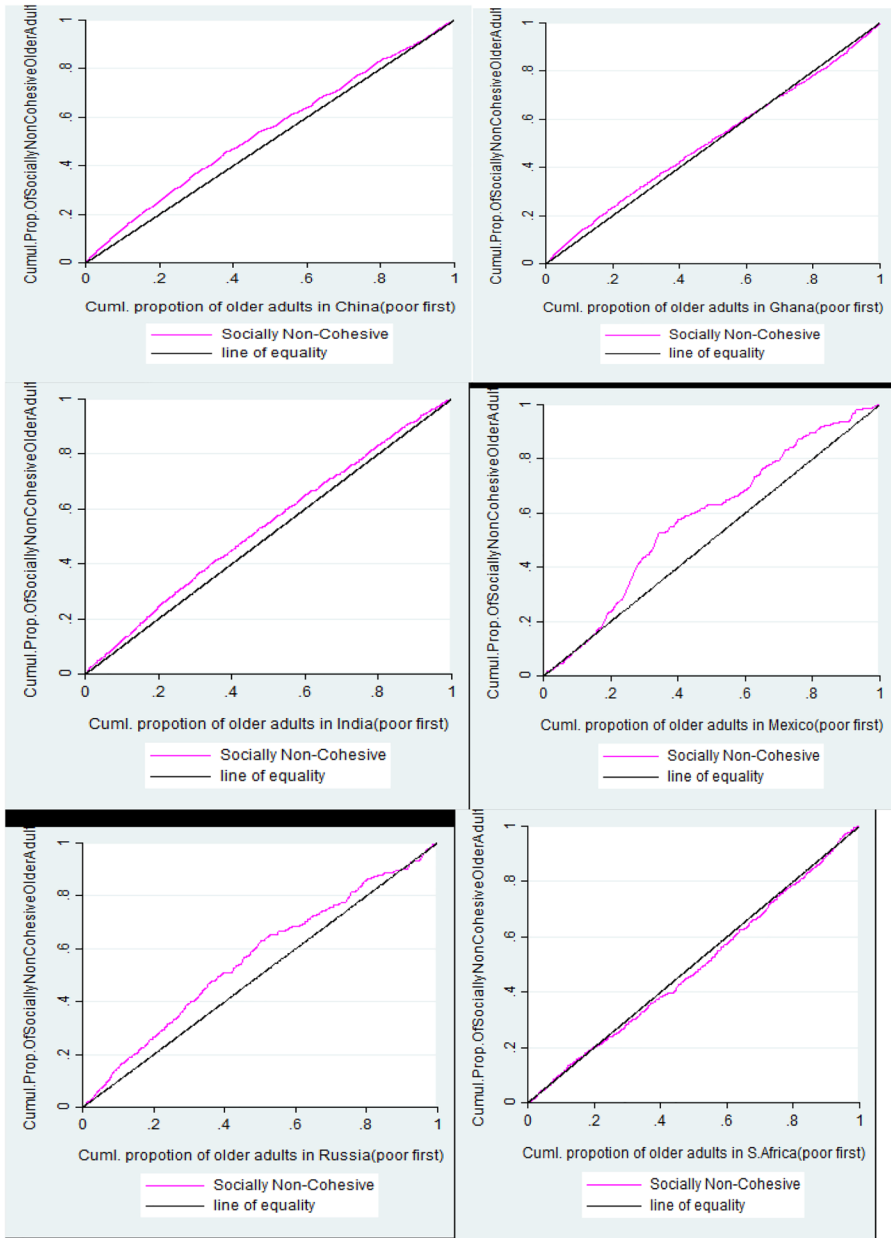


Fig. 3 Concentration curves representing the economic inequality in social non-cohesion among older adults in selected countries, 2007–10

power on social cohesion as those older adults having higher levels of education had significantly higher social cohesion in all the countries. The highest impact of the increase in educational attainment on social cohesion is seen in Mexico.

Table 2 Ordinary least squares regression model estimating effects of background characteristics on social cohesion score in selected countries, 2007–10

	China	Ghana	India	Mexico	Russia	South Africa
Wealth Quintile						
Poorest [®]						
Poorer	2.59***	4.51***	1.47**	-0.389	4.81***	0.413
Middle	3.89***	6.66***	3.64***	3.45**	4.71***	-0.242
Richer	4.82***	6.46***	4.43***	0.913	6.67***	0.731
Richest	6.39***	4.59***	6.03***	4.44***	7.88***	0.209
Work Status						
Never worked [®]						
Currently working	7.11***	30.10***	7.07***	8.65***	12.4***	2.51***
Currently not working	3.75***	19.10***	2.75***	2.59**	1.69	-3.46***
Educational Attainment						
No formal education [®]						
Up to primary	1.63***	3.59***	0.15	1.41	-0.66	-0.424
Above primary to secondary	3.14***	2.56***	1.69***	3.85***	1.88	1.19*
Above secondary	4.78***	4.92***	4.11***	9.35***	6.14***	5.39***
Age						
50–59 [®]						
60–69	-0.31	-0.741	-.739*	2.41*	-1.07	-0.928
70+	-3.19***	-1.72**	-4.24***	0.538	-5.93***	-4.12***
Sex						
Male [®]						
Female	0.14	-1.83***	-6.04***	3.22***	0.86	-0.213
Marital Status						
Currently married [®]						
Widowed	0.43	-1.75**	-1.33***	-2.20*	0.88	-1.01
Others	-3.88***	-1.62**	-3.53***	-1.92	-0.64	-2.32***
Residence						
Urban [®]						
Rural	5.4***	3.44***	3.37***	5.56***	1.39*	1.91***
Household Structure						
Nuclear [®]						
Non-nuclear	-1***	-0.646	-0.36	0.347	-0.95	0.0294
Religion						
Majority [®]						
Minority	8.27***	0.645	-0.219	-0.802	0.61	-5.44***

***- $p < 0.01$, **- $p < 0.05$, *- $p < 0.10$

The social cohesion score among those who have more than ten years of education is higher by 9 point compared to older adults without formal education in Mexico. It is also established that the social cohesion score decreases with an increase in age, particularly at the upper ages in all countries except Mexico.

The maximum reduction in social cohesion score among the 70+ population is observed in Russia, with a decline of six point compared to the 50–59 age group population. Older females belonged to China, Mexico, and Russia are socially more cohesive than their male counterparts. Older adults living in rural areas are more socially cohesive as compared to those living in urban areas.

Table 3 reveals the determinants of social cohesion (score) among older adults by the selected covariates. The pooled Ordinary Least Squares regression model is used for this analysis. Regarding the social cohesion score of older adults in Ghana, older adults in Mexico, Russia, South Africa, and China have a higher social cohesion score. Social cohesion scores of these countries are higher by 2 points in Mexico, 4 points in Russia, 6 points in South Africa, and 8 points in China than Ghana. Indian older adults had lower social cohesion than older adults of Ghana. As compared to the older adults of first wealth quintile (the poorest), a consistent increase of 2.3, 3.8, 4.4, and 5.4 points in social cohesion score is found among older adults belonged to 2 (poor), 3 (middle), 4 (rich) and 5 (richest) wealth quintiles, respectively. With reference to those older adults who were never worked, currently working older adults had 9 points higher social cohesion. Likewise, compared to older adults having no formal education, older adults having education above the secondary level have 5.8 points higher social cohesion. Among the 70+ population, the social cohesion score is 3 points less than the population belonging to the 50–59 age group. Rural older adults have a higher social cohesion of 3.7 points with regards to their urban counterparts. Older adults who belonged to minority religions were having a higher social cohesion score than their counterparts.

Table 4 presents the economic inequality in social cohesion among older adults in all six countries. The concentration index of social non-cohesion against economic status is estimated. A concentration index is a measure of inequality and takes a value between -1 to $+1$. The closer the value to 1 (absolute), the distribution of social non-cohesion is more unequal, and the closer the value to 0, the more equal is the distribution of social cohesion. We have also adjusted the concentration indices for socio-economic and demographic variables. The value -1 shows that social non-cohesion is highly concentrated among the poor population, and the value $+1$ shows that social non-cohesion is highly concentrated among the rich population. Among older adults of all countries except South Africa, social non-cohesion is significantly concentrated among poor populations. Social non-cohesion is found more among the economically poor older adults in Mexico (CI -0.16 , $p < 0.01$), Russia (CI -0.12 , $p < 0.01$), India (CI -0.07 , $p < 0.01$), and China (CI -0.08 , $p < 0.01$). For most of the background characteristics, social non-cohesion is significantly concentrated among the poor population in all the countries except in South Africa.

Table 3 Pooled ordinary least squares regression model estimating effects of various background characteristics on social cohesion score in selected countries, 2007–10

Country	
Ghana [®]	
China	7.98***
India	-0.43
Mexico	2.29***
Russia	4.27***
South Africa	5.63***
Wealth Quintile	
Poorest [®]	
Poorer	2.36***
Middle	3.79***
Richer	4.44***
Richest	5.42***
Work Status	
Never worked [®]	
Currently working	9.12***
Currently not working	2.49***
Educational Attainment	
No formal education [®]	
Up to primary	1.15***
Above primary to secondary	2.53***
Above secondary	5.85***
Age	
50–59 [®]	
60–69	-0.34
70+	-3.22***
Sex	
Male [®]	
Female	-0.43**
Marital Status	
Currently married [®]	
Widowed	-0.90***
Others	-1.48***
Residence	
Urban [®]	
Rural	3.73***
Household Structure	
Nuclear [®]	
Non-nuclear	-0.551***
Religion	
Majority [®]	
Minority	1.63***

***- $p < 0.01$, **- $p < 0.05$, *- $p < 0.10$

Table 4 Concentration indices for social non-cohesion among older adults of selected countries, 2007–10

Country	Adjusted Concentration Index								
	Over All Concentration Index	Age	Sex	Marital Status	Education	Work Status	Residence	Household Structure	Religion
China	-0.08***	-0.07***	-0.07***	-0.07***	-0.07***	-0.08***	-0.09***	-0.10***	-0.10***
Ghana	-0.02	-0.01	-0.001	0.004	0.03*	0.01	-0.03**	-0.03**	-0.03**
India	-0.07***	-0.07***	-0.06***	-0.06***	-0.05***	-0.07***	-0.08***	-0.08***	-0.08***
Mexico	-0.16***	-0.17***	-0.17***	-0.18***	-0.16***	-0.14***	-0.15***	-0.15***	-0.14***
Russia	-0.12***	-0.06***	-0.07***	-0.06***	-0.05***	-0.04***	-0.04***	-0.04***	-0.04***
South Africa	0.03**	0.02	0.02*	0.03**	0.04***	0.04***	0.03**	0.03*	0.02

***- $p < 0.01$, **- $p < 0.05$, *- $p < 0.10$

Discussion

This study examined social cohesion and its covariates in six countries: China, Ghana, India, Mexico, Russia, and South Africa. Furthermore, this study also examined economic inequality in social cohesion in these six countries. The countries included in this analysis are at different stages of population aging, and older adults in these countries significantly vary in their social, economic, and demographic characteristics. Several significant findings emerged from this study. First, the mean social cohesion score was higher in Ghana, Russia, and South Africa, whereas it was lower in China, India, and Mexico. Second, social cohesion was highly skewed and concentrated towards richer older adults in all the countries except South Africa, where the rich-poor gap was negligible in social cohesion among older adults. Third, Mexico has the lowest social cohesion among older adults in comparison to all other countries. Also, as measured by the rich-poor gap in social cohesion, economic inequality was highest among older adults in Mexico compared to any other country. Fourth, social cohesion decreases with an increase in the age of older adults in all countries. Fifth, social cohesion was higher among male older adults than in female older adults in all the countries except in Russia. Sixth, social cohesion is higher among educated older adults, currently working older adults, richer older adults, and older adults who live in rural areas in all the countries. Seventh, social non-cohesion was concentrated towards poor older adults in all the countries except in South Africa, where social non-cohesion was concentrated towards rich older adults.

This study finds the economic inequality in older adults' social cohesion as social cohesion was higher among richer older adults than their counterparts in all the countries except in South Africa. This finding is in line with previously available literature (Rahman & Singh, 2019a, 2019b). Furthermore, previous studies have noted rich-poor economic inequalities in the studied countries (Wu, 2009). Old age and poverty have been highlighted as a rising concern in developing countries (Sherlock, 2000). Working older adults were found to be having higher social cohesion than their counterparts in all the countries. By virtue of working, older adults get access to meet their colleagues daily, making their social cohesion stronger than those who do not work.

Educational attainment is seen as a protective factor, and older adults with higher education seem to have higher social cohesion levels than their counterparts. Previous studies also highlighted a higher level of social cohesion among educated older adults in the studied countries (Miao et al., 2019; Singh et al., 2017). Educated older adults by virtue of being linked to their working environment may have better social cohesion than their counterparts. The result found a negative association between the age of older adults and social cohesion. Nearly in all the countries except Mexico, social cohesion declined among older adults with an increase in their age. Previous studies also noted poor social cohesion among aged older adults (Rahman & Singh, 2019a, 2019b). With the increase in age, older adults tend to have more chronic diseases and confined to bed, thereby reducing their movements and further reducing social cohesion. Previous studies have highlighted a higher level of chronic diseases

among aged older adults (Srivastava et al., 2020). Already enough literature is available examining the relationship between aging, chronic disease, and physical inactivity (Garin et al., 2014; Levasseur et al., 2015). Physical inactivity is associated with a low level of social cohesion among older adults (Yip et al., 2016).

This study has mixed findings for gender-wise social cohesion among older adults in various countries. Social cohesion was higher among male older adults in Ghana, India, and South Africa, whereas it was higher among female older adults in China, Mexico, and Russia. A previous study could not find any significant association between social cohesion and gender in the Shanghai province of China (Miao et al., 2019). Social cohesion was higher among rural older adults than their counterparts. Previous studies suggest that social cohesion is higher among rural residents than in urban residents (Rahman & Singh, 2019a, 2019b; Xu et al., 2018). Older adults living in rural areas enjoy a more socially cohesive life as people in rural areas share close relations than their counterparts in urban areas. Furthermore, older adults residing in rural Ghana had the highest social cohesion than older adults in any other country. This may be because Ghana has a higher rural population density than other studied countries, which means more opportunities to meet people, enhancing their social cohesion (Rahman & Singh, 2019a, 2019b).

This study has some plausible limitations also. The measurement of social cohesion may be affected by recall bias as the recall period was twelve months. It is evident that cognitive ability degrades with an increase in age; therefore, we can assume that there may have recall biases. The present study is based on multi-country data, and the religious composition of the selected countries was different, so a religion-based comparison could not be made. Majority versus Minority was the only available option with the author to include religion in the analysis in a multi-country study. Despite the above limitation, this study is of significant importance. The study has various potential strengths too. To our knowledge, minimal research is available exploring economic differences in social cohesion among older adults. This study adds the relevant knowledge to the literature gap. Furthermore, data were drawn from a multi-country survey that makes it comprehensive in terms of accessibility. The selected countries belong to various continents of the world (according to United Nations categorizations – Asia (China, India), Africa (Ghana, South Africa), Latin America and the Caribbean (Mexico), and Europe (Russia)). The abovementioned countries contribute approximately 42 percent of the world's total population. Also, the 50+ population of the selected countries is 42 percent in the world's 50+ population. Apart from considering the population size and geographic range, selected countries are illustrative of low, middle, and upper-income countries.

Conclusion

This article has explored a range of factors relating to social cohesion while exploring economic inequality in social cohesion among older adults in six low and middle-income countries. By attempting this study, we tried to fill the literature gap as little has been done to assess the extent to which economic inequality exists for social cohesion among older adults in the studied countries. Discussion about social

cohesion largely remained focused to examine level and trends, and we could not find any significant literature examining economic inequality in social cohesion among older adults. Therefore, this study is important and has significance to policy formulation. Various studies have confirmed the association between social cohesion and the health of older adults (Choi & Costa, 2018; Kim et al., 2020). Therefore, improving social cohesion among the elderly may also positively impact their health, which may further take away the burden from health infrastructure in that particular country. Improving social cohesion among older adults in urban areas shall be priorities for the government in all the studied countries.

Author's Contribution Conceptualization: Mohammad Hifz Ur Rahman; Methodology: Mohammad Hifz Ur Rahman; Formal analysis and Investigation: Mohammad Hifz Ur Rahman; Writing- Original draft preparation: Abdul Jaleel, Mohammad Hifz Ur Rahman; Writing-Review and Editing: Shekhar Chauhan, Ratna Patel; Supervision: Abdul Jaleel; Validation: Mohammad Hifz Ur Rahman, Shekhar Chauhan, Ratna Patel, Abdul Jaleel.

Funding The authors did not receive any grant or funding to carry out the research.

Declarations

Conflict of Interest The authors declare that they have no conflict of interest.

Informed Consent The study is based on secondary data source. Therefore, it does not require any informed consent. The data can be downloaded from the following link- <https://apps.who.int/healthinfo/systems/surveydata/index.php/catalog/sage>

References

- Agresti, A. (2003). *Categorical data analysis* (Vol. 482). John Wiley & Sons. https://projecteuclid.org/download/pdf_1/euclid.ss/1177011454
- Chan, J., To, H. P., & Chan, E. (2006). Reconsidering social cohesion: Developing a definition and analytical framework for empirical research. *Social Indicators Research*, 75, 273. <https://doi.org/10.1007/s1205-005-2118-1>
- Choi, Y. J., & Matz-Costa, C. (2018). Perceived neighborhood safety, social cohesion, and psychological health of older adults. *The Gerontologist*, 58(1), 196–206. <https://doi.org/10.1093/geront/gnw187>
- Embretson, S., & Reise, S. (2000). "Item Response Theory for Psychologists", Mahwah, NJ: Erlbaum
- Garin, N., Olaya, B., Miret, M., Ayuso-Mateos, J.L., Power, M., Bucciarelli, P., Haro, J.M. (2014). Built environment and elderly population health: a comprehensive literature review. *Clinical Practice & Epidemiology in Mental Health*, 10, 103–115. <https://doi.org/10.2174/1745017901410010103>
- Garin, N., Olaya, B., Moneta, M. V., Miret, M., Lobo, A., Ayuso-Mateos, J. L., & Haro, J. M. (2014). Impact of multimorbidity on disability and quality of life in the Spanish older population. *PLoS One*, 9(11), e111498.
- Green, A., Janmaat, G., & Han, C. (2009). *Regimes of social cohesion*. Centre for Learning and Life Chances in Knowledge Economies and Societies, Institute of Education, University of London. [https://discovery.ucl.ac.uk/id/eprint/10003014/1/Green2009Regimes\(Report\).pdf](https://discovery.ucl.ac.uk/id/eprint/10003014/1/Green2009Regimes(Report).pdf)
- He, W., Muenchrath, M. N., & Kowal, P. R. (2012). *Shades of gray: a cross-country study of health and well-being of the older populations in SAGE countries, 2007–2010*. US Department of Commerce, Economics and Statistics Administration, US Census Bureau. https://www.researchgate.net/profile/Paul_Kowal2/publication/280534500_Shades_of_Gray_A_Cross-Country_Study_of_Health_and_Well-Being_of_the_Older_Populations_in_SAGE_Countries_2007-2010/links/55b84ec108ae092e965884fb.pdf

- Hyypä, M. T., & Mäki, J. (2001). Individual-level relationships between social capital and self-rated health in a bilingual community. *Preventive Medicine*, 32(2), 148–155. <https://doi.org/10.1006/pmed.2000.0782>
- Ichida, Y., Kondo, K., Hirai, H., Hanibuchi, T., Yoshikawa, G., & Murata, C. (2009). Social capital, income inequality and self-rated health in Chita peninsula, Japan: A multilevel analysis of 25 communities. *Social Science & Medicine*, 69, 489–499. <https://doi.org/10.1016/j.socscimed.2009.05.006>
- Inoue, S., Yorifuji, T., Takao, S., Doi, H., & Kawachi, I. (2013). Social cohesion and mortality: A survival analysis of older adults in Japan. *American Journal of Public Health*, 103, 60–66. <https://doi.org/10.2105/AJPH.2013.301311>
- Jeannotte, M. S., Stanley, D., Pendakur, R., Jamieson, B., Williams, M., Aizlewood, A., & Planning, S. (2002). "Buying in or dropping out: The public policy implications of social cohesion research", *Strategic Research and Analysis (SRA), Strategic Planning and Policy Coordination. Department of Canadian Heritage, Ottawa, Canada.*
- Kakwani, N., Wagstaff, A., & Doorslaer, V. E. (1997). Socio-economic inequalities in health: Measurement, computation and statistical inference. *Journal of Econometrics*, 77(1), 87–104. [https://doi.org/10.1016/S0304-4076\(96\)01807-6](https://doi.org/10.1016/S0304-4076(96)01807-6)
- Kawachi, I. (1999). Social capital and community effects on population and individual health. *Annals of the New York Academy of Sciences*, 896, 120–130. <https://doi.org/10.1111/j.1749-6632.1999.tb08110.x>
- Kim, J., Kim, J., & Han, A. (2020). Leisure Time Physical Activity Mediates the Relationship Between Neighborhood Social Cohesion and Mental Health Among Older Adults. *Journal of Applied Gerontology*, 39(3), 292–300. <https://doi.org/10.1177/0733464819859199>
- Levasseur, M., Genereux, M., Bruneau, J. F., Vanasse, A., Chabot, E., Beaulac, C., & Bedard, M. M. (2015). Importance of proximity to resources, social support, transportation and neighborhood security for mobility and social participation in older adults: Results from a scoping study. *BMC Public Health*, 15, 503. <https://doi.org/10.1186/s12889-015-1824-0>
- Lloyd-Sherlock, P. (2000). Old age and poverty in developing countries: New policy challenges. *World Development*, 28(12), 2157–2168. [https://doi.org/10.1016/S0305-750X\(00\)00077-2](https://doi.org/10.1016/S0305-750X(00)00077-2)
- Masters, G. N., & Wright, B. D. (1997). The Partial Credit Model, *Handbook of Modern Item Response Theory.*
- Masters, G. (1982). "A Rasch model for partial credit scoring" *Psychometrika*, 47(2), 149–174. <https://doi.org/10.1007/BF02296272>
- Matsubayashi, K., & Okumiya, K. (2012). Field medicine: A new paradigm of geriatric medicine. *Geriatrics & Gerontology International*, 12, 5–15. <https://doi.org/10.1111/j.1447-0594.2011.00738.x>
- Miao, J., Wu, X., & Sun, X. (2019). Neighborhood, social cohesion, and the Elderly's depression in Shanghai. *Social Science & Medicine*, 229, 134–143. <https://doi.org/10.1016/j.socscimed.2018.08.022>
- Muraki, E. (1992). A generalized partial credit model: Application of an EM algorithm. *ETS Research Report Series*, 1992(1), i–30. <https://doi.org/10.1002/j.2333-8504.1992.tb01436.x>
- Musick, M. A., Herzog, A. R., & House, J. S. (1999). Volunteering and mortality among older adults: Findings from a national sample. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 54(3), S173–S180. <https://doi.org/10.1093/geronb/54B.3.S173>
- OECD (2012). "Perspectives on global development: Social cohesion in a shifting world" accessed from <https://www.oecd.org/site/devpgd2012/49067800.pdf>
- Phongsavan, P., Chey, T., Bauman, A., Brooks, R., & Silove, D. (2006). Social capital, socio-economic status and psychological distress among Australian adults. *Social Science & Medicine*, 63, 2546–2561. <https://doi.org/10.1016/j.socscimed.2006.06.021>
- Rahman, M. H. U., & Singh, A. (2019). Socio-economic disparity in the occurrence of disability among older adults in six low and middle income countries. *International Journal of Human Rights in Healthcare*, 12(1), 60–75. <https://doi.org/10.1108/IJHRH-05-2018-0034/full/html>
- Rahman, M. H. U., & Singh, A. (2019b). Disability and social cohesion among older adults: A multi-country study. *International Journal of Social Economics*, 46(4), 485–502. <https://doi.org/10.1108/IJSE-05-2018-0230>
- Rothstein, B., & Uslander, E. M. (2005). All for all: Equality, corruption, and social trust. *World Pol.*, 58, 41–72. <https://heinonline.org/HOL/LandingPage?handle=hein.journals/wpot58&div=7&id=&page=>

- Rowe, J. W., & Kahn, R. L. (1997). Successful aging. *The Gerontologist*, 37, 433–440. <https://doi.org/10.1093/geront/37.4.433>
- Singh, P., Govil, D., Kumar, V., & Kumar, J. (2017). Cognitive impairment and quality of life among elderly in India. *Applied Research in Quality of Life*, 12(4), 963–979. <https://doi.org/10.1007/s11482-016-9499-y>
- Snelgrove, J. W., Pikhart, H., & Stafford, M. (2009). A multilevel analysis of social capital and self-rated health: Evidence from the British Household Panel Survey. *Social Science & Medicine*, 68(11), 1993–2001. <https://doi.org/10.1016/j.socscimed.2009.03.011>
- Srivastava, P., & Kumar, P. (2015). Disability, its issues and challenges: Psychosocial and legal aspects in Indian scenario. *Delhi Psychiatry Journal*, 18(1), 195–205.
- Srivastava, S., Anwar, T., Patel, R., & Chauhan, S. (2020). Dynamics of chronic diseases in metro and non-metro regions of India: evidence from India Human Development Survey I and II. *International Journal of Scientific Reports*, 6(8), 322–331. <https://doi.org/10.18203/issn.2454-2156.IntJSciRep20203116>
- Wagstaff, A., & Doorslaer, V. E. (2004). Overall versus socio-economic health inequality: A measurement framework and two empirical illustrations. *Health Economics*, 13(3), 297–301. <https://doi.org/10.1002/hec.822>
- Wilson, M. (2004). *Constructing Measures: An Item Response Theory Approach*" Mahwah. Erlbaum.
- World Health Organization and World Bank. (2011). *World Report on Disabilities*. World Health Organization.
- World Health Organization. (2002). *ICF: International classification of functioning, disability and health*. Switzerland.
- Wu, X. (2009). Income inequality and distributive justice: A comparative analysis of mainland China and Hong Kong. *The China Quarterly*, 200, 1033–1052. <https://doi.org/10.1017/S0305741009990610>
- Xu, H., Ostbye, T., Vorderstrasse, A. A., Dupre, M. E., & Wu, B. (2018). Place of residence and cognitive function among the adult population in India. *Neuroepidemiology*, 50(2–3), 119–127. <https://doi.org/10.1159/000486596>
- Yip, C., Sarma, S., & Wilk, P. (2016). The association between social cohesion and physical activity in Canada: A multilevel analysis. *SSM-Population Health*, 2, 718–723. <https://doi.org/10.1016/j.ssmph.2016.09.010>
- Zheng, X., & Rabe-Hesketh, S. (2007). Estimating parameters of dichotomous and ordinal item response models with GLLAMM. *Stata Journal*, 7(3), 313–333. <https://doi.org/10.1177/1536867X0700700302>.
- Ziersch, A. M., Baum, F. E., MacDougall, C., & Putland, C. (2005). Neighborhood life and social capital: The implications for health. *Social Science & Medicine*, 60, 71–86. <https://doi.org/10.1016/j.socscimed.2004.04.027>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Shekhar Chauhan is a Ph.D. research scholar at International Institute for Population Sciences, Mumbai. He completed his post-graduation in population studies from International Institute for Population Sciences, Mumbai. His area of interest includes maternal and child health care. He has a keen interest on the issue of child marriage too.

Mohammad Hifz Ur Rahman is currently working as an Assistant Professor in the department of Community Medicine, Maharishi Markandeshwar Medical College & Hospital, Maharishi Markandeshwar University, Solan, Himachal Pradesh. Dr Rahman has completed his post-graduation in Statistics from Banaras Hindu University, Varanasi. Further he did M.Phil and PhD from International Institute for Population Sciences, Mumbai. He has published various research papers in reputed peer reviewed journals. His research interests are disability, ageing, nutrition, and child health.

AbdulJaleel is currently associated with International Institute for PopulationSciences as a Senior Research Officer. After completing his post-graduation inSocial work, he pursued his Master in Population Studies from InternationalInstitute for Population Sciences, Mumbai, India. He has completed his PhD fromInternational Institute for Population Sciences, Mumbai, India.

Ratna Patel is a Ph.D. research scholar atInternational Institute for Population Sciences, Mumbai. After pursuingpost-graduation in Economic from Banaras Hindu University, she went on topursue one year master degree course of Population Studies from InternationalInstitute for Population Sciences, Mumbai, India. Thereafter, she completed herM.Phil. in population studies from International Institute for PopulationSciences, Mumbai. She has published various articles in national andinternational journal. Her area of interest includes ageing, public health,adolescent health care, maternal and child health care.

Authors and Affiliations

Shekhar Chauhan¹  · **Mohammad Hifz Ur Rahman**²  · **Abdul Jaleel**³  · **Ratna Patel**⁴ 

Shekhar Chauhan
shekhariips2486@gmail.com

- ¹ Department of Population Policies and Programmes, International Institute for Population Sciences, Mumbai, India
- ² Department of Community Medicine, Maharishi Markandeshwar Medical College & Hospital, Maharishi Markandeshwar University, Solan, Himachal Pradesh, India
- ³ Senior Project Officer, International Institute for Population Sciences, Mumbai, India
- ⁴ Department of Public Health and Mortality Studies. International Institute for Population Sciences, Mumbai, India