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Inequality of Opportunity in Health in Old Age in China and India

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Abstract: In this paper we have examined inequality of opportunity in health among aging population in China and India drawing from Roemer's distinction of inequality due to circumstances beyond one's control and efforts for which one should be responsible. We studied whether the Chinese policies of abolishing property rights and relatively better public provision of nutritional and health resources diminished the importance of early life circumstances on health outcomes as compared to India. Using data from Wave 1 of the WHO Study on Global *Ageing and Adult Health Survey*, we found that early childhood nutritional and disease environment, and parental education, especially father's education, played an important role in health inequality in later life in both countries. Though the Chinese developmental programs led to better health outcomes for its population, it did not perform as well in removing inequality of opportunity in health among the aging population compared to India. On the other hand, though the Indian state achieved lesser inequality due to circumstances for its aging population, it mainly favoured the male. The relatively high importance of circumstances in overall inequality, compared to factors within individual control, in both countries also highlight the need to redesign redistributive policies.

Keywords: Property rights, Aging population, Inequality of opportunity

1. INTRODUCTION

In recent years, there has been a fresh interest in understanding inequality and its implications for designing public policy. There has also been a shift in the

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primary focus on distribution of outcome to how those distributions originate (Pignataro, 2012; Roemer & Trannoy, 2016). This came from the growing recognition that it is the inequality of opportunity (IOP) to attain the outcome that matters more than inequality per se. On the one hand, equalising outcome ignores differences in tastes and preferences of individuals for which they must be responsible. On the other hand, it fails to fully appreciate the differences in the individual's resources which are associated with the outcome (Dworkin, 1981; Dworkin, 1981). This literature considers factors for which individuals can exercise their choices to be an acceptable source of inequality, while those that are due to differences beyond their control to be unacceptable (Fleurbaey, 2008). Such idea of inequality based on legitimate and illegitimate sources has become central in the literature of social justice and relevant in designing public policies (Cohen, 1989; Fleurbaey & Schokkaert, 2011). In this paper we use this framework to investigate the nature of inequality in health among aging population in China and India.

One of the important theoretical expositions in this area is that by Roemer (Roemer, 1998; Roemer. 2002). Roemer's model introduced the concept of efforts, as factors affecting outcome which were within individual's control, and circumstances as those beyond. He separated individuals into types based on their exposure to similar circumstances. For any given policy, there was a distribution of individuals with different outcomes within a given type. Roemer attributed these within type variations to their efforts. In this framework, equality was achieved, when individuals at a given rank in the distribution within a type had the same outcome across all types. To address possible limitation of resources for the feasibility of such a solution, he proposed maximisation of the minimum indirect utility for a given rank of the effort distribution across all types. Such equalisation removed any association of circumstances with outcomes, while at the same time accounted for possible variation due to effort. In addition, by focusing on position in the effort distribution rather than absolute level of effort, it acknowledged that individual's efforts are possibly associated with their type.

Though there were several other formalisations e.g. by Van de Gaer (1993) (cited in Ramos and Van de Gaer, 2016), which focused specifically on the equalisation of "opportunity sets" among types, Roemer's approach captured a number of important ideas that are relevant in the literature on health outcomes and have become widely used in studying inequality of opportunity in health (Dias, 2014). Several studies established the role of factors within individuals'

control e.g. education (Grossman, 2006) and lifestyle choices (Contoyannis & Jones, 2004) in determining health outcomes. Yet others identified the importance of factors like childhood circumstances in determining health throughout lifetime. There are now several models which establishe relation between childhood circumstances like parental socioeconomic status and in-utero development and health in early childhood with implications on health later in life (Case et al., 2005; Currie & Almond, 2011). Others identified how childhood risk factors were reactivated later in life (Barker, 1995; Wadsworth, 1997). Still others highlighted how childhood socioeconomic status affected socioeconomic status later in life and through it, health (Marmot et al., 2001). Such effect of circumstances are also known to affect health outcomes by affecting efforts later in life e.g. through intergenerational transmission of health behaviours and preferences for health and lifestyle (Ahlburg, 1998; Wickrama et al., 1999).

Several studies have empirically examined the concept of IOP in health. The literature uses a variety of strategies for measuring inequality as well as different sets of variables to capture circumstance and efforts. However, all of them were able to identify IOP in data from a wide range of countries. In one of the earliest paper in this area, Rosa Dias (2009) compared the ratio of an inequality measure for health, standardised by circumstances, to that of actual health to measure IOP. Using four waves of the longitudinal National Child Development Study which followed a cohort of 17000 individuals in Great Britain since 1958, they found between 21 and 26 per cent of inequality in health in a year could be attributed to circumstances. The study also found remarkable persistence of social class measured by father's employment type across different waves of the survey. In another study using British data, Donni et al. (2014) examined the exante approach, which focused on the equality of opportunity irrespective of circumstances and the ex-post approach, which focused on the distribution of health among individuals with identical efforts. Using several waves of the British Household Panel Survey between 2000 and 2005 on individuals above 55 years of age, they found that percentage share of equality originating from individual circumstances amounted to 32-42% using either method.

Trannoy et al. (2010) took a different approach to measure IOP. They compared the Gini and Erreygers index for predicted probability of good or very good health with current characteristics and those with imputed best circumstances. Using data from the French part of the 2004/5 wave of the

Survey of Health, Ageing and Retirement in Europe (SHARE) they found that inequality is almost halved if everyone has the best circumstances. Jusot et al. (2013) measured IOP by decomposing the measure of inequality (variance) into components - circumstance, efforts and demographic. They measured IOP by the relative contribution of circumstances in total inequality. Using the 2006 wave of the French Health, Health Care and Insurance Survey, they observed that approximately 46 per cent of all inequality in health for the sample could be attributed to circumstances. Bricard et al. (2013) following the same strategy using the 2008/9 Retrospective wave of the SHARELIFE data for individuals 50-80 years of age found that health inequalities due to circumstances varied from 30 per cent to 80 per cent in different European countries. They also noted that unlike in the case of France, as in Jusot et al. (2013), different assumptions regarding whether to account for the correlation between circumstances and effort as circumstances following Roemer or to treat effort as independent of circumstances, resulted in significant differences in the measure of IOP.

However, there are very few studies on IOP on developing countries. In one, Fajardo-Gonzalez (2016) studied IOP in health in Columbia. She found that household socioeconomic status during childhood and parental educational attainment were significantly related to inequality in adulthood. Ethnicity along with parental education was relevant in the urban sample while the region of birth played an important role in rural sample. She used predicted probability of good or better health to calculate a dissimilarity index, which compared the distribution of circumstances among those with high and low outcomes to identify the share of total opportunities that need to be redistributed. Using the 2010 Living Standard and Social Mobility Survey among heads of household aged 25-65 years she found that the share of total opportunity that need to be redistributed ranged between 8% and 10%. In another, Jusot and Menéndez (2018) studied IOP in adult health in Indonesia using the 2007 wave of the Indonesian Family Life Survey for household members of 40 years and above. They found a significant effect of parent's vital status. The effect of parental education was mainly indirect, through its effect on descendant's socioeconomic, marital and migration status. In addition, they observed that effect of communities measured by religion, language, and province, played an important role in the Indonesian context. They used a strategy similar to Jusot et al. (2013) and found a 10% contribution of circumstance related factor on overall inequality.

2. CHINA AND INDIA

China and India are of special interest in studying IOP in health among the aging population. Both have a large and rapidly aging population that are projected to account for about two-fifths of the world's elderly population by 2050 (United Nations, 2015). They are also projected to face a substantially higher burden of care in the near future (Chatterji et al., 2008). This is particularly important as both countries have experienced growing disparities in health across social and spatial dimensions (Subramanian et al., 2008; Tang et al., 2008). They also have a highly inadequate welfare system despite significant economic progress in recent decades (Liu et al., 1999; Dey et al., 2012). A better understanding of the inequalities that are beyond individual control in the context of these two countries has important implications for designing welfare policies. Several researches in this area had noted that, the idea that disparities have their origin beyond individual control have positive implications for public support towards redistributive policies (Alesina & Angeletos, 2005; Bénabou & Tirole, 2006).

There is another important motivation to study inequality of opportunities in China and India. Checchi and Peragine (2010) in their study on IOP in income in different regions of Italy argued that such studies informed the understanding of economic and institutional mechanisms behind the inequality. Both China and India were at similar stages of economic development at the point of their inception as a modern state in the middle of the 20th century (Drèze & Sen, 2013). Both states had explicit socialist goals but took different trajectories in political and economic organisation. China introduced a command system with centralised decision making, while in India, parliamentary process and reliance on a free market system was retained to assure individual political and economic freedom (Malenbaum, 1982).

Some of the exemplary successes in the Chinese system came about in their ability to translate their policy to action by the state bureaucracy. This they did with the abolition of private ownership of the means of production, collectivisation of agricultural production during the Great Leap Forward (1958-62). They also carried out similar programs during the Cultural Revolution (1966-76). In addition, they started aggressive welfare programs in health and human development since the 1970s, which along with the market-based reforms since 1979 were instrumental in substantially reducing poverty.

India also embarked on similar reforms like the Land Reform Act of 1949. However the actual implementation were minimal as the political structure

of local governments were dominated by the landed class (Besley & Burgess, 2000; Jodhka, 2012). Public programs were also much less successful because of the dependence on the private sectors capacity and incentives to deliver the program needs (Malenbaum, 1982). India initiated economic liberalisation in the 1990s but the capacity of the Indian state to integrate to the world economy and generate significant gains from global integration were far less than that of China which started the process decades earlier.

These different developmental trajectories have consequences on circumstances at birth and the possibility of intergenerational mobility in education and occupation, with consequences on health in later life. This is important as socioeconomic factors show strong association with health inequalities both in China (Tang et al., 2008) and in India (Goli et al., 2014). This leads us to our first hypothesis that importance of circumstances in total inequality will be lower in China than in India. In the same vain we also hypothesised that IOP will reduce more over time in China compared to India.

Both China and India have a long and strong tradition of patriarchal and patrilineal systems and practices, which discriminate against women. However, the male-female gaps in health, longevity, education, and employment have reduced at a faster rate in China than in India (Das Gupta et al. 2004; Drèze & Sen, 2013). This is associated with the Chinese state's effort to empower women particularly through labour force participation in both rural and urban areas during the Maoist era (Cook & Dong, 2011). As a result, China achieved one of the highest female labour force participation rates in the world (Kidd & Meng, 2001). And labour force participation rate has been much higher for Chinese women than for Indian women ever since the early 1950s.

However, there were other factors which contributed to reducing gender inequity in China. It came about through collectivisation of means of production where communes substituted for the traditional role of the family and consequently reduced the power of family and lineage over women (Andors, 1983 cited in Das Gupta et al., 2004). The Communist Party also attempted to give equal rights for women in family law. The most radical step was taken in the Marriage Law of 1950 which sought to eliminate arranged marriages, bride-price, and child marriage. It also upheld women's right to enter and exit marriage and inherit property and control of their children. Once again government intervention and overall outcomes in this area, in India, were significantly behind that of China and national level revisions in inheritance laws favouring women's inheritance rights were not introduced till the amendments

to the Hindu Succession Act in 2005. So here we hypothesised that gendered disparities in IOP in health would be lesser in China compared to India.

3. ANALYTICAL STRATEGY

Several parametric strategies have been proposed in the literature to measure IOP (Ramos & Van de Gaer, 2016), Fleurbaey and Schokkaert (2009), Pignataro (2012) provide an extensive review. Essentially, they attempted to measure the extent of IOP by two alternative concepts – direct unfairness and fairness gap. Direct unfairness measures inequality when it is only due to circumstances by using a counterfactual distribution where differences in efforts are eliminated. This is usually achieved by setting the efforts to the mean or using the predicted outcome based on the circumstance variables only. Fairness gap on the other hand is an indirect measure which tries to account for remaining inequality when opportunities are equalised. This strategy compares actual distribution with a counterfactual distribution where there is no illegitimate source of inequality i.e. inequalities due to circumstances. Though several studies have taken either of these approaches, establishing causality in parametric regression specifications remains a serious limitation in this approach. Usual techniques to overcome such issues like instrumental variables or experimental and quasi-experimental strategies are difficult to implement (Pignataro, 2012; Roemer & Trannoy, 2016). In this study our main intention was to have a comparative discussion of the association of circumstances with health outcome as well as between circumstances and efforts under different policy contexts. So instead of these strategies, we measured IOP based on the association between these factors following similar strategies by Jusot et al. (2013).

The starting point of this approach was a reduced form specification of the relation between health outcome H_i with circumstance C_i and effort E_i.

$$H_i = \alpha + \beta_1 C_i + \beta_2 E_i + \beta_3 D_i + \beta_4 L_i + \epsilon_i \quad (1)$$

D_i, and L_i are demographic and location related variables and ϵ_i are the errors.

Earlier authors like Dworkin referred to individual's resources and preferences. In that approach, preferences were outcomes of "free will" and must be considered on its own right as individuals should be responsible for the same. Roemer on the other hand acknowledged the relation between efforts and circumstances and instead of preferences proposed the idea of "relative effort" as effort that was cleaned of any effect of circumstances. So alternatively, we considered

$$H_i = \alpha + \beta_1 C_i + \beta_2 E_i^* + \beta_3 D_i + \beta_4 L_i + \epsilon_i$$

Here, E_i^* is the error term in the following specification.

$$E_i = \acute{\alpha} + \gamma_1 C_i + \gamma_2 D_i + \eta_i \quad (3)$$

As measure of inequality we used variance. Though not used frequently in discussions of inequality, Roemer and Trannoy (2016) argued that variance was better suited for health outcomes where the outcome of interest was usually an index. It is true that variance is not scale invariant, but it is translation invariance and it is usually not possible to find a meaningful measure which satisfies both scale invariance and translation invariance (Zheng, 1994). It also does not satisfy transfer sensitivity axiom, by placing different weights at different ends of the distribution. However, these are less severe in case of health, given the other properties they satisfy. It has been used by several studies in areas of IOP who make use of the fact that variance can also be additively decomposable (Bricard et al., 2013; Ferreira & Gignoux, 2013; Jusot et al., 2013).

Following these studies we used Shapley value decomposition of variance which had been extended to inequality analysis by Shorrocks (2013). Contribution of a source in the natural decomposition of variance is given by the covariance between each source of health and the outcome.

$$\sigma^2(\widehat{H_1}) = \text{cov}(\widehat{\beta_1} C_i, \widehat{H_l}) + \text{cov}(\widehat{\beta_2} E_i^*, \widehat{H_l}) + \text{cov}(\widehat{\beta_3} D_i, \widehat{H_l}) + \text{cov}(\widehat{\beta_4} L_i, \widehat{H_l}) \quad (4)$$

IOP was measured in this strategy using $(\widehat{\beta_1} C_i, \widehat{H_l})$ or *cov* $(\widehat{\beta_1} C_i, \widehat{H_1})/\sigma^2(\widehat{H_l})$ as absolute and relative measure respectively.

Further, we also explored the importance of circumstance in determining efforts by comparing the relative measure using the specification with original efforts (equation 1) and that with residual efforts cleaned of its association with circumstances and demographic factors (equation 2). Such comparison was useful to understand the extent to which circumstances are associated with efforts. To observe the changes over time we examined the variation of these measures across different cohorts and to examine gender differences we evaluated the measures separately by gender.

4. DATA AND VARIABLES

Self-reported health is widely used as a measure of individual health status as studies note strong association between self-reported health and overall

physical health, health care utilisation and mortality (Jylhä et al., 2006; DeSalvo et al., 2009; Jylhä, 2009). However, self-reported health is subjective, and several studies observed that they systematically vary across age groups, socioeconomic strata, racial/ethnic groups as well as across countries (Jylhä et al., 1998; Salomon et al., 2004; Menec et al., 2007). This was particularly a concern in the context of this current research as Bago d'Uva et al. (2008), comparing self-reported health and vignettes using the data used in this study, found similar differences in reporting behaviour across countries.

Alternatively, we followed a strategy used by Groot (2000) and Jürges (2007). It assumed that there is a latent "true" health status which is comparable across individuals. The unobserved "true" health variable was obtained by regressing the observed health conditions on the subjective measure. Thus, the estimated true health was the part that was explained by variation in actual conditions and was, therefore, comparable across groups. This strategy had an additional utility. Existing study using self-reported health could not separately identify the role of age cohort and gender in the analysis of IOP. However, since this study estimated true health by adjusting for age and sex, any remaining effect in measuring IOP could thus be attributed to the period of birth and gender. The self-reported health variable in the survey had five response categories: very good, good, moderate, bad, and very bad. However, since the cell frequencies for the very good and very bad were low in both countries, they were reassigned as good and bad respectively.

To estimate a continuous health index, we used several objective measures available in the survey. We used BMI to identify underweight (less than 18.5) or overweight (greater than 25). We also used indicators for high-risk waist to hip ratio (>0.9 for males, >0.85 for females) and hypertension (systolic >=140, diastolic >=90). We also used measures of lung functioning tests which are relevant to the diagnosis of asthma, pulmonary fibrosis, emphysema and chronic obstructive pulmonary disease. In addition, we used measures of maximum grip strength in both hands (using Smedley's hand dynamometer), time taken to walk four meters in normal and rapid pace and low vision using visual acuity in either near or distant vision (using logMAR chart). We also used a composite index of cognitive ability based on a battery of cognitive tests (verbal recall, verbal fluency, forward and backward digit span) in the survey. Instruments for chronic conditions, available in the survey were not used, as there might be a systematic bias in diagnosis based on access to health services.

Table 1 presents the coefficients and marginal effects of very good or good health from the ordered logistic regression of objective measure of health on the subjective measure. Self-reported health is adversely associated with age in both countries with stronger effects in India. Being female is associated with significant negative effect in India unlike in China. Among malnutrition related variables, being underweight shows significant and negative relations for both countries, though effects are not significant for being overweight. Positive and significant association of higher waist to hip ratio in case of India is an anomaly, but it is possibly because such cases are concentrated among those with better socioeconomic status. Hypertension does not show up as significant, most likely because of a small proportion of such population, but poor lung capacity shows significant negative effect on self-reported health in both countries. Grip strength shows expected positive effect on self-reported health in both countries. Time taken for a normal walk and for the rapid walk is significantly and negatively related to good health in China and India respectively. The effect of low vision and cognitive score on good health is also significant and in the expected direction in both countries. From the above specifications, the study constructed a health index using the probability of good or very good health for either country. The predicted probability was further standardised using the maximum and minimum values to create a health index.

Following the literature, we identified circumstances at birth using parental SES measured by father's education (none, less than primary, primary and above) and occupation (agricultural, others, elementary or never worked), whether mother ever went to school and ever worked. In addition, we also used the person's height as an indicator of childhood nutritional and disease environments following Bozzoli et al. (2009) and Case and Paxson (2008). To identify effort, we used indicators of lifestyle choices like consumption of tobacco and alcohol, fruits and vegetables and years of schooling. To account for changes over time, we considered three different birth cohorts – those above 70 years, those between ages 60 and 70 years and those between 50 and 60 years of age. Typically, they represented those who were born before, around the time, and after the foundation of Peoples Republic of China (1949) and independent India (1947). To account for variation in gender norm, we added control for sex of the individual. In addition, we also added control for rural/urban and province/state dummies.

5. RESULTS

Table 2 shows the decomposition of the variance in the ordinary least square regressions to provide a measure of IOP in health and to quantify the relative

contribution of different factors. The table also reports the 95 per cent confidence interval of bootstrapped standard errors using percentile method for the relative measure. At this point, it is worth noting that approximately 47% of observed inequality in China and 44% in India could not be explained by the model and could be attributed to unobserved circumstances, efforts or luck. This is, however, lower than Jusot and Menéndez (2018) who used a similar strategy for Indonesia.

Among circumstance factors, height which reflects nutritional and disease environment in childhood plays the strongest role in both countries and the relative importance is significantly higher in China (21.1% versus 14.4% in India). This is followed by parental education which shows similar effect in both countries. Parental occupation plays a lesser yet significant role with a marginally higher importance in China (2.8 %) compared to India (1.6%).

Among effort factors, consumption of tobacco and alcohol does not contribute significantly in health inequality in either country, while consumption of fruit and vegetables show similar contribution in overall inequality in both countries. The most important source of variation, among effort factors is educational attainment and its contribution is marginally higher in India (8.2%) compared to China (5.8%).

The single most important source of variation is demographic. Among demographic factors most of the variation is due to the variation by age cohorts. Age cohorts show similar effects in both countries, while gender shows significantly higher effect in India compared to China. Contribution of location is lowest compared to circumstance, efforts and demographic factors in either country. It is possible that the regional and rural/urban sources of variation often discussed in the case of China and India, materialises through other controls like parental education occupation and nutritional and diseases environments as well as educational opportunities.

The contribution of circumstance at 28.7%, is significantly higher in China compared to effort at 6.1% (Figure 1). Further the contribution of circumstance in China is significantly higher than in India (at 21.8%). Also, the importance of effort is marginally higher in India compared to China. Demographic factors contribute the most in either country– 60% in China and 65% in India, but the contribution is significantly higher in India compared to China. Finally, location contributes the least and shows very similar contribution in either country. The only papers with comparable strategies (Jusot et al., 2013; Jusot & Menéndez, 2018) report much higher IOP for France and lower measure for Indonesia.

In the alternative specification, disregarding the effect of circumstances on effort, contribution of circumstances and efforts are 21.1 % and effort 22.5 % respectively in China, circumstances contribute significantly less in India (15.1%) compared to effort (23.6%) (Figure 2). Comparing these results with the Roemer's approach showed the dual importance of circumstance on health outcome — both direct as well as indirect through effort. Roemer specification resulted in approximately 44.3% increase in the share of inequality due to circumstance in India which was significantly higher than the 35.9% increase in China. This was unlike observations made by Bricard et al. (2013) for European countries where the difference was higher in countries with higher IOP. On the other hand, relative importance of effort declined more in China (72.9%) compared to India (62.2%).

Importance of circumstance was around 40% across the different age cohorts for China (Figure 3). For India there was a significant difference between the youngest (33.5%) and oldest (51.3%) cohort. Also, there was a significant difference in the share explained by circumstance between the youngest cohort in China (44.3%) compared to India. The results indicate that importance of circumstances at birth diminished more over time in India, compared to China. Similar differences can be seen in the case of effort except that effort contributes significantly more to inequality among the oldest cohort (23.4%) compared to the youngest cohort (11%) in China. In case of India importance of effort though significantly lower than in China for oldest cohort, it is not significantly different from other cohorts in India.

There is only a marginal difference between gender in China on the relative contribution of circumstance (Figure 4). Also, contribution of circumstance among female in China are quite similar to that in India. However, there is a significant difference between the contribution of circumstance among male (11.3%) and female (23.2%) in India. Similar variation can also be seen in case of effort where contribution of effort is 14.6% among males compared to 7.1% among females in India. Once again contribution of effort is very similar among females in China and India, but they are significantly different among males.

5. CONCLUSIONS

The main objective of this paper is to have a better understanding of IOP in the context of developing countries. Using data on China and India, we found that circumstance plays an important role, often much more than

effort in its contribution to health inequality. Childhood nutritional and disease environment plays the strongest role. Circumstance not only plays an important role directly but also plays a significant role in how it affects effort.

China fares poorly compared to India in removing the importance of circumstance in overall inequality. The importance of circumstance has declined over time in India, while it remains relevant for different cohorts in China. The higher contribution of circumstances in China is an important result given removing that relation was one of the primary goals of the Chinese developmental policies. While circumstance is less important in India, it mainly favours the male. Given the experience of China this is a very important problem which the Indian developmental program seems to have overlooked.

Though China achieved a much better outcome in terms of human development at the turn of the century, the policies were also accompanied by social upheavals like the famines following the Great Leap Forward (Wemheuer & Manning, 2011; Walder, 2015) and rustication associated with the Cultural Revolution (Walder, 2016). It has been argued that even programs like land redistribution after 1949 was not necessarily egalitarian and created its own form of stratification (Potter & Potter, 1990). These have important implications on childhood conditions and mobility. Though drawing causal identification for the causes of these variations is beyond the scope of this paper, it is possible to speculate that these results reflect the consequences of these upheavals.

However, the study also noted an important implication of relatively better gender equity in China compared to India. Important changes in family laws and collectivisation of means of production substantially reduced the role of sources of gender discrimination within the family. It was also facilitated by the state's attempt to encourage women's participation in economic as well as social and political process (Das Gupta et al., 2004). The consequence of these efforts can be seen in the comparatively lesser burden of circumstances on women in China compared to those in India.

The most important limitation in this study was attrition due to mortality. If early life circumstances are associated with health, they may potentially also affect mortality (García-Gómez et al., 2015) and the estimates of inequality is a lower bound for such estimates. However, since the focus is on public policy for surviving members, this study does not make any attempt to address such attritions. Estimation is also potentially complicated by measurement errors – particularly recollection bias in retrospective questions about circumstances.

Therefore, we restricted the indicators of circumstances to more general categories and supplemented usual set of variables with the individual's height as a proxy of early childhood environments. For testing the robustness of the results, we also considered several other specifications like accounting for detailed mother's information on education and occupation, using residence for majority of life or at birth, and estimating "relative effort" using location variables in addition to circumstance and demographic variables. However, they did not result in any major departure from the conclusions made in this paper. Finally, as in other research in this area, data availability restricts the number of circumstances variable that can be used in a study. Estimates of inequality based on incomplete set of circumstances should be interpreted as a lower bound of true inequality (Ferreira & Gignoux, 2013).

The main contribution of this paper is the comparative analysis of two alternative policy scenarios where private property is abolished and a centralised system ensured the provision of nutrition and health and one, which did not have such fundamental and extensive changes. While several studies highlight the successes of China in significantly reducing poverty and improving the well-being of its population, this study finds no significant effect of some of the drastic policies in removing the relation between circumstances and health outcomes.

Table 1: Ordered logit regression of objective measures on self-reported health

	China		*India*	
Dependent Variable:	*Coefficient*	*Marg. Eff.*	*Coefficient*	*Marg. Eff.*
Self-Reported Health		Very/Good		Very/Good
Age	-0.007***	-0.001***	-0.026***	-0.005***
	(0.00)	(0.00)	(0.00)	(0.00)
Female	-0.049	-0.010	-0.222***	-0.043***
	(0.04)	(0.01)	(0.07)	(0.01)
BMI: Underweight	-0.205**	-0.042**	-0.308***	-0.059***
	(0.09)	(0.02)	(0.06)	(0.01)
BMI: Overweight	-0.038	-0.008	0.002	0.000
	(0.04)	(0.01)	(0.08)	(0.02)
Waist to Hip	-0.023	-0.005	0.134**	0.026**
	(0.04)	(0.01)	(0.07)	(0.01)
Hypertension	-0.054	-0.011	-0.053	-0.010
	(0.04)	(0.01)	(0.06)	(0.01)
FEV1	0.159***	0.034***	0.021	0.004
	(0.03)	(0.01)	(0.03)	(0.01)

	China		*India*	
Dependent Variable:	*Coefficient*	*Marg. Eff.*	*Coefficient*	*Marg. Eff.*
FEV1 %	-0.002	-0.001	0.002**	0.000**
	(0.00)	(0.00)	(0.00)	(0.00)
Grip Strength	0.008***	0.002***	0.008**	0.001**
	(0.00)	(0.00)	(0.00)	(0.00)
Normal Walk	-0.134***	-0.028***	0.015	0.003
	(0.02)	(0.00)	(0.01)	(0.00)
Rapid Walk	-0.018	-0.004	-0.177***	-0.034***
	(0.01)	(0.00)	(0.03)	(0.01)
Low vision	-0.146***	-0.031***	-0.100*	-0.019*
	(0.04)	(0.01)	(0.06)	(0.01)
Cognitive Score	0.292***	0.062***	0.352***	0.068***
	(0.02)	(0.00)	(0.03)	(0.01)
Observations	11,675		5,275	
Pseudo R-squared	0.0366		0.0528	
Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)				

Table 2: Decomposition of Circumstances, Effort, Demographic and Location variables

	China			*India*		
	Absolute IOP	*Relative IOP*	*95% Conf. Interval for Relative IOP*	*Absolute*	*Relative %*	*95% Conf. Interval for Relative IOP*
Circumstance						
Parental Education	0.032	6.0	(5.1,6.8)	0.034	6.1	(4.7,7.4)
Parental Occupation	0.015	2.8	(2.2,3.3)	0.009	1.6	(0.9,2.2)
Height	0.112	21.1	(19.6,22.6)	0.080	14.4	(12.6,16.1)
Effort						
Education (Years)	0.031	5.8	(4.9,6.8)	0.046	8.2	(6.7,9.7)
Tobacco/Alcohol	0.000	0.1	(-0.0,0.1)	0.001	0.1	(-0.0,0.3)
Fruit/Vegetable	0.002	0.3	(0.1,0.6)	0.004	0.7	(0.2,1.1)
Demographic						
Age Group	0.255	48.0	(46.0,49.9)	0.263	47.2	(44.6,49.8)
Gender	0.062	11.7	(10.6,12.8)	0.099	17.8	(16.0,19.7)
Location	0.023	4.3	(3.6,5.0)	0.022	3.9	(2.9,4.9)
Total	0.531			0.556		

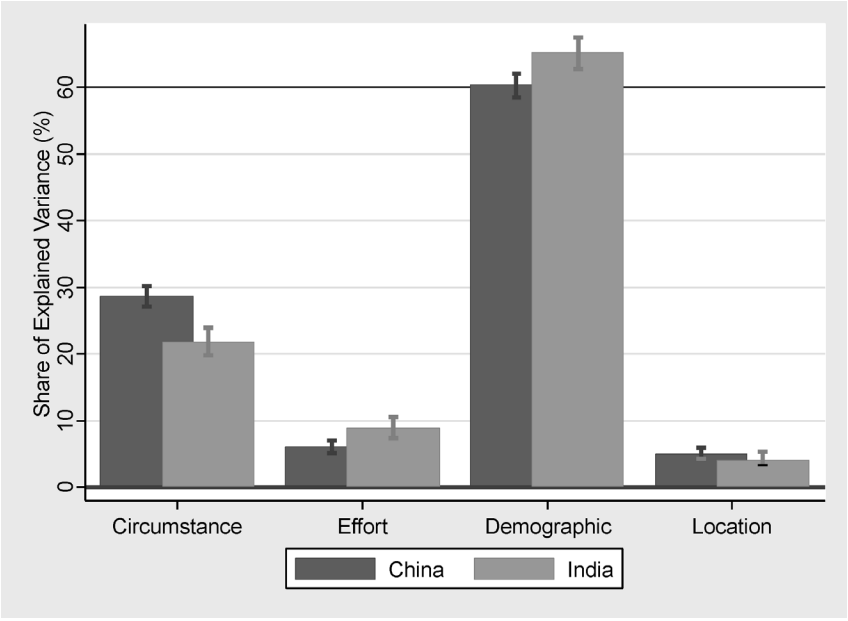

Figure 1: Relative contribution of different factors on health inequality using Roemer's approach (with bootstrapped 95% confidence interval)

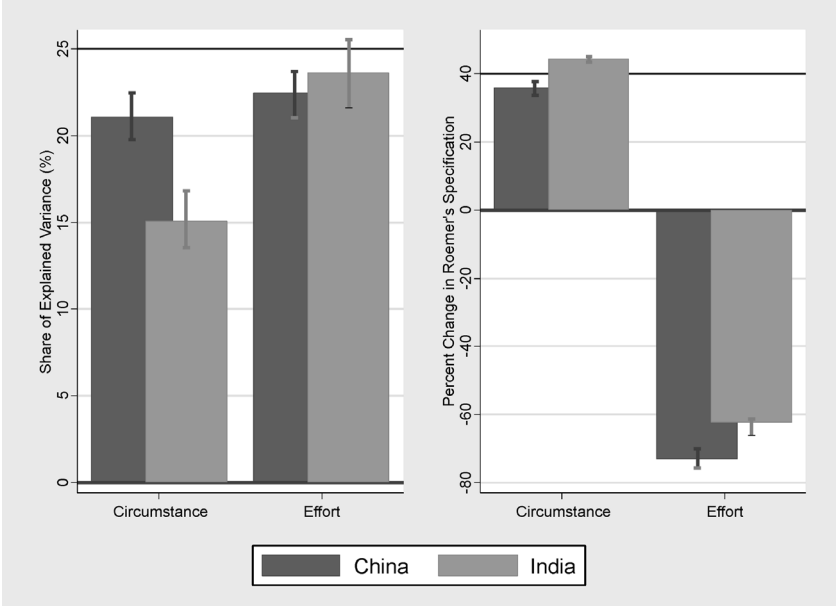

Figure 2: Relative contribution of different factors on health inequality with actual effort and comparison with the Roemer's approach (with bootstrapped 95% confidence interval)

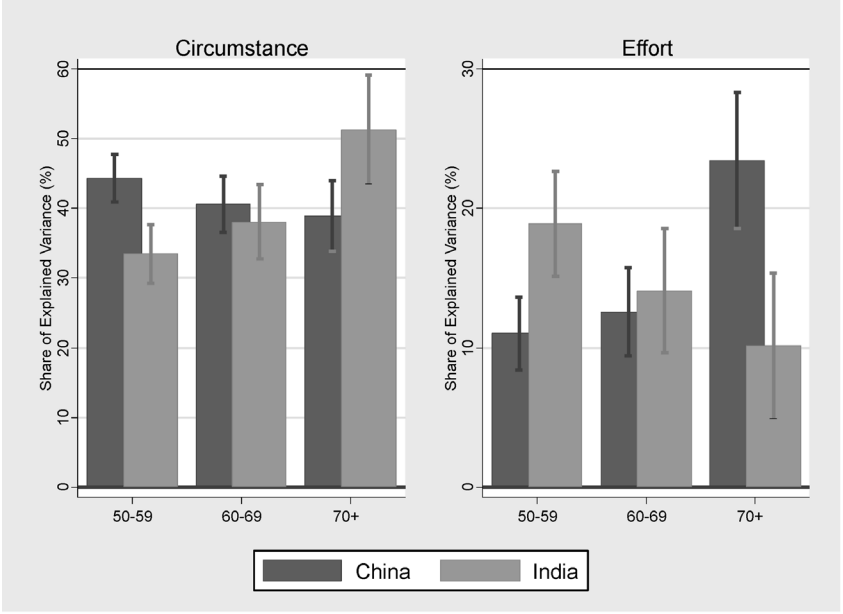

Figure 3: Relative contribution of different factors on health inequality by age cohorts (with bootstrapped 95% confidence interval).

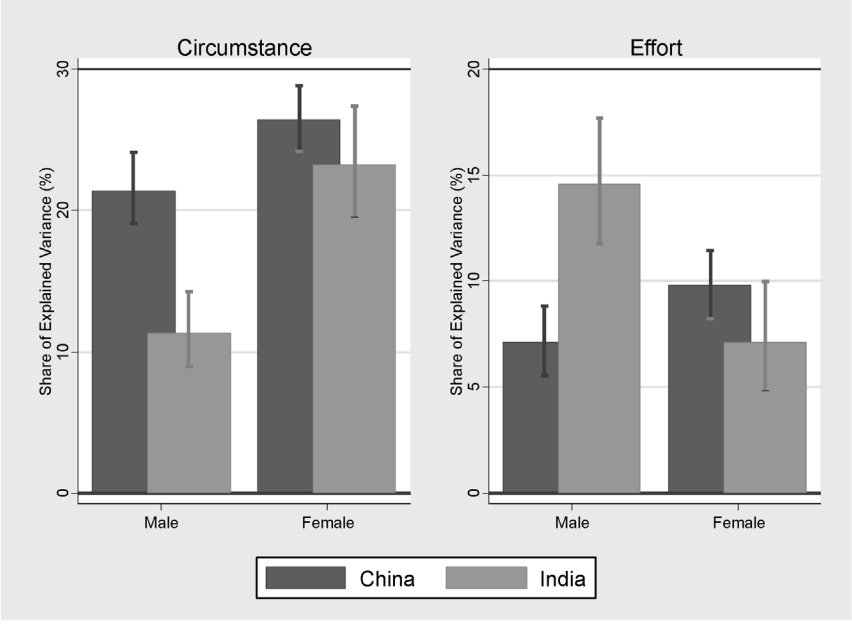

Figure 4: Relative contribution of different factors on health inequality by gender (with bootstrapped 95% confidence interval).

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