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Measuring and Decomposing Inequalities in Mental Disorders among Elderly in Five Low- and Middle-Income Countries: Evidence from WHO-SAGE, Wave 1

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Abstract

The paper aims to quantify the extent of inequalities among the older population in India, China, Ghana, Russia and South Africa. Though studies show prevalence of mental disorder among these countries, little is known about relative contribution of explanatory factors for health-related inequality in mental disorders among elderly. Data from Global Ageing and Adult Health (SAGE), WAVE-1 (2007-10), has been used for analysis. Finding portrays that though inequality prevails more in China, Indian older population suffers more from mental disorders compared with the other selected countries. Further, decomposition analysis reveals that age, urban residence, male sex and education (high school or more) show significantly more importance in order to explain relative contribution in inequality for mental disorders. In contrast, relative contribution of employment is very less. The lower value of unexplained CI shows that selected explanatory factors significantly explain the existing inequalities. In essence, results indicate that inequalities are artefacts of existing inequalities through place of residence, gender, education and economic factors, which need instant attention of policy makers to promote mental well-being through active and healthy ageing.

Keywords: *Elderly population, inequality, mental disorder, WHO-SAGE*

I. Introduction

A mental disorder among elderly is an important issue, especially in the developing countries where ageing population is increasing as a result of demographic transition. Mental disorders contain many symptoms like depression, schizophrenia and anxiety, and prevail throughout the world. Mental disorders account for 12 per cent of the global burden of disease and 31 per cent of years lived with disability (Sayers, 2001). Between 1990 and 2010, this burden increased by 37.6 per cent (Whiteford et al., 2013). The WHO demonstrated that among older people, the prevalence of mental disorder is the highest (15%) and mental malady contributed around 6.6 per cent of all the disabilities (World Health Organization, 2017). It has been found that mental health, neurological problems and substance use disorders attributed around one-third of global DALYs, which is bigger than of all the developed countries combined (Charlson et al., 2016). The national mental health survey of India reported that the prevalence of lifetime psychological morbidity, current psychological morbidity, and risk of suicides was 13.9 per cent, 10.5 per cent and 6.4 per cent respectively. The study also presented that the treatment gap for mental disorders fluctuates from 70 per cent to 90 per cent across the regions (Gururaj et al., 2015). Consequently, tackling mental health inequalities has come into the limelight throughout the world in the light of public health priority. "Mental or psychological well-being is influenced not only by individual attributes but also by the socio-economic circumstances in which persons find themselves and the broader environment in which they live" (WHO, 2012). Interest is growing among the researchers worldwide in authenticating the contribution of social factors on the aetiology and fruition of mental disorders.

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There are several risk factors identified for mental health problems by many countries cross-sectional nationally representative surveys. Some of the most repeatedly cited risk factors for mental health problems are female gender (Mundt et al., 2014; Chou and Cheung, 2013; Zhang et al., 2014), lower socio-economic status (Meyer et al., 2014), lower income (Gruebner et al., 2012), negative life events (Kelly et al., 2011), lack of social or emotional support (Kelly et al., 2011; Caron et al., 2007), living alone (Mundt et al., 2014), not being married (Chou and Cheung, 2013; Zhang et al., 2014), higher age (Zhang et al., 2014; Beutel et al., 2004), household food insufficiency (German et al., 2011; Siefert et al., 2007), less favourable housing condition (Siefert et al., 2007; Tong et al., 2011), lower education (van der Waerden., 2014), unemployment (van der Waerden, 2014), lower overall health status (Zhang et al., 2014), functional impairment (St John et al., 2006), rural residency (Wang et al., 2013), poor quality of life (Zhang et al., 2014), perceived stress (van der Waerden., 2014), and loneliness (Wang et al., 2013; Tong et al., 2011). Several studies revealed that mental health is affected by the places in which people live (Gale et al., 2011).

At the same time, many studies show contradictory findings which demonstrate that low income, place of residence and educational level are not associated with poor mental health (Mundt et al., 2014). Numerous studies reveal that there is a weak relationship between socio-economic inequality and subjective health (Sulander et al., 2012;). Many others have found that the relationship between education and quality of life is weaker for mental health rather than physical health (Konig et al., 2010; Pavlovic et al., 2010). World Health Organization (2018) has found that there is a strong association between poor psychological health and rapid social change, gender discrimination, social exclusion, stressful work conditions, risks of violence and unhealthy lifestyle. The present research aims to quantify the extent of inequalities in the context of mental disorders among the older population in India, China, Ghana, Russia and South Africa. Though, studies show the prevalence of mental disorders among these countries, little is known about the relative contributions of explanatory factors. among the elderly.

II. Data and methods

Global Agi g and Adult Health (SAGE), WAVE-1 (2007-10) has been used as a data source. It has used two target populations: a large sample aged 50 years and older which is the focus of the study, and a smaller sample aged 18–49 years. SAGE is a longitudinal, survey which was initiated by the WHO. All five countries implemented a multistage cluster sampling design resulting in nationally representative cohorts. Country-wise sample size is: India (6492), China (12792), Ghana (4272), Russia (3788) and South Africa (3788).

To make a mental health index, eight symptoms of mental health have been used in this study. These are (i) participation in the community, (ii) dealing with conflicts and tensions with others, (iii) making a new friendship, (iv) dealing with strangers, (v) falling asleep, (vi) not feeling rested, (vii) feeling depressed and (viii) anxiety. In the questionnaire, five response categories were asked as "None," "Mild," "Moderate," "Severe," and "Extreme".

Explanatory Variables: Age groups (50-59, 60-69, 70-79, 80 years and above), sex (male and female), place of residence (rural, urban), educational level (no formal education, less than primary, primary school completed, secondary education completed, high school completed, college and above education), and employment (public sector, private sector, self-employed and informal employment).

Principal component analysis (PCA) is used to make mental health index. Wagstaff decomposition analysis has been used to quantify the relative inequalities. PCA is used to produce the factor score for continuous variable for each household. For calculation of CI, wealth index has been divided into five equal quintiles and for decomposition analysis the continuous wealth index variable has been used.

The decomposition analysis presents the contribution to the inequality in mental disorders among selected countries as explained by predictor variables, namely, place of residence, sex, age, education and employment. The marginal effect takes either a negative or positive value. Positive marginal effect indicates that the explanatory variable has a positive association with the mental disorder outcomes and has a higher likelihood of mental problems and vice versa. The value of the absolute contribution indicates the extent of inequality contributed by the explanatory variables.

Decomposition of concentration index (CI)

Decomposition of CI has been computed in two stages. First, CI measures the degree of income-related inequality in a health variable. It is computed as twice the covariance of the health variable and a population ranked by economic status, divided by the variable mean according to Equation 1. The value of CI measures the severity of socio-economic inequality. The larger the value of CI, the higher the disparity.

$$C = \frac{2}{\mu} cov(y_i, R_i) \dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where C values CI, y_i is outcome variable index, R is the fractional rank of individual i in the distribution of socio-economic position, μ is the mean of the outcome variable of the sample and cov denotes the covariance.

Second, the CI of mental disorders measures the degree of inequality which can be decomposed into the contribution of various determinants. Decomposition of CI demonstrates that the health CI can be decomposed into the contribution of each factor to income-related health inequality in which each contribution is the product of the sensitivity of heath concerning that factor and the degree of income-related inequality in that factor. Based on the linear regression relationship between the outcome variable y_i, the intercept α, the relative contribution of x_{ki} and the residual error ε_i in the equation 2,

$$y_i = \alpha + \sum \beta_k x_{ki} + \varepsilon_i \dots\dots\dots\dots\dots\dots (2)$$

Where ε_i is an error term, given the relationship between y_i and x_{ki} in the equation 2, the CI for y (C) can be rewritten as in equation 3:

$$C = \sum(\frac{\beta_k \bar{x}_k}{\mu}) C_k + \frac{GC_\varepsilon}{\mu} / \mu \dots\dots\dots\dots\dots\dots (3)$$

where μ is the mean of y_i ,$\bar{x}_k$ is the mean of x_k, β_k is the coefficient from a linear regression of outcome variables, C_k is the CI for x_k (defined analogously to C and GC_ε is the generalized CI for the error term (ε_i).

Equation (3) shows that C is made up of two components: 'deterministic' or 'explained' variable, equivalent to a weighted addition of CIs of the regressors, where the weights are simply the elasticities. The second is a residual or 'unexplained' component which reflects the inequality in health that cannot be explained by systematic variation in the x_k across socio-economic groups (Wagstaff et al., 2003; Hosseinpoor et al., 2006; O'Donnell et al., 2008).

III. Results

Figure 1 shows the percentage of prevalence of mental disorder symptoms among the elderly. Around half (48%) of India's elderly participated in the community, followed by Ghana (42%), whereas in China only one in ten elderly participated in the community which is the least among all the compared countries in this study. Only 12 per cent of China's elderly dealt with tension, followed by South Africa (33%) whereas more than half (51%) of India's elderly dealt with tension, followed

by Ghana and Russia (35% for both). The highest percentages of making friends and dealing with strangers are found among India's elderly which constitute 44 per cent and 53 per cent respectively, whereas lowest percentage found among China's elderly which account for only 10 per cent and 24 per cent respectively. In the case of falling asleep and feeling tired, the highest percentages are found among Russian elderly which constitute 72 per cent and 76 per cent respectively, whereas the lowest percentages are found among China's elderly which account for 39 per cent and 37 per cent. The highest percentages of feeling depressed and anxiety are found among India's elderly constituting 57 per cent and 64 per cent respectively, whereas the lowest percentages are found among China's elderly which account for only 19 per cent each. The main trend of the figure was the lowest percentage found in China in all the mental disorder symptoms among the elderly, whereas the highest percentage was found in India (except feeling depressed and anxiety).

Figure1: Prevalence of mental disorder symptoms among elderly, 2007-10

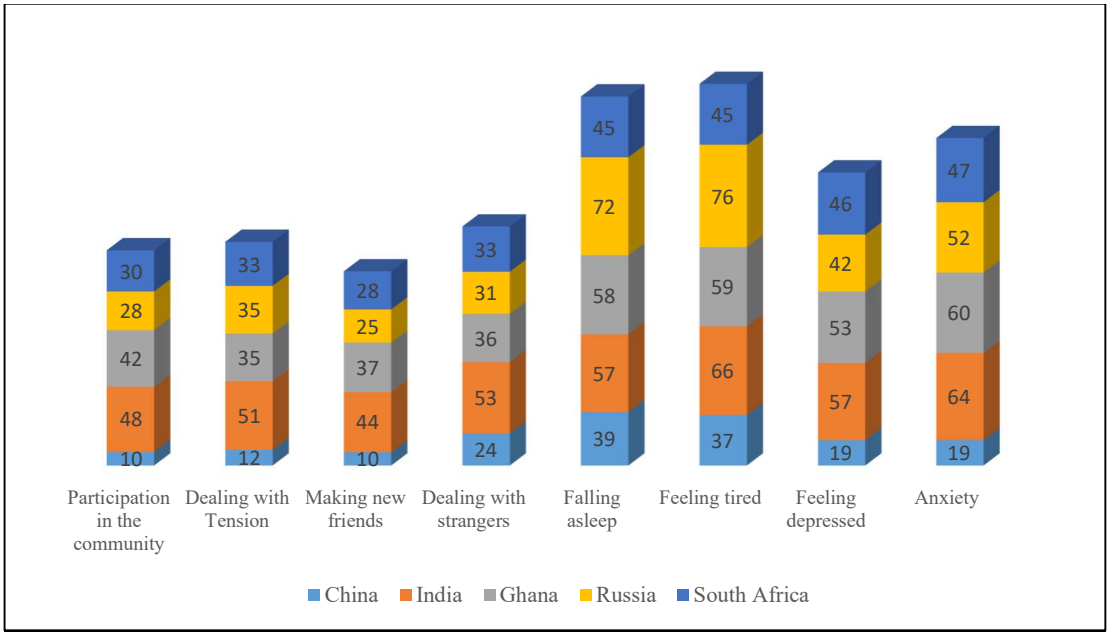
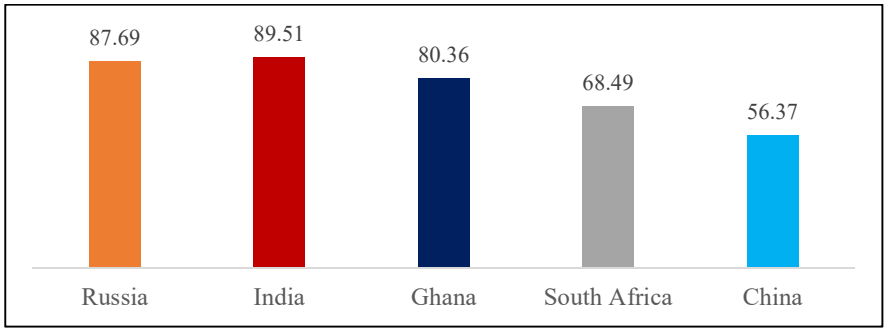


Figure 2 shows that more than about 90 per cent elderly in India suffer from a mental disorder, followed by Russia (88%), Ghana (80%) and South Africa (68%). China's elderly suffers less from mental disorders (56%).

Figure2: Percentage distribution of mental disorders among elderly, 2007-10



In Figure 3 the concentration curve shows the pro-poor inequality. It portrays that inequality for mental disorders was low among South African and Russian elderly and they were less suffering from mental disorder as compared with India, Ghana and China.

Figure 3: CI curve for mental disorders among elderly, 2007-10

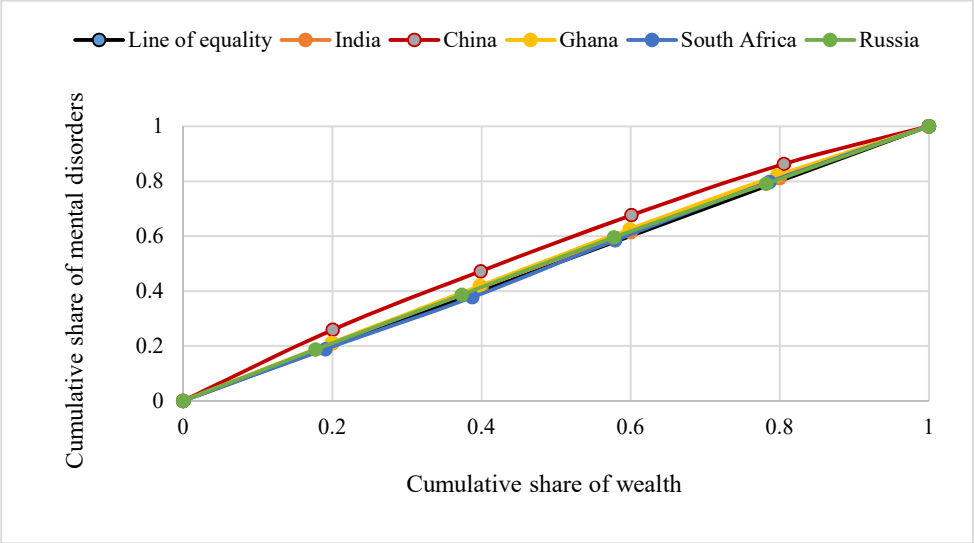


Table1: Prevalence of mental health disorders by socio-economic and demographic characteristics among elderly, 2007-10

Background variables	China	India	Ghana	Russia	South Africa
Place of residence					
Urban	54.1	87.5	76.4	87.4	69.1
Rural	58.6	90.2	83.1	88.7	67.2
Age (years)					
50-59	49.2	86.4	71.4	81.7	65.7
60-69	57.8	91	81.8	88.9	68.1
70-79	64.7	93	88.7	92.2	73.4
80 and above	73.5	95.4	92.4	95.6	75.7
Sex					
Male	51.1	86.1	76.4	81.1	65.4
Female	61.3	93	84.9	91.3	70.8
Educational status					
No formal education	68.3	94.2	85.9	97.4	72.3
Less than primary	59.7	90.5	78.2	96.1	70.7
Primary school completed	57	87	77.6	94.5	68.2
Secondary school completed	49.6	83.9	76.8	91.2	67.3
High school completed	45.4	79.4	70.3	86.1	60.2
College and above	41.2	74.8	64.2	84.1	57.1
Employment					
Public sector	51.9	77.8	73.3	88.4	62.1
Private sector	46.3	81.2	69.8	81.6	66.3
Self-employed	60.1	88.1	82.2	85.2	66.9
Informal employment	60.1	94.2	73.4	85.7	70.7

Table 1 illustrates the percentage of prevalence of mental health disorders by socio-economic and demographic characteristics among the elderly. In the light of place of residence, the prevalence of mental health disorders was more in rural areas in China, India, Ghana and Russia (58.6%, 90.2%, 83.1% and 88.7 respectively), whereas it was more in urban areas in South Africa. The highest prevalence of mental health disorders was found at the age of 80 years and more in China (73.5%), India (95.4%),, Ghana (92.4%), Russia (95.6%) and South Africa (75.7). In all the countries, the prevalence of mental health disorders gradually increased with increasing age. It was found more among females, about 93 per cent in India, followed by Russia (91.3%), Ghana (84.9%), South Africa

(70.8%) and China (61.3%). The highest prevalence of mental health disorders was found among those elderly who had no formal education (97.4% in Russia, 94.2% in India, 85.9% in Ghana, 72.3% in South Africa and 68.3% in China). Its prevalence decreased with increasing educational qualifications in all countries. In India, South Africa and China, the prevalence of mental health disorders was highest among those elderly who were employed in the informal sector, i.e., 94.2 per cent in India, 70.7% in South Africa and 60.1% in China. It was the highest among those elderly who were employed in the public sector in Russia (88.4%), whereas in Ghana it was highest among those who were self-employed (82.2%).

Table 2 shows the value of the CI among elderly, and a negative sign indicates that there is pro-poor inequality. CI estimates show considerable economic inequalities in mental disorder in India (CI=-0.022), China (CI=-0.117), Ghana (CI=-0.037), South Africa (CI=0.004) and Russia (CI=-0.011). Results of CI estimates portray that poor people suffer from the severity of mental disorders.

Table 2: CI for mental disorders among elderly, 2007-10

Country	CI	Std. Error	P-Value	Number (N)
Russia	-0.011	0.004	0.002	3788
India	-0.022	0.002	0.000	6492
Ghana	-0.037	0.004	0.000	4272
South Africa	0.004	0.006	0.570	3788
China	-0.117	0.004	0.000	12798

Table 3 presents the estimates of marginal effect and decomposition analysis of inequality in mental health disorders in China, India, Ghana, Russia and South Africa. In India people aged between 70 and 79 years (16%), males (7.1%) and informally employed (21%) contributed more positively to mental disorders, while education (specially college and higher education (24%) negatively contributed to mental disorder. The decomposition analysis for China and Ghana also follows the similar pattern of inequality contribution by the predictors. However, in the case of China and Ghana, place of residence, sex, self-employment and age become more prominent variables influencing mental health of the elderly. Further, in Russia urban (26%), males (31%), age between 70 and 79 years, and high schooling (20%) contributed most toward mental health problems. Besides, employment has a negligible contribution in mental disorders. In South Africa, informal employment (8.3%), males (13.40%), age between 80 and above (14%) and secondary education contributed more towards mental disorders.

IV. Discussion and conclusion

This paper explains the socio-economic inequalities for mental disorders among elderly people in China, India, Ghana, Russia and South Africa. Further, it finds the contribution of socio-demographic factors to mental disorders among the elderly. Ithas included five low-middle income countries with a large ageing population and sees the individual contribution of each background characteristics in the total inequality responsible for mental disorders.

The findings show that a large proportion of the elderly suffered from mental disorders. Results portray that the Indian elderly suffered more from mental disorders followed by Ghana, Russia, South Africa and China. Most of the elderly suffered from tiredness, anxiety, depression and sleeping problems. More than half the elderly from India, Russia and Ghana reported that they have anxiety, depression, sleeping problem and feeling tiredness. About three-fourths of the Russian elderly suffered from sleeping problems and tiredness. However, China's elderly had very low prevalence of mental disorders symptoms as compared with other selected countries.

Table 3: Estimates of marginal effect and decomposition analysis of inequality in the mental health disorders India, China, Ghana, Russia, and South Africa (2007-10)

Explanatory variables	Marginal effect	CI	Absolute contribution to CI	Percentage contribution to CI
India				
Urban	-0.029	-0.028	0.001	4.22
Male	-0.019	-0.044	0.002	7.17
Age in years (60-69)	0.008	-0.004	0.000	0.00
Age in years (70-79)	0.076***	0.078	0.004	16.03
Age in years (80 and above)	0.063*	0.041	0.001	2.11
Less than primary education	-0.052	-0.022	0.001	2.11
Primary school completed	-0.073**	-0.050	0.002	8.86
Secondary school completed	-0.064*	-0.048	0.001	5.06
High school completed	-0.094**	-0.057	0.002	8.02
College and above	-0.153***	-0.184	0.006	23.63
Private sector	-0.031	-0.033	0.000	1.27
Self-employed	-0.003	-0.025	0.000	0.84
Informal employment	0.050	0.080	0.005	20.68
Explained CI			0.024	100
Total CI			-0.022	
Unexplained CI			-0.046	
China				
Urban	0.036	-0.024	-0.002	-3.45
Male	-0.085***	-0.045	0.008	17.46
Age in years (60-69)	0.058***	0.002	0.000	0.22
Age in years (70-79)	0.114***	0.084	0.007	15.09
Age in years (80 and above)	0.171***	0.187	0.006	13.36
Less than primary education	-0.009	0.035	0.000	-0.43
Primary school completed	-0.054*	-0.029	0.001	2.80
Secondary school completed	-0.044	-0.020	0.001	1.51
High school completed	-0.121***	-0.126	0.008	17.24
College and above	-0.182***	-0.193	0.007	14.01
Private sector	-0.075**	-0.123	0.004	8.19
Self-employed	0.069**	0.047	0.006	13.58
Informal employment	0.027	0.062	0.000	0.43
Explained CI			0.046	100
Total CI			-0.117	
Unexplained CI			0.163	
Ghana				
Urban	-0.055***	-0.038	0.003	8.29
Male	-0.069***	-0.093	0.013	31.71
Age in years (60-69)	0.096***	-0.009	-0.001	-2.20
Age in years (70-79)	0.150***	0.065	0.009	21.46
Age in years (80 and above)	0.172***	0.067	0.004	10.73
Less than primary education	-0.018	-0.084	0.001	1.71
Primary school completed	-0.007	-0.033	0.000	0.24
Secondary school completed	0.041	-0.030	0.000	-0.49
High school completed	-0.075**	-0.119	0.006	15.37
College and above	-0.145**	-0.170	0.004	8.78
Private sector	-0.015	-0.023	0.000	0.24
Self-employed	0.001	0.011	0.000	0.00
Informal employment	-0.093*	-0.064	0.002	4.15
Explained CI			0.041	100
Total CI			-0.037	
Unexplained CI			0.041	

Continued…….

Table 3: Estimates of marginal effect and decomposition analysis of inequality in the mental health disorders in India, China, Ghana, Russia and South Africa, 2007-10…. *Continued.*

Explanatory variables	Marginal effect	CI	Absolute contribution to CI	Percentage contribution to CI
Russia				
Urban	-0.075*	-0.031	0.007	26.42
Male	-0.084**	-0.053	0.008	30.89
Age in years (60-69)	0.081*	0.012	0.001	4.47
Age in years (70-79)	0.111**	0.086	0.008	32.93
Age in years (80 and above)	0.046	-0.073	-0.001	-4.07
Less than primary education	-0.067	0.234	-0.001	-2.03
Primary school completed	-0.059	-0.051	0.001	2.44
Secondary school completed	-0.042	0.048	-0.001	-5.69
High school completed	-0.097**	-0.023	0.005	19.51
College and above	-0.078*	0.022	-0.002	-6.10
Private sector	0.012	0.002	0.000	0.00
Self-employed	-0.010	0.085	0.000	0.00
Informal employment	-0.083	-0.078	0.000	1.22
Explained CI			0.025	100
Total CI			-0.011	
Unexplained CI			0.035	
South Africa				
Urban	0.056*	0.007	0.001	5.15
Male	-0.064*	-0.023	0.003	13.40
Age in years (60-69)	0.015*	-0.007	0.000	-0.52
Age in years (70-79)	0.011	0.025	0.000	1.03
Age in years (80 and above)	0.097*	0.129	0.003	14.43
Less than primary education	0.041	0.087	0.003	16.49
Primary school completed	0.041	0.008	0.000	-1.03
Secondary school completed	-0.090	-0.100	0.006	30.93
High school completed	-0.056**	-0.087	0.002	8.76
College and above	-0.046*	-0.037	0.000	2.06
Private sector	0.005	-0.011	0.000	-0.52
Self-employed	-0.024	-0.078	0.000	1.55
Informal employment	0.031	0.058	0.002	8.25
Explained CI			0.019	100
Total CI			0.004	
Unexplained CI			0.016	

Interestingly enough, this study shows high prevalence of mental disorders in which most of the elderly suffered from any one of the symptoms which has been included to construct mental health index. It shows that more than three-fourths of the elderly suffered from a mental disorder symptom in India, Ghana, and Russia, whereas about half of the elderly from China and South Africa had a a mental disorder.

The study finds that the elderly who lived in rural setting suffered more from mental disorders than rural dwellers which is corroborated by a study (Usha & Lalitha, 2016). The reason behind it might be less accessibility of health facility in rural areas (Dey et al., 2012). This study shows that ageing is an important factor for mental disorders in all countries. Previous studies have also confirmed a similar relationship between mental disorder and age among the elderly (Abdul Manaf et al., 2016; Zhang et al., 2014).

Further, this study finds that the female elderly had more mental health problems as compared with male elderly, especially in India, Russia and Ghana. But Women and Mental Health Foundation (*undated*) found that men and women equally suffer from mental ill-health. Besides, some mental disorders are common among them and abuse is often a factor behind it. Education is also a

significant predictor and this study also reveals its strong and inverse relationship with mental disorders. As education increases, the prevalence of mental disorders has declined in each country. Findings of a study by Belo et al. (2020) runs against that of the present study. Further, this study shows that the elderly who worked as informal employees suffered more from mental disorders. Interestingly enough, the elderly who worked in the private sector in China, Ghana and Russia had less mental disorders as compared with those in the public sectors. The study also finds that the elderly from India and South Africa who worked in the public sector had less mental disorders as compared with others.

This study calculated the CI and drew the concentration curve. The results of the CI and Ci curve shows that there was pro-poor inequality for mental disorders among the elderly and the Chinese poor were more affected from mental disorders. The findings show that there was large inequality existing in China, followed by Ghana, India and Russia. Moreover, education and age had a strong relationship with mental disorders and the CI indicates that the poor suffered more from mental disorders. Thus, this study has also tried to explain the contribution of individual factors in the inequality of mental disorders for each selected country.

Further, decomposition analysis reveals that the place of residence, age, sex, education and employment are key contributors to the inequality for mental disorders among the selected nations. Results show that education contributed negatively to the inequality for mental disorders among the elderly. In Russia and Ghana, employment also contributed negatively while the place of residence contributed negatively to inequality in China and South Africa. Ageing became a major determinant for mental disorders and it contributed to more inequality for mental disorders in China and Ghana. Gender discrimination also contributed to inequality in each country and females suffered more from mental disorders.

This study finds that the elderly suffered from any of the following mental disorders: participation in the community, dealing with conflicts and tensions with others, making a new friendship, dealing with strangers, falling asleep, not feeling rested, feeling depressed, and anxiety in these countries.

Life expectancy has been increasing due to improvement in the access to health facilities and standard of living. As a consequence of this, morbidity has also increased and the elderly live with health-related problems. Symptoms of mental disorders are common among the elderly and they often feel loneliness, anxiety of problems, not interested to participate in the community, sleeping disorders, tiredness and depression. In essence, results indicate that inequalities are artefacts of existing inequalities through place of residence, gender, education and economic factors, which need instant attention of policy-makers to promote mental well-being through active and healthy ageing in these countries.

References

Abdul Manaf, M. R., Mustafa, M., Abdul Rahman, M. R., Yusof, K. H., & Abd Aziz, N. A. (2016). Factors influencing the prevalence of mental health problems among Malay elderly residing in a rural community: A cross-sectional study. *PloS one*, *11*(6), e0156937.

Belo, P., Navarro-Pardo, E., Pocinho, R., Carrana, P., & Margarido, C. (2020). Relationship between mental health and the education level in elderly people: Mediation of leisure attitude. *Frontiers in Psychology*, *11*, 573.???

Beutel, M. E., Weidner, K., Schwarz, R., &Brähler, E. (2004). Age-related complaints in women and their determinants based on a representative community study. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, *117*(2), 204-212.

Caron, J., Latimer, É., & Tousignant, M. (2007). Predictors of psychological distress in low-income populations of Montreal. *Canadian Journal of Public Health/Revue* Canadienne de Sante'e Publique, S35-S44.???

Charlson, F. J., Baxter, A. J., Cheng, H. G., Shidhaye, R., & Whiteford, H. A. (2016). The burden of mental, neurological, and substance use disorders in China and India: A systematic analysis of community representative epidemiological studies. *The Lancet, 388*(10042), 376-389.

Chou, K. L., & Cheung, K. C. K. (2013). Major depressive disorder in vulnerable groups of older adults, their course and treatment, and psychiatric comorbidity. *Depression and Anxiety, 30*(6), 528-537.

Dey, S., Nambiar, D., Lakshmi, J. K., Sheikh, K., & Reddy, K. S. (2012). Health of the elderly in India: Challenges of access and affordability. In *Aging in Asia: Findings from new and emerging data initiatives*. National Academies Press (US).

Gale, C. R., Dennison, E. M., Cooper, C., & Sayer, A. A. (2011). Neighbourhood environment and positive mental health in older people: The Hertfordshire Cohort Study. *Health & Place, 17*(4), 867-874.

German, L., Kahana, C., Rosenfeld, V., Zabrowsky, I., Wiezer, Z., Fraser, D., & Shahar, D. R. (2011). Depressive symptoms are associated with food insufficiency and nutritional deficiencies in poor community-dwelling elderly people. *The Journal of Nutrition, Health & Aging*, *15*(1), 3-8.

Gruebner, O., Khan, M. M. H., Lautenbach, S., Müller, D., Krämer, A., Lakes, T., & Hostert, P. (2012). Mental health in the slums of Dhaka: A geoepidemiological study. *BMC Public Health, 12*(1), 177.

Gururaj, G., Varghese, M., Benegal, V., Rao, G. N., Pathak, K., Singh, L. K., ... & Lenin Singh, R. K. (2015). for the NMHS Collaborators Group. *National mental health survey of India*, *2015-16: Prevalence, Pattern and Outcomes*. Bengaluru: National Institute of Mental Health and Neuro Sciences.

Hosseinpoor, A. R., Doorslaer, E. V., Speybroeck. N., Naghavi. M., Mohammad, K., Majdzadeh, R. et al. (2006). Decomposing socioeconomic inequality in infant mortality in Iran. *International Journal of Epidemiology 35*(5), 1211–1219.

Kelly, B. J., Lewin, T. J., Stain, H. J., Coleman, C., Fitzgerald, M., Perkins, D., ... & Beard, J. R. (2011). Determinants of mental health and well-being within rural and remote communities. *Social Psychiatry and Psychiatric Epidemiology, 46*(12), 1331-1342.

König, H. H., Heider, D., Lehnert, T., Riedel-Heller, S. G., Angermeyer, M. C., Matschinger, H., .. & de Graaf, R. (2010). Health status of the advanced elderly in six European countries: Results from a representative survey using EQ-5D and SF-12. *Health and Quality of Life Outcomes, 8*(1), 143.

Meyer, O. L., Castro-Schilo, L., & Aguilar-Gaxiola, S. (2014). Determinants of mental health and self-rated health: a model of socioeconomic status, neighborhood safety, and physical activity. *American Journal of Public Health, 104*(9), 1734-1741.

Mundt, A., Kliewe, T., Yayla, S., Ignatyev, Y., Busch, M. A., Heimann, H., ...? & Aichberger, M. C. (2014). Social characteristics of psychological distress in disadvantaged areas of Berlin. *International Journal of Social Psychiatry, 60*(1), 75-82.

O'Donnell, O., Doorslaer,, E. V., Wagstaff, A., & Lindelow, M. (2007). *Analyzing health equity using household survey data: A guide to techniques and their implementation.* World Bank, Washington, DC.

Pavlović, M., Korajlija, A. L., Šimić, D., Bobić, J., & Čorović, N. (2010). Perception of health among the mobile aged population (Part of the study on chronic disease in Croatia). *Društvenaistraživanja, 19*(6), 1079-1092.

Sayers, J. (2001). The world health report 2001-Mental health: new understanding, new hope. *Bulletin of the World Health Organization, 79,* 1085-1085.

Siefert, K., Williams, D. R., Finlayson, T. L., Delva, J., & Ismail, A. I. (2007). Modifiable risk and protective factors for depressive symptoms in low-income African American mothers. *American Journal of Orthopsychiatry*, *77*(1), 113-123.

Sulander, T., Pohjolainen, P., & Karvinen, E. (2012). Self-rated health (SRH) and socio-economic position (SEP) among urban home-dwelling older adults. *Archives of Gerontology and Geriatrics, 54*(1), 117-120.

Tong, H. M., Lai, D. W., Zeng, Q., & Xu, W. Y. (2011). Effects of social exclusion on depressive symptoms: Elderly Chinese living alone in Shanghai, China. *Journal of Cross-cultural Gerontology*, *26*(4), 349-364.

Usha, V. K., & Lalitha, K. (2016). Quality of life of senior citizens: A rural-urban comparison. *Indian Journal of Social Psychiatry*, *32*(2), 158.

Wagstaff, A., Doorslaer, E. V., & Watanabe, N. (2003) On decomposing the causes of health sector inequalities with an application to malnutrition inequalities in Vietnam. *Journal of Econometrics 112*(1), 207–223.

Wang, Z., Shu, D., Dong, B., Luo, L., & Hao, Q. (2013). Anxiety disorders and its risk factors among the Sichuan empty-nest older adults: A cross-sectional study. *Archives of Gerontology and Geriatrics, 56*(2), 298-302.

Whiteford, H. A., Degenhardt, L., Rehm, J., Baxter, A. J., Ferrari, A. J., Erskine, H. E., ... & Burstein, R. (2013). Global burden of disease attributable to mental and substance use disorders: Findings from the global burden of disease study 2010. *The Lancet, 382*(9904), 1575-1586.

Women and Mental Health Foundation. *Women and mental health*. Accessed from https://www.mentalhealth.org.uk/a-to-z/w/women-and-mental-health

World Health Organization. (2012). *Risks to mental health: an overview of vulnerabilities and risk factors.* Background paper by WHO Secretariat for the development of a comprehensive mental health action plan. Geneva: World Health Organization.

World Health Organization. (2017). Mental health of older adults. Factsheet. Geneva: World Health Organization. Accessed from http://www.who.int/mediacentre/factsheets/fs381/en/.

Zhang, M., Simon, M. A., & Dong, X. (2014). The prevalence of perceived stress among US Chinese older adults. AIMS Medical Science, *1*(1), 40-56.