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Explaining the social gradient in health: inequality in health outcomes in selected states of India, 2015-2016

Madhumita Bango

School of Health Systems Studies, Tata Institute of Social Sciences, Mumbai, India

ABSTRACT

Introduction: This study tries to investigate the relative strengths of social and economic status in determining the health status or outcomes in terms of life expectancy of persons in selected states of India. Material and methods: We analysed cross-sectional household-level survey data from the fourth round of the National Family Health Survey which was conducted between 2015 and 2016. The age at death was calculated for state comparison, while multiple logistic regression was carried out to understand the effect of conditioning variables (social, economic, and demographic) on age at death. Results: Amongst the selected states, Bihar has the lowest life expectancy of people in each social category along with the Muslim households. Females had a marginally higher life expectancy than males. Persons in urban locations had a 4 percentage points higher life expectancy than persons in rural locations. The coefficients suggest a positive association between economic status and age at death. Those from the poorest quantile had a considerably higher likelihood of age at death. Socio-economic status, sex, place of residence, and housing environment were found to be the major predictors for age at death. Conclusions: The study has shown that if a person stands at the bottom of the social ladder in India, the risk of suffering premature death, poor health, and lack of access to treatment and care is substantially higher. This phenomenon has serious social and economic implications for the country and warrants immediate policy interventions where people matter and social justice is supreme.

KEY WORDS: inequality, health outcome, life expectancy, social gradient.

ADDRESS FOR CORRESPONDENCE: Madhumita Bango, Research Scholar, School of Health Systems Studies, Tata Institute of Social Sciences, V.N. Purav Marg, Deonar, Mumbai, Maharashtra-400088, India, e-mail: himadhu911@gmail.com

INTRODUCTION

Inequalities in health within and between countries is a challenge to the world. That there should be a spread of life expectancy of 48 years among countries and 20 years or more within countries is not inevitable. An increasing number of studies identify social factors at the root of much of these inequalities in health [1]. Socioeconomic inequality in health is everywhere evident in India, with the poor living shorter and sicker lives than their wealthier compatriots. This pervasive mortality pattern is associated with lower income, education, occupational status, or poor living conditions [2-7].

In India, caste is a marker for socio-economic status. The official classification defines four categories of caste: Scheduled Castes (SCs), Scheduled Tribes (STs), Other Backward Classes (OBCs), and others. The SCs, the lowest level in the ladder, constitute around 20% of the Indian population, a large percentage of those who live in rural areas and are mainly landless agricultural labourers. The STs, or Adivasis, often like SCs, suffer economic and social scarcity. They comprise around 9% of India's population. OBCs and general castes together encompass 71% of India's total population [8].

According to the social gradient, "which 'runs right across society' health status is influenced by an individual's position in the social hierarchy, which itself is influenced by social, political, and economic circumstances" [9]. The Black report [10] described several studies that



FIGURE 1. A framework for social determinants of health which includes health behaviours and biomedical factors that are part of a person's individual lifestyle and genetic make-up (adapted from [11])

examined the underlying social factors related to health outcomes in industrialized countries. The primary finding from these studies, particularly concerning mortality and life expectancy, was the existence of "a social gradient" in mortality: "wherever you stand on the social ladder, your chances of an earlier death are higher than it is for your betters" [12]. However, the most critical implication of a social gradient to health outcomes is that people's vulnerability to disease not only depends on their individual behaviour but also, crucially, on the social environment within which they spend their life [13].

According to the World Health Organization (WHO), "the social conditions in which people are born, live and work is the single most important determinant of good health or ill health. As factors that affect health, social determinants can be seen as 'causes of the causes' – that is, as the foundational determinants which influence other health determinants". In keeping with this model, Figure 1 illustrates how the social determinants have an extended effect on people's health,

The framework identifies the significance of social determinants of health. The framework includes socioeconomic and community factors related to income, health literacy, social status, and educational attainment. Their broader social and economic conditions shape the health advantages and disadvantages experienced by the people. Sometimes, inequalities in health emerge in the form of a 'social gradient of health' – the higher a person's socioeconomic position, the healthier they are. Moreover, some health inequalities are attributable to external factors and conditions outside the control of the individuals concerned. Inequalities that are avoidable and unjust, health inequities are often linked to forms of disadvantage such as poverty, discrimination, and access to goods and services [14].

The "social gradient to health" is fundamentally a Western concept [15]. The social gradient in health is a term used to describe the phenomenon whereby people who are less advantaged in terms of socioeconomic position have worse health (and shorter lives) than those who are more advantaged. There has been a minimal investigation into whether, in developing countries, people's state of health depends on their social status. For example, in India, we know from studies of specific geographical areas that health outcomes differ systematically according to gender, economic class, caste, and religion [16]. Also, local government spending on public goods, including health-related goods, after controlling for various factors, is lower in areas with more significant caste fragmentation than ethnically more homogeneous areas [17]. Considering India in its entirety, two of its most socially depressed groups, the Scheduled Tribes, and the Dalits, have some of the worst health outcomes. As Guha [18] observes, 29% of STs and 16% of SCs have no access to doctors or clinics, and only 42% of ST children and 58% of SC children have been immunized. Hence, it is possible that the relatively poor health outcomes of India's socially deprived groups have not much to do with their low social status but much more to do with their poor living conditions and their weak economic position.

The latest round of National Family Health Survey (NFHS) data has been used for this study, which is based on a sample of households that is representative at the national, state, and district levels, thereby permitting us to provide estimates of the age at death, which was used as a proxy of life expectancy. This paper aims to evaluate the relative strengths of economic and social status in determining the health status of persons in India and across the selected states.

MATERIAL AND METHODS

DATA

This study is based on the publicly available data from the fourth round of the NFHS conducted during 2015-2016. NFHS 4 was conducted under the governance of the Ministry of Health and Family Welfare (MOH&FW) and carried out by the International Institute for Population Sciences. This survey is an Indian version of the Demographic Health Survey (DHS). The survey was conducted across all over the 29 states and 7 union territories (UTs). From the fourth wave, the survey was representative not only of the states but also of the districts of India. The NFHS survey adopted a 2-stage stratified random sampling approach by selecting primary sampling units (PSUs) by covering all 640 census enumeration blocks (CEBs) for urban areas and villages for rural areas with a PPS (probability proportional to population size) strategy. In the next stage, a systematic random sample selection of 22 HHs (households) was made for each PSU and CEB, respectively.

The analysis is restricted to three states, named Bihar, West Bengal, and Tamil Nadu. Between these three states extreme health outcome variations with different socio-economic development of health systems have been identified. Bihar is the third most populous state in India, where around 40% of its population is below the poverty line. The mortality rates are much higher than the national level and reflect a poor health status in the state. Amongst the major states, the Human Development Index in Bihar has been the lowest for the last three decades. On the other hand, Tamil Nadu is often ranked the best among the high-performing states in India, next only to Kerala in terms of health outcomes. The state is renowned for its low mortality rates. Tamil Nadu has led the way in various new approaches to enhance the access to good-quality health services at an affordable cost. Not only in the health sector but also the socio-economic status in terms of education, employment, purchasing power of the people has also been an example to others. By contrast, in West Bengal, a mixed kind of socioeconomic development has been found. To show the interstate differences, these states were compared.

DESCRIPTION OF THE VARIABLES

In NFHS 4, for the first time each household was asked if there had been a death or deaths in the household in the last one year, and if yes, then the particulars of these deaths. For this study, age at death has been used as a proxy of life expectancy of persons. Age at death of a person was considered as the outcome variable of this study. For the predictors, the author classified those into two categories, demographic and socioeconomic. These

variables were found to be important determinants of age at death in the previous literature. Under demographic variables, the following variables have been considered: gender (male and female); socio-economic variables are place of residence (urban and rural), caste (Scheduled Caste, Scheduled Tribe, and non-SC/STs comprises OBCs and the general population), religion (Hindu, Muslim, Christian, and others), wealth quantile (poor, middle, and rich), health insurance (yes and no), frequency of household members smoking inside the house (never, daily, weekly, and monthly), and under the household's living conditions author has taken cooking fuel (clean and other fuel), toilet (flush toilet, pit latrine, no facility/open defecation), floor (natural, rudimentary, and furnished floor), wall (natural, rudimentary, and furnished wall), and roof (natural, rudimentary, and furnished roof).

STATISTICAL ANALYSIS

The household-level data on age at death were utilized to carry out the study. In the analysis, author considered those deaths which took place in the last year of the survey. Author used simple bivariate techniques to examine the differences in outcome of the selected predictors between the SC, ST, and non-SC/ST caste categories. A logit regression model was used to understand the effect of explanatory variables on age at death.



FIGURE 2. Mean age at death (years) in India (A), Bihar (B), West Bengal (C), and Tamil Nadu (D) by social group, 2015-2016

RESULTS

Figure 2 depicts the mean age at death in India and the selected states by the social groups. Amongst the selected states, Bihar has the lowest life expectancy of people, which is 54 years, even lower than the national level (57 years). On the other hand, West Bengal shows the highest life expectancy (64 years) along with Tamil Nadu, 60 years. Regarding social groups, a different picture can be seen. The age at death was highest for persons from the Scheduled Caste and Scheduled Tribe households and lowest for persons from Forward caste non-Muslim households amongst all the selected states. However, in Bihar, the differences in age at death between the well-off (58 years) and disadvantaged group (48 years) was highest, around 10 years; in contrast, for West Bengal, the difference was around 6 years. Moreover, the OBC non-Muslim caste category also has a better life expectancy in all the selected states.

Table 1 shows the results for age at death of persons from households in which death (or deaths) occurred as recorded in the NFHS 4. Expectedly, age at death was lower among males than females due to some biological reasons in India and the selected states. Nevertheless, surprisingly, Bihar presents an opposite picture of higher life expectancy among males (55 years) than females (54 years), though the difference was quite negligible. In India, caste and religion have a significant influence on a person's life expectancy. Regarding the caste category, Scheduled Caste and Scheduled Tribe households bear a higher burden of early deaths than the forward caste households, with Bihar showing the worst scenario of early deaths among the social caste categories. Again, among the religious categories, Muslim households were more vulnerable, with the lowest life expectancy in all the selected states (49 years, 60 years, and 57 years, respectively). At the same time, the age at death was found to be highest in Hindu households. Moreover, urban-rural differences in age at death were observed. Life expectancy is highest in urban compared to rural households. On average, 4 years of difference in age at death were detected. Interestingly in Tamil Nadu (59 years), no urban-rural difference in age at death was found. Yet again, wealth quantile was found to be an essential predictor of age at death. Due to economic affluence in the more prosperous households (62 years), age at death was higher than for the poorer households (52 years). However, the differences in age at death among middle (58 years) and wealthy households was not much. Moreover, the same trend was seen in all three selected states. In a nominal percentage of households it was reported that any family member of the household had been covered by any kind (public or private) of insurance. The result indicates that those covered by insurance were less likely to die at an early age (58 years) than those households (56 years) that were not covered by any insurance. The frequency of household members smoking inside the house seems to be an essential indicator of age at death. Those households where household members used to smoke daily or weekly or monthly (56 years) had lower age at death compared to those households where members never smoke inside the house (57 years); a similar picture was found in Bihar and Tamil Nadu. Consequently, in West Bengal, the difference in age at death between never and daily/ weekly/monthly smoking inside the house was around 6 years. Further, author tried to understand whether the household's living condition affects a person's age at death. Household living conditions might be considered as a proxy for the economic condition of the households. Those having better housing conditions, such as using clean fuel for cooking, having a flush or pit toilet facility, or having a furnished floor, wall, and roof, have a better life expectancy than those not having any toilet facility, having a natural or rudimentary floor, wall, and roof in India and the selected states.

Table 2 presents odds of predicted age at death by the conditioning variables in Bihar, West Bengal, and Tamil Nadu. Gender was found to be a vital conditioning variable for age at death in India. Probability of shorter life expectancy was experienced by the males, with 1.9 times in India, 1.3 times in West Bengal, and 1.2 times in Tamil Nadu; higher probability of longer life expectancy was experienced by the females. Again, in terms of social status, caste and religion have a significant position in Indian society. However, in the Scheduled Caste and Scheduled Tribe households predicted age at death was lowest, but the Non-SC/ST households present a better picture of age at death. Similarly, Muslim households were at greater risk of lower age at death in all the selected states. Further, place of residence turned to be a significant conditioning variable for age at death. Expectedly, those from a rural setting were 2.5 units (1.09 times in Bihar, 1.5 times in West Bengal, 1.01 times in Tamil Nadu, respectively) experienced the lowest age at death due to limited access to healthcare and poverty. Moreover, we tried to understand whether economic status affects people's age at death. The coefficients suggest a positive association between economic status and age at death. Those from the poorest households had a considerably higher likelihood of age at death. Likewise, those household members who were not covered by insurance died at an early age. And lastly, household living conditions sometimes affect a person's life; on the other hand, social status often defines people's health; under this section, author considered cooking, fuel, toilet facility, floor, wall, and roof as a symbol of social status. The results highlight considerably less significance with these household conditioning variables and age at death in all the selected states.

DISCUSSION

This article provides converging evidence of how social status affects a person's health across India's selected

Conditioning variables	Age at death				
	India	Bihar	West Bengal	Tamil Nadu	
Gender					
Male	55.69	54.5	59.9	57.9	
Female	57.52	53.9	64.1	62.2	
Caste					
Scheduled caste	54.6	48.6	61.0	57.3	
Scheduled tribe	50.3	51.7	56.3	59.0	
Non-SC/STs	58.8	55.9	63.5	60.7	
Religion			1	I	
Hindu	57.3	55.1	62.0	59.5	
Muslim	52.9	48.6	59.6	57.1	
Christian	49.7	80.0	52.2	64.1	
Others	58.5	52.7	68.2	46.0	
Place of residence			1		
Urban	58.4	58.3	63.8	59.9	
Rural	55.8	53.7	61.1	59.4	
Wealth quantile					
Poor	52.2	52.2	58.5	56.1	
Middle	57.5	59.7	65.8	59.2	
Rich	62.0	61.5	66.9	61.8	
Health insurance					
No	56.0	54 3	62.1	58.8	
Yes	57.8	53.7	61.1	60.0	
Frequency of HH members smoking inside the house	57.0	55.7	0111	00.0	
Never	57 1	56.4	62.3	60.2	
Daily	55.6	51.5	60.7	58.1	
Weekly	55.9	53.0	64.7	59.2	
Monthly	55.8	54.5	54.9	62.3	
HH living conditions: Cooking fuel	55.0	51.5	51.5	02.0	
Clean fuel	60.7	60.2	66 1	60.6	
Other fuel	54.4	53.1	60.3	57.6	
HH living conditions: Toilet	0		00.0	0710	
Flush toilet	59.5	58.9	65.3	60.9	
Pit latrine	56.0	56.7	59.8	61.5	
No facility/Open defecation	53.3	52.1	57.7	58.1	
HH living conditions: Floor	0010				
Natural floor	52.7	52.2	59.1	55.7	
Rudimentary floor	55.8	59.4	61.6	57.8	
Finished floor	59.9	59.5	65.0	60.1	
HH living conditions: Wall					
Natural walls	52.8	52.4	60.4	56 1	
Rudimentary walls	53.6	48.8	58.6	57.3	
Finished walls	58.1	55.7	62.8	60.2	
HH living conditions: Boof	50.1	55.7	02.0	00.2	
Natural roofing	51.6	49.8	58.8	58.6	
Rudimentary roofing	55.8		49.9	57.7	
Finished roofing	57.0	55.7	62.4	50.0	
Mean	56.5	5/ 2	63.5	50.5	
mean	50.5	J7.2	0	59.0	

TABLE 1. Reported age at death (in years) by selected conditioning variables in Bihar, West Bengal, and Tamil Nadu, 2015-2016

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Conditioning variables	India	Bihar	West Bengal	Tamil Nadu			
Gender							
Female, ref.							
Male	1.94***	0.26	1.28***	1.21***			
Caste			·				
Scheduled caste, ref.							
Scheduled tribe	2.88***	3.04	1.23**	2.63			
Others	0.32***	0.46***	040	0.44**			
Religion							
Hindu, ref.							
Muslim	2.78***	2.47***	1.52	1.36			
Christian	2.19***	2.69	2.28	2.40*			
Others	0.07	2.51	2.52	2.15			
Place of residence							
Urban, ref.							
Rural	2.49***	1.09	1.51	1.01			
Wealth quantile							
Poor, ref.							
Middle	0.37***	0.42**	0.51**	0.40			
Rich	0.17***	0.34	0.21*	0.19**			
Health insurance							
No, ref.							
Yes	0.43***	0.13	0.05	0.24			
Frequency of HH members smoking inside t	he house	r	1				
Never, ref.							
Daily	2.92***	3.60***	1.79	1.80			
Weekly	1.52***	3.02**	2.23	1.54			
Monthly	1.47***	2.36	2.60*	1.23			
HH living conditions: Cooking fuel							
Clean fuel, ref.							
Other fuel	0.44	0.56	0.19	0.01			
HH living conditions: Toilet	I	1	1				
Flush toilet, ref.							
Pit latrine	0.33	0.21	2.60**	3.14			
No facility/Open defecation	1.79***	1.56	2.33**	2 .24			
HH living conditions: Floor	1	1	1				
Natural floor, ref.							
Rudimentary floor	1.26***	4.74	0.64	0.28			
Finished floor	2.22***	2.12	1.79	1.89			
HH living conditions: Wall							
Natural walls, ref.							
Rudimentary walls	0.82**	3.54**	3.68	0.41			
Finished walls	1.30***	0.98	2.24**	1.63			
HH living conditions: Roof							
Natural roofing, ref.							
Rudimentary roofing	1.69***	2.11	2.89	2.08			
Finished roofing	2.40***	2.10*	1.94	2.46			

TABLE 2. Odds of age at death by selected conditioning variables in Bihar, West Bengal, and Tamil Nadu, 2015-2016

*p < 0.05, **p < 0.01, ***p < 0.001

states by exploiting the latest data from the NFHS 4. The socioeconomic gradient is now a well-established phenomenon in several countries worldwide, and it is unsurprising to see that this pattern is also evident in India. Extensive literature discussing the social determinants of health has emerged to explore why such differences exist and persist [19, 20].

One of the key findings is that decreasing income quantile was associated with an incremental increase in the prevalence of poor health outcomes. Mackenbach [21] found that people from more impoverished social or economic conditions are at higher risk of poor health, with higher rates of morbidity, disability, and death, and live shorter lives than those who are more advantaged. Usually, every step up the socioeconomic ladder is accompanied by an increase in health. However, the evidence suggested that living in a forward state (compared to living in a backward state) and belonging to a relatively affluent household significantly improved the health outcome [15]. Again, results regarding gender differentials in life expectancy were found to be higher among females than males. The gender differential in life expectancy is a proven result observed across the world, and it might be defined by a combined effect of behavioural and biological factors. However, the results concerning gender variances should be interpreted with caution given historical concerns about the greater degree of under-recording of female than male mortality in the SRS [22]. Additionally, the results of the study also reconfirm this fact. Furthermore, age at death was found to be higher in urban households than in rural households. This is consistent with the literature, suggesting that as countries undergo epidemiological transition, greater access to healthcare and better nutrition are found in urban settings than rural areas [3, 23, 24]. However, various other population characteristics may also be associated with health disparities; in India, the most pertinent of these are caste and religion [3]. Life expectancy was found to be lower among the deprived caste and religious sections. Regarding the geographical setting, people living in backward states have poor health outcomes compared to the households from the forward states [15]. Considerable inter-state differences have been observed in health outcomes. Similarly, our study also found that households from Bihar bear the burden of early deaths irrespective of class, caste, religion, and gender compared to the households of West Bengal and Tamil Nadu. This inequality may exist due to the improved health facilities, health education, and awareness amongst the people. Moreover, it was found that in those households covered by any insurance (a nominal percentage) the probability of early death was lower than in those that were not covered. In India, awareness about health insurance is still deficient [4].

Author has explored the variables related to housing living conditions to examine whether there is any effect

of the household's living conditions and health outcomes. The results indicate that a HH's living conditions have a diminutive effect on health outcomes irrespective of geographical settings. Nevertheless, it might affect different kinds of morbidity. However, evidence on the close relationship between living and working conditions and health outcomes has led to a conclusion about how human health is sensitive to the social environment. Factors like income, education, type of employment, power, and social support act to strengthen or undermine individual and community health. Because of their potent and underlying effects, these health-determining factors are known as the 'social determinants of health' [13]. Consequently, the focus on interpersonal differences in risk might be usefully complemented by examining differences in risk between different social environments. For example, even after controlling for interpersonal differences, mortality risks might differ by occupational class. For example, since low-status jobs make fewer mental demands, they cause more psychological distress than high-status jobs [13]. Previous work on characteristics associated with mortality probabilities in India indicates that these other factors primarily appear to be driving through their impact on socioeconomic conditions and that once the socioeconomic status is controlled, they have a limited effect on mortality [25-28].

CONCLUSIONS

To conclude, poor health outcomes and shorter life expectancy are mainly concentrated in households with the least resources in both urban and rural settings. This study lays out the problems of inequalities in health, and health status should be a matter of concern to all. If a population's health suffers, it is an indicator that the set of social arrangements needs to change. This phenomenon has serious social and economic implications for the country and warrants immediate policy interventions. Hence, the Government should seek to introduce public policy based on a world vision where people matter and social justice is supreme. This study has shown that if you stand at the bottom of the social ladder in India, your risk of suffering premature death, poor health, and lack of access to treatment and care is substantially higher. It should also be noted that there are several important health-related attributes, like self-health assessment, nature of work, diet, smoking, etc., which are not taken into account due to limitations of data.

DISCLOSURE

The author reports no conflict of interest.

References

1. Marmot M. Social determinants of health inequalities. Lancet 2005; 365(9464): 1099-1104.

- Vyas S, Hathi P, Gupta A. Social disadvantage, economic inequality, and life expectancy in nine Indian states. Proc Natl Acad Sci USA 2022; 119(10): e2109226119.
- Asaria M, Mazumdar S, Chowdhury S, et al. Socioeconomic inequality in life expectancy in India. BMJ Glob Health 2019; 4(3): e001445.
- Baru R, Acharya A, Acharya S, et al. Inequities in access to health services in India: caste, class and region. Economic and Political Weekly 2010; 45(38): 49-58.
- Selvaraj S, Karan AK. Deepening health insecurity in India: evidence from National Sample Surveys since 1980s. Econ Polit Wkly 2009; 44(4): 55-60.
- Joe W, Mishra US, Navaneetham, K. Health inequality in India: evidence from NFHS 3. Econ Polit Wkly 2008; 43(31): 41-47.
- Orpana HM, Lemyre L. Explaining the social gradient in health in Canada: using the National Population Health Survey to examine the role of stressors. Int J Behav Med 2004; 11(3): 143-151.
- Census of India. Government of India. New Delhi, 2011. Available from: https://censusindia.gov.in (accessed: 10 February 2022).
- 9. Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health: final report of the commission on social determinants of health. WHO, 2008. Available from: https://www.who.int (accessed: 10 February 2022).
- DHSS (Black Report). Inequalities in health: report of a Research Working Group. Department of Health and Social Security, 1980. Available from: http://www.sochealth.co.uk/ history/black.htm (accessed: 10 February 2022).
- Göran D, Whitehead M. Policies and strategies to promote social equity in health. Institute for Futures Studies, Stockholm 1991.
- Epstein H. Life & Death on the Social Ladder. Unhealthy Societies, by Richard G. Wilkinson. New York Rev Books 1998; 45: 26-30.
- Marmot M. Status syndrome: how our position on the social gradient affects longevity and health. Significance 2004; 1(4): 150-154.
- 14. Whitehead M. The concepts and principles of equity and health. Int J Health Serv 1992; 22(3): 429-445.
- Borooah VK. Caste, religion, and health outcomes in India, 2004-14. Econ Polit Wkly 2018; 53(10): 65-73.
- Sen G, Iyer A, George, A. Systematic hierarchies and systemic failures: gender and health inequities in Koppal District. Econ Polit Wkly 2007; 42(8): 682-690.
- Sengupta J, Sarkar D. Discrimination in ethnically fragmented localities: a study on public good provision in West Bengal. Econ Polit Wkly 2007; 42(32): 3313-3321.
- Guha R. Adivasis, naxalites and Indian democracy. Econ Polit Wkly 2007; 42(32): 3305-3312.
- 19. Marmot M, Friel S, Bell R, et al. Closing the gap in a generation: health equity through action on the social determinants of health. Lancet 2008; 372(9650): 1661-1669.
- Bambra C, Gibson M, Sowden A, et al. Tackling the wider social determinants of health and health inequalities: evidence from systematic reviews. J Epidemiol Community Health 2010; 64(4): 284-291.

- Mackenbach JP. Socioeconomic inequalities in health in highincome countries: the facts and the options. In: Oxford textbook of global public health. Vol. 1. 6th edition. Oxford University Press, Oxford 2015.
- Yadav AK, Ram F. Assessment of completeness of birth registrations (5+) by sample registration system (SRS) of India and major states. Demogr India 2015; 44: 111-118.
- Million Death Study Collaborators. Changes in cause-specific neonatal and 1-59-month child mortality in India from 2000 to 2015: a nationally representative survey. Lancet 2017; 390(10106): 1972-1980.
- Million Death Study Collaborators; Bassani DG, Kumar R, et al. Causes of neonatal and child mortality in India: a nationally representative mortality survey. Lancet 2010; 376(9755): 1853-1860.
- Po JYT, Subramanian SV. Mortality burden and socioeconomic status in India. PLoS One 2011; 6(2): e16844.
- 26. Saikia N, Bhat PNM. Factors affecting adult mortality in India: an analysis of national family health surveys of 1992-93 and 1998-99 (NFHS I and II). Demography India 2008; 37(2): 291-302.
- 27. Saikia N, Ram F. Determinants of adult mortality in India. Asian Popul Stud 2010; 6(2): 153-171.
- Subramanian SV, Nandy S, Irving M, et al. The mortality divide in India: the differential contributions of gender, caste, and standard of living across the life course. Am J Public Health 2006; 96(5): 818-825.