Economics Bulletin

Volume 38, Issue 3

Visible consumption, relative deprivation, and health: evidence from a developing country

Punarjit Roychowdhury
Indian Institute of Management, Indore

Abstract

Empirical research that explores the psychosocial relationship between relative deprivation (RD) and health has measured RD in terms of income although income is not easily observable. I extend this literature by shifting the focus from income to its visible manifestations − visible consumption expenditure. This is likely to more appropriately match both theory and intuition since a prerequisite for RD to have any kind of psychosocial impact on health is that RD must be visible, i.e., it must be measured based on a metric which is observable. Utilizing newly available data from India, in consonance with the psychosocial hypothesis that asserts a negative relationship between RD and health, I find that higher (visible) RD is associated with worse overall health. Moreover, my results suggest the negative association between RD is stronger for individuals living in rural areas and individuals who belong to the lower end of the income distribution.

I am grateful to the associate editor, Stéphane Mussard, two anonymous reviewers, and Daniel Millimet for extremely useful comments. All remaining errors are my own.
Citation: Punarjit Roychowdhury, (2018) "Visible consumption, relative deprivation, and health: evidence from a developing country", *Economics Bulletin*, Volume 38, Issue 3, pages 1366-1380
Contact: Punarjit Roychowdhury - punarjitroychowdhury@gmail.com.
Submitted: January 20, 2018. **Published:** July 18, 2018.

1 Introduction

Over the past few years, a large body of literature has emerged that explores the psychosocial effects of relative deprivation (RD) – which refers to a lack of individual's economic wellbeing relative to other members of the community – on health of individuals. It is hypothesized that 'feeling' more relatively deprived (i.e., feeling less well off than others) creates unhappiness, negative emotions, and psychological stress. This, in turn, mobilizes hormones (e.g. glucocorticoids) that have harmful effects on the metabolic, cardiovascular and immune system, thereby increasing susceptibility to illness and leading to worse health in general (Wilkinson, 1996; Marmot and Wilkinson, 2001; Marmot 2004; Lhila and Simon, 2010). The psychological stress induced by relative deprivation, in fact, might also affect health indirectly via health compromising behaviors such as increased smoking, drug use, alcohol abuse and poor eating habits (Marmot and Wilkinson, 2001; Eibner and Evans, 2005).

In consonance with the theoretical predictions, much of the existing empirical work in public health and social epidemiology literature finds a negative relationship between RD and health (see Adjaye-Gbewonyo and Kawachi, 2012 for a literature review; recent additions to this literature include Mangyo and Park, 2011; Balsa, French and Regan, 2013; Cuesta and Budria, 2015; Salti and Abdulrahim, 2016). However, there are two major gaps in the extant literature. First, most of the existing papers measure RD based on individual or household income, although it is widely known the income is actually an opaque measure, and that income of other members in a community is generally not visible to an individual (Hicks and Hicks, 2015; Roychowdhury, 2017). However, a prerequisite for RD to trigger any kind of psychosocial or behavioral effect (more specifically, 'feelings') is that it must be measured based on a metric that is observable to the households.[1]

Second, barring a few exceptions (e.g. Mangyo and Park, 2011), most of the existing studies on RD and health focus on the developed countries. Whether RD has a negative effect on health of individuals in developing countries – which typically have higher levels of absolute deprivation or poverty – is a question which has remained largely unexplored. Examining this question is not only important for extending our understanding of the psychological and sociological determinants of health in developing countries, but is also relevant for analyzing the (side) effects of 'Moving to Opportunity'-type relocation policies in these countries that induce low income families to move from poor areas (e.g. slums) into areas with a greater proportion of wealthier people.[2] In light of this, Adjaye-Gbewonyo and Kawachi (2012, p. 136), in a review of empirical studies that test the RD hypothesis in relation to population health using the Yitzhaki Index and related relative income measures, note that "the set-

[1] In fact, as noted by Bertram-Hümmer and Baliki (2015), defining RD based on unobservable income is perhaps also not consistent with the original conception of RD. According to Runciman's (1966) definition, a person A is considered relatively deprived of an object X when (1) A does not have X and wants it, and sees it as feasible that he should have it, and (2) sees some other person or persons G with X. (1) and (2) reflect the deprivation and the relativity criteria respectively. Hence, by definition, in order for both criteria to be satisfied, an essential condition is required: object X and a reference group G must be seen by A.

[2] 'Moving to opportunity'-type relocation schemes, of late, have been designed by governments of various low income countries including Indonesia, China, Brazil, Thailand, Kenya, Nigeria, and India. Recent papers that look at the economic impacts of such relocation programs include Chetty et al. (2016) and Barnhardt et al. (2017) among many others.

ting and social contexts for testing the RD hypothesis need to be expanded to examine the salience of the concept for low-income countries..."

This paper seeks to fill these gaps in the existing literature. Specifically, it uses newly available microdata from India (which is home to one third of the world's poor[3]) to examine the psychosocial relationship between RD and health by measuring RD not in terms of income but in terms of visible manifestations of income – visible consumption expenditure (i.e., household expenditure on visible goods). This matches more appropriately both theory and intuition in capturing the psychosocial link between RD and health. A neighbor's income and bank account balance are by no means perfectly observable to households, but the physical manifestations of income in terms of expenditure on visible goods are likely to observable. As noted by Hicks and Hicks (2015), it is the act of consumption and the display of opulence drive home the reality of RD and socioeconomic inequality within a community. Thus, the psychosocial relationship between RD and health should be driven by the observed visible consumption expenditure, and not by the unobserved income. That, it is not per say the *actual* inequality and RD, but the *perceptions* of inequality and RD that drive behavioral effects has also been noted recently by Oshio and Urakawa (2014), Bertram-Hümmer and Baliki (2015), and Roychowdhury (2017) among a few others.

My findings are compelling. In consonance with the hypothesized psychosocial mechanism, I find that higher (visible) RD is associated with worse overall health. Moreover, my results indicate that the negative association between RD and health is stronger for the rural households as well as households who belong to the lower end of the income distribution.

2 Data

The data for the analysis come from the Indian Human Development Survey (IHDS) 2012. IHDS is a nationally representative multitopic household survey conducted by the National Council for Applied Economic Research (NCAER) in New Delhi and University of Maryland (see Desai et al., 2015 for details). The sample was drawn using stratified random sampling.

The IHDS 2012 was conducted in 2011-12 and it covered 42,152 households in 1503 villages and 971 census-defined urban neighborhoods across India. The survey is based on two one-hour interviews with a knowledgeable informant in each household, which covered health, education, employment, economic status, marriage, fertility, gender relations and social capital of the households. It also has information on caste/religious affiliation of households. Data are publicly available through the Inter-university Consortium for Political and Social Research (ICPSR).[4]

2.1 Health

The IHDS 2012 has information on various types of health outcomes of all individuals in the surveyed households which can broadly categorized into short term morbidities (e.g. fever, diarrhea, etc.), and long term/major morbidities (e.g. diabetes, hypertension, heart disease, asthma, etc.). The health outcome variables in the IHDS are all binary variables. The

[3] http://theweek.com/speedreads/449835/onethird-worlds-extreme-poor-live-india

[4] http://www.icpsr.umich.edu/icpsrweb/DSDR/studies/36151

variables reflecting short run health equals 1 if an individual reports to have suffered from a particular disease in the last 30 days, and 0 otherwise. The variables reflecting long run health, on the other hand, equals 1 if the individual is currently suffering (or was suffering in the recent past) from a particular disease, and 0 otherwise. The health outcomes that I consider in this study include the common short term morbidities like fever, cough, and diarrhea, as well as some long term morbidities like hypertension, diabetes, cardiovascular disease, mental illness, and STD/HIV. As hypothesized, if 'feeling' more relatively deprived creates psychological stress and mobilizes hormones that have harmful effects on overall health, thereby increasing one's susceptibility to illness, or causes one to engage in health compromising behavior, one would expect RD to be negatively associated with the above health outcomes.

Because of the large number of health outcome variables, I follow Kling et al. (2007) and Karlan and Zinman (2010), and aggregate the variables into a summary standardized *illness* index (H_1). As discussed by Kling et al. (2007), this improves statistical power. In other words, using a summary illness index (or health index), instead of all the health outcomes separately, reduces the number of statistical tests to be performed, in turn, reducing the chance of false positives. The summary illness index is an average across standardized z-score measures of each health outcome. The z-score is calculated by subtracting the mean and dividing by the standard deviation. Additionally, I also create an alternative illness index (H_2) which is the sum of the binary health outcomes, scaled by the total number of outcomes considered.[5]

2.2 Relative Deprivation

2.2.1 Index of Relative Deprivation

I measure RD based on Deaton's (2001) variation of the Yitzhaki (1979) index. This approach, often used in the deprivation literature, captures Runciman's (1966, p. 10) idea that "the magnitude of a relative deprivation is the extent of the difference between the desired situation and that of the person desiring it".

Given that the aim of this study is to capture the psychosocial link between RD and health, I assume the object of relative deprivation is visible consumption expenditure. Let D_n denote the set of visible consumption expenditure distributions for the population or the

[5] Composite indices are often criticized on the grounds of lack of conceptual clarity about what exactly one is trying to measure and difficulty of interpretation. These problems, however, are unlikely to be a major issue in the present context since the indexes that I am using are created based on several well-defined binary indicators of the same outcome variable, health, and there is hardly any reason to suspect whether each of the indicators actually measure health or not. In contrast, if one had to construct a measure for, say, poverty based on indicators for education, health, family size and labor force participation, it would have been much harder to justify whether or not each component deserves to be included in the index, because fundamentally these variables are very different and the concept of poverty itself is highly abstract (at least compared to health). However, the summary health indexes that I am using might be criticized on a different ground. Specifically, by using the summary health measure one could be perhaps failing to provide a more detailed analysis of the relationship between RD and health. This, I think, is a valid criticism, and possibly a drawback of the approach used in this paper. I had to make this tradeoff to reduce the chance of false positives in the regression results. Future work in this area perhaps might look into providing a more detailed assessment of the relationship between RD and health without having to make this tradeoff.

reference group, if different from the whole population. Then, for all $n \in N$, $v \in D_n$, I define a ranked visible consumption distribution as vector $\mathbf{v} = (v_1, v_2, ..., v_n)$ with $v_1 \leq v_2 \leq .... \leq v_n$. The deprivation faced by a person with visible consumption expenditure v_i with respect to a person with visible consumption expenditure v_j is $v_j - v_i$ if $v_i < v_j$, or zero otherwise.

Now, individual deprivation is the sum of the gaps between an individual's visible consumption expenditure and the visible consumption expenditure of all individuals visibly richer than he/she is, normalized by the sum of visible consumption expenditure of all individuals in the reference group. This is the Deaton's (2001) variation of the Yitzhaki index which, for an individual with visible consumption expenditure v_i, is expressed as:

$$RD(v_i) = \frac{\sum_{j=i+1}^{n}(v_j - v_i)}{\sum_{j=1}^{n} v_j} \tag{1}$$

Intuitively, this measure assumes that when making comparisons, individuals consider the proportion of total community visible consumption expenditure by people who are higher on the visible consumption distribution. Further, assuming a continuous visible consumption distribution, the Deaton measure of the individual with highest visible consumption will be 0, while that of the individual with lowest visible consumption will be 1.

2.2.2 Definition of Visible Consumption

There are fifty-two consumption categories in the IHDS 2012 (2005). Some of the consumption categories, which are frequently purchased items, use a thirty day time frame while the rest use a three hundred and sixty five day time frame. I convert all expenditures to the annual time frame before estimation.

As noted by Hicks and Hicks (2014), "identifying the visibility of expenditure is not a trivial task." To determine the composition of the visible consumption basket, Khamis et al. (2012) conducted an online survey in India. This survey was modeled after the surveys conducted by Charles et al. (2009) and Heffetz (2011) – both of which were carried out in the United States to determine the visibility and status value of different consumption items. In this paper I adopt Khamis et al.'s (2012) definition of visible goods since to my knowledge this is the first and, until now, the only survey conducted in India. Moreover, this survey was designed specifically to determine the visibility of the consumption goods covered in the IHDS. Based on Khamis et al.'s (2012) survey, I consider visible consumption to consist of personal transport equipment, footwear, vacations/holidays, furnitures/fixtures, social functions, repair maintenance, house rent/society charges, house rent installment, other rents, entertainment, clothing/bedding, jewelry/ornaments, recreation goods, other personal goods, tobacco, services (domestic services, barbers, laundry), spices/salt, household fuel, household electricity, toiletries, restaurants/eating out. Visible consumption does not include goods and services such as food consumed at home, insurance premiums, books, education and health expenditures.[6]

[6]See Khamis et al. (2012) for a detailed description of the survey.

2.2.3 Definition of Reference Groups

Like most other household surveys, IHDS does not have precise social interactions data. Deaton (2001) suggests that, in absence of such data, the most sensible reference groups of households are those that live in the immediate geographic location. Fafchamps and Shilpi (2008), in fact, suggest that in context of low income countries immediate neighbors are likely to constitute a 'natural' reference group. This is because social-psychologists have shown that, when making relative well-being assessments, people compare themselves with a reference group composed of people who started from the same conditions, e.g., those they grew up with. And since in India social mobility is remarkably low (Munshi and Rosenzweig, 2009) meaning that most people live along people they grew up with, "people almost certainly compare themselves to their immediate geographical neighbors" (Deaton, 2001, p. 21). Thus, I define the reference group of a household as all other households in its village (in rural areas) or neighborhood (in urban areas), which basically are small geographic units[7] populated by households who are similar in many dimensions and are exposed to similar geographic and institutional conditions.[8]

2.3 Analytic Sample and Summary Statistics

My working sample consists of 38,873 households from across India: these are the households who have no missing (or invalid) information on health of household head, consumption expenditure, income, and other demographic characteristics of the household head (e.g., age, gender, literacy status), annual total household income is non-negative, the age of the household head is at least 18, and who belong to reference groups that consist of at least three households. Table A1 in the Appendix presents the description and summary statistics of all the variables used in this study.

3 Empirics

3.1 Econometric Model

The baseline econometric equation is given by

[7] The average area of villages included in the IHDS is approximately 3.3 sq. miles. While the average area of urban neighborhoods are not available from the survey, these are also likely to be reasonably small since the average number of households residing in a census-defined urban neighborhood is roughly 200.

[8] One might argue that village-based reference groups are too small (in terms of the geographical area as well as the number of households in them). I, however, do not feel that a reference group which is broader than a village/neighborhood would be meaningful. This is because one ideally wants to define reference groups in the most precise manner as possible to capture social interactions. Too broad reference groups could mean a household in such a reference group would never get a chance to interact with majority of the other households within the reference group. In fact, in the extant literature on social interactions as well, villages/neighborhoods are routinely used to define geographic reference groups. Nevertheless, to check the sensitivity of my baseline results to a broader definition of reference groups, I define reference groups in terms of a household's district of residence (instead of village). In Table A2 in the Appendix, I present results of these regressions. As expected, the average effect of RD on health is no longer significant. This is reassuring and lends credibility to the argument the reference groups should be defined as precisely as possible. This in turn indicates that the baseline definition of reference groups is unlikely to be problematic.

$$H_{ig} = \alpha + \beta RD_{ig} + \delta X_{ig} + \lambda G_{-ig} + \gamma_s + \varepsilon_{ig} \quad (2)$$

where H_{ig} represents the illness index of the head of household i in reference group (village/neighborhood) g with higher values of H indicating worse overall health; RD_{ig} represents household i's RD measured based upon visible consumption expenditure; β measures the association between (visible) RD and health (more specifically, illness); X_{ig} is a vector of demographic characteristics including (log) household income, age, marital status and literacy status of household head, family/household size, proportion of adolescents and adults in the household, proportion of household members who are married, a variable indicating whether the household is living in an urban or rural area, and a set of dummy variables indicating caste/religious affiliation of the household; G_{-ig} is a vector of reference group characteristics such as (log) mean income and mean age, gender, literacy, marital and caste composition of reference groups;[9] γ_s are unobserved state characteristics that are common to all households within the state; finally, ε_{ig} represents the idiosyncratic error term. In addition to controlling for reference group characteristics that are likely to be correlated with both RD and household health (e.g. mean income), I include state fixed-effects. Doing so allows me to control for unobserved state-level characteristics, e.g. welfare expenditure and public good provision, which may be correlated with both RD and health of household head. This implies that the effect of RD on health is identified by comparing similar households across villages/neighborhoods within the same state rather than across states that are far off from each other. If RD adversely affects health (or in other words, RD has a positive impact on illness), I should find $\beta > 0$.

3.2 Results and Discussion

In Table 1, I present the main results. The first (second) panel presents the results with illness index H_1 (H_2) as the dependent variable. Columns (1) and (4) present the results from the specifications where I regress the illness index on RD but do not include any control variables. Columns (2) and (5) presents the results from the specifications that include demographic characteristics of the households as controls but not reference group-/community-level controls or state fixed effects. The last two columns in each panel report results of regressions in which I include demographic characteristics, reference group controls as well as state fixed effects.

The raw association between RD and illness, as reported in column (1), is 0.207. This is statistically significant at 1% level of significance, and suggests that a 1 standard deviation increase in RD is associated with a 0.05 standard deviations increase in overall illness as measured by H_1. The raw association between RD and illness, when using the alternative illness index, H_2, also shows effect of similar magnitude: a 1 standard deviation increase in RD is associated with 0.06 standard deviation increase in H_2.

When I include controls for demographic characteristics, the size of the estimated coefficients of RD falls as expected, but nevertheless they remain statistically significant at 1% level of significance. In terms of standard deviations, the effects are as follows: a 1 standard

[9] The negative sign indicates that household i is left out when calculating reference group level measures for household i.

deviation increase in RD is associated with an increase in overall illness by 0.02 standard deviations when overall illness is measured by H_1, and by 0.03 standard deviations when overall illness is measured by H_2.

Next, I include controls for reference group characteristics, as well as state fixed effects in addition to demographic characteristics. This is my preferred specification. As can be seen from the estimated coefficients reported in columns (3) and (6), the magnitude of the effect of RD on illness now falls only slightly (compared to the estimates of the coefficients obtained from regressions that control for only demographic characteristics). This is reassuring since it suggests the association between RD and health is unlikely to be subject to severe bias due to omitted reference group or geographic characteristics. Specifically, the point estimates of the coefficients of RD of my preferred specification suggests that a 1 standard deviation increase in RD is associated with a 0.02 standard deviations increase in both H_1 and H_2.

Overall, thus, in consonance with the prediction of the psychosocial hypothesis, my results indicate a negative relationship between (visible) RD and overall health (or put differently, a positive relationship between RD and illness). From a policy perspective, this suggests that the relocation programs in developing countries that induce low income families to move from poor areas into areas with a greater proportion of wealthier people, by augmenting feelings of negative emotions and stress due to higher visible RD of those who move, may cause their health to deteriorate.[10]

Table 2 tests for heterogeneity in the effect of RD on health. Specifically, it examines whether the effect of RD on health varies by (1) a household's area of residence (i.e., whether it resides in an urban or rural area), and (2) household's socioeconomic status (SES) as measured by log of household income. I find that the negative impact of RD on health is greater for people living in rural areas compared to urban areas. Specifically, results of the regression reported in column (1) ((3)) indicate that as RD increases in 1 unit, H_1 (H_2) increases by 0.11 (0.01) units for people living in rural areas. For people in urban areas, the effect of RD on health is much smaller: a 1 unit increase in RD is associated with a 0.002 (0.001) unit increase in H_1 (H_2). This might be because societies are much more clustered and less heterogeneous in rural areas compared to urban areas, in turn increasing the potential for social interaction among people in these areas. As noted by Debertin (1997) in a rural community each neighbor is usually more aware of what the others are doing compared to those in urban communities (for e.g., people in rural areas are likely to be more aware about how much their neighbors are spending on social celebrations). This might augment the intensity of the psychosocial effect of RD.

For household SES, I find that the adverse effect of RD on health is higher (lower) for individuals belonging to the lower (higher) end of the income distribution. Specifically, based on health index H_1, a 1 unit increase in SES (log of household income) is associated with a

[10] It might worthwhile to point out here that one could in principle construct RD using household income (instead of consumption) and do the same empirical analysis and check the sensitivity of the baseline results. While carrying out this exercise is feasible, note that inferring anything meaningful on the basis of the results of this exercise might be inappropriate. This is because the entire premise of this paper is based on the argument that when one measures RD based on income and uses that to look at the psychosocial impact of RD on health, the regression suffers from measurement error problem because income of neighbors/peers is not observed by individuals. This implies that the estimate of the coefficient of RD measured using income is not likely to be unbiased and consistent.

fall in the positive effect of RD on illness by 0.065 units. Similar results are obtained when using H_2 instead of H_1. Specifically, the positive effect of RD on illness as measured by H_2 falls by 0.007 units when SES (log of household income) increases by 1 unit. Thus, results of the heterogeneity analysis based on household SES indicate that the psychosocial effects of RD on health is more pronounced among the people who belonging to the lower SES. This suggests that social comparisons are likely to be extremely important for the poor, contrary to what it is generally thought to be.

References

Adjaye-Gbewonyo, K. and Kawachi, I. (2012) "Use of the Yitzhaki Index as a test of relative deprivation for health outcomes: A review of recent literature" *Social Science & Medicine* 75, 129–137.

Balsa, A.I., French, M.T. and Regan, T.L. (2013) "Relative Deprivation and Risky Behaviors" *Journal of Human Resources* 49, 446–471.

Barnhardt, S., Field, E. and Pande, R. (2017). "Moving to Opportunity or Isolation? Network Effects of a Randomized Housing Lottery in Urban India" *American Economic Journal: Applied Economics* 9, 1–32.

Bertram-Hümmer, V. and Baliki, G. (2015) "The Role of Visible Wealth for Deprivation" *Social Indicators Research* 124, 765-783.

Charles, K. K., Hurst, E. and Roussanov, N. (2009) "Conspicuous consumption and race" *Quarterly Journal of Economics* 124, 425-467.

Chetty, R., Hendren, N. and Katz, L.F. (2016) "The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment" *American Economic Review* 106, 855-902.

Cuesta, M. B. and Budria, S. (2014) "Income deprivation and mental well-being: The role of non-cognitive skills" *Economics and Human Biology* 17, 16–28.

Deaton, A. (2001) "Relative deprivation, inequality and mortality," NBER Working Paper 8099, Cambridge, MA.

Debertin, D. L. (1997) "A comparison of social capital in rural and urban settings" mimeo, University of Kentucky. Available at http://www.uky.edu/~deberti/socsaea.htm

Desai, S., Dubey, A. and Vanneman, R. (2015) India Human Development Survey-II (IHDS-II) (Computer file), University of Maryland and National Council of Applied Economic Research, New Delhi (producers), 2015. Ann Arbor, MI: Inter-university Consortium for Political and Social Research (distributor)..

Eibner, C. E. and Evans, W. N. (2005) "Relative deprivation, poor health habits and mortality" *Journal of Human Resources* 40, 591–620.

Fafchamps, M. and Shilpi, F. (2008) "Subjective welfare, isolation, and relative consumption" *Journal of Development Economics* 86, 43–60.

Heffetz, O. (2011) "A test of conspicuous consumption: Visibility and income elasticities" *Review of Economics and Statistics* 93, 1101-1117.

Hicks, D. L. and Hicks, J. H. (2014) "Jealous of the Joneses: conspicuous consumption, inequality, and crime" *Oxford Economic Papers* 66, 1090-1120.

Karlan, D. and Zinman, J. (2010) "Expanding Credit Access: Using Randomized Supply Decisions To Estimate the Impacts" *Review of Financial Studies* 23, 433-464.

Khamis, M., Prakash, N. and Siddique, Z. (2012) "Consumption and social identity: Evidence from India" *Journal of Economic Behavior & Organization* 83, 353-371.

Kling, J.R, Liebman, J.B. and Katz, L.F. (2007) "Experimental analysis of neighborhood effects" *Econometrica* 75, 83–119.

Lhila, A. and Simon, K.I. (2010) "Relative deprivation and child health in the USA" *Social Science & Medicine* 71, 777–785.

Mangyo, E. and Park, A. (2011) "Relative Deprivation and Health: Which Reference Groups Matter?" *Journal of Human Resources* 46, 459–481.

Marmot, M. (2004). *Status Syndrome: How Social Standing Directly Affects Your Health and Life Expectancy*, London: Bloomsbury Publishing.

Marmot, M. and Wilkinson, R. G. (2001) "Psychosocial and material pathways in the relation between income and health: a response to Lynch et al." *British Medical Journal* 322, 1233–1236.

Munshi, K. and Rosenzweig, M. (2009) "Why is mobility in India so low? Social insurance, inequality, and growth," NBER Working Paper No. 14850, Cambridge, MA.

Oshio, T. and Urakawa, K. (2014) "The association between perceived income inequality and subjective well-being: Evidence from a social survey in Japan" *Social Indicators Research* 116, 755-770.

Roychowdhury, P. (2017) "Visible inequality, status competition, and conspicuous consumption: evidence from rural India" *Oxford Economic Papers* 69, 36-54.

Runciman, W. G. (1966) *Relative deprivation and social justice*, London: Routledge.

Salti, N. and Abdulrahim, S. (2016) "The relationship between relative deprivation and self-rated health among Palestinian women in refugee camps in Lebanon" *SSM - Population Health* 2, 317–326.

Wilkinson, R. G. (1996) *Unhealthy societies–The afflictions of inequality*, London: Routledge.

Yitzhaki, S. (1979) "Relative deprivation and the Gini coefficient" *Quarterly Journal of Economics* 93, 321–324.

Table 1. Baseline Results

	H_1			H_2		
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]
RD	0.207***	0.098***	0.073***	0.025***	0.010***	0.008***
	(0.021)	(0.021)	(0.022)	(0.002)	(0.002)	(0.002)
ln (Income)		-0.025***	-0.016***		-0.003***	-0.002***
		(0.005)	(0.005)		(0.001)	(0.001)
Age		0.011***	0.011***		0.001***	0.001***
		(0.001)	(0.001)		(0.000)	(0.000)
Male		-0.256***	-0.271***		-0.028***	-0.030***
		(0.026)	(0.026)		(0.003)	(0.003)
Literate		0.037***	0.033***		0.002	0.002*
		(0.012)	(0.012)		(0.001)	(0.001)
Married		0.011	0.045*		-0.001	0.004
		(0.024)	(0.024)		(0.003)	(0.003)
Household Size		-0.015***	-0.018***		-0.002***	-0.002***
		(0.003)	(0.003)		(0.000)	(0.000)
Teenage Proportion		0.050	0.067**		0.007**	0.009***
		(0.033)	(0.033)		(0.003)	(0.003)
Adult Proportion		0.175***	0.234***		0.021***	0.029***
		(0.034)	(0.035)		(0.003)	(0.003)
Married Proportion		-0.031	-0.063**		-0.005	-0.008***
		(0.031)	(0.031)		(0.003)	(0.003)
Urban		0.053***	0.045***		0.003**	0.003**
		(0.012)	(0.014)		(0.001)	(0.001)
High Caste Brahmin		-0.119***	-0.040		-0.011***	-0.007
		(0.043)	(0.050)		(0.004)	(0.005)
High Caste Non-Brahmin		-0.193***	-0.052		-0.019***	-0.007
		(0.037)	(0.045)		(0.003)	(0.004)
OBC		-0.196***	-0.084*		-0.018***	-0.009**
		(0.036)	(0.0436)		(0.004)	(0.004)
Dalit		-0.185***	-0.076*		-0.017***	-0.008*
		(0.037)	(0.044)		(0.004)	(0.004)
Adivasi		-0.302***	-0.143***		-0.030***	-0.016***
		(0.038)	(0.048)		(0.004)	(0.005)
Muslim		-0.068*	0.010		-0.006	-0.001
		(0.038)	(0.049)		(0.004)	(0.005)
Reference Group Controls	N	N	Y	N	N	Y
State Fixed Effects	N	N	Y	N	N	Y
Observations	38,873	38,873	38,873	38,873	38,873	38,873
Adjusted R-squared	0.003	0.048	0.066	0.004	0.056	0.082

Notes: Columns (1) - (3) reports results of regressions with dependent variable H_1. Columns (4) - (6) reports results of regressions with dependent variable H_2. H_1 and H_2 denote illness indexes with lower (higher) values corresponding to better (worse) health. See text for definitions of H_1 and H_2. Reference group controls include mean of ln(Income), mean age, proportion of males, proportion of literates, proportion of married individuals, and proportion of households belonging to each social group category. All reference group variables are calculated by leaving out the focal individual. Robust standard errors in parentheses. The omitted categories include proportion of children in the household, social group dummy indicating whether or not a household is a Sikh/Jain or Christian, and proportion of households in the reference group who are Sikhs/Jains or Christians. All regressions include a constant. *** p<0.01, ** p<0.05, * p<0.1.

Table 2. Heterogeneity Analysis

	H_1		H_2	
VARIABLES	[1]	[2]	[3]	[4]
RD	0.110***	0.799***	0.0125***	0.0872***
	(0.0260)	(0.174)	(0.00259)	(0.0178)
RD x Urban	-0.108**		-0.0120***	
	(0.0443)		(0.00432)	
RD x ln(Income)		-0.0650***		-0.00706***
		(0.0156)		(0.00158)
ln (Income)	-0.0158***	0.0120	-0.00189***	0.00114
	(0.00508)	(0.00754)	(0.000503)	(0.000751)
Age	0.0110***	0.0108***	0.00110***	0.00108***
	(0.000481)	(0.000482)	(4.82e-05)	(4.83e-05)
Male	-0.271***	-0.267***	-0.0303***	-0.0299***
	(0.0258)	(0.0258)	(0.00268)	(0.00268)
Literate	0.0340***	0.0327***	0.00215*	0.00201*
	(0.0120)	(0.0120)	(0.00120)	(0.00120)
Married	0.0448*	0.0438*	0.00359	0.00348
	(0.0241)	(0.0241)	(0.00250)	(0.00250)
Household Size	-0.0174***	-0.0177***	-0.00233***	-0.00236***
	(0.00275)	(0.00275)	(0.000280)	(0.000280)
Teenage Proportion	0.0688**	0.0705**	0.00932***	0.00950***
	(0.0328)	(0.0328)	(0.00321)	(0.00321)
Adult Proportion	0.233***	0.221***	0.0290***	0.0277***
	(0.0345)	(0.0346)	(0.00338)	(0.00338)
Married Proportion	-0.0623**	-0.0548*	-0.00834***	-0.00754**
	(0.0305)	(0.0306)	(0.00307)	(0.00307)
Urban	0.0877***	0.0455***	0.00805***	0.00340**
	(0.0210)	(0.0136)	(0.00206)	(0.00132)
High Caste Brahmin	-0.0401	-0.0376	-0.00668	-0.00640
	(0.0496)	(0.0496)	(0.00475)	(0.00475)
High Caste Non-Brahmin	-0.0516	-0.0498	-0.00662	-0.00642
	(0.0448)	(0.0448)	(0.00426)	(0.00427)
OBC	-0.0835*	-0.0813*	-0.00930**	-0.00907**
	(0.0435)	(0.0436)	(0.00417)	(0.00418)
Dalit	-0.0769*	-0.0736*	-0.00801*	-0.00764*
	(0.0440)	(0.0440)	(0.00418)	(0.00419)
Adivasi	-0.143***	-0.140***	-0.0155***	-0.0152***
	(0.0484)	(0.0484)	(0.00468)	(0.00469)
Muslim	0.00966	0.0123	-0.00141	-0.00112
	(0.0493)	(0.0493)	(0.00472)	(0.00472)
Reference Group Controls	Y	Y	Y	Y
State Fixed Effects	Y	Y	Y	Y
Observations	38,873	38,873	38,873	38,873
Adjusted R-squared	0.0658	0.0661	0.0818	0.0822

Notes: H_1 and H_2 denote illness indexes with lower (higher) values corresponding to better (worse) health. See text for definition of H_1 and H_2. Reference group controls include mean of ln(Income), mean age, proportion of males, proportion of literates, proportion of married individuals, and proportion of households belonging to each social group category. All reference group variables are calculated by leaving out the focal individual. Robust standard errors in parentheses. The omitted categories include proportion of children in the household, social group dummy indicating whether or not a household is a Sikh/Jain or Christian, and proportion of households in the reference group who are Sikhs/Jains or Christians. All regressions include a constant. *** p<0.01, ** p<0.05, * p<0.1.

Appendix

Table A1. Summary Statistics

Variables	Description	Mean	SD
Illness Indexes			
H_1	(Standardized) summary illness index calculated as an average across standardized z-score measures of each health outcome	0.00	1.00
H_2	Sum of the binary health outcomes, scaled by the total number of outcomes considered	0.05	0.10
Relative Deprivation			
RD	Yitzhaki index of relative deprivation; calculated based upon annual total household visible consumption	0.39	0.25
Covariates			
Income	Annual total household income	125674.58	215022.76
ln(Income)	Log of annual total household income	11.16	1.25
Household Size	Total number of individuals in the household	4.87	2.33
Children Proportion	Proportion of children in the household	0.24	0.22
Teenage Proportion	Proportion of teenagers in the household	0.11	0.16
Adult Proportion	Proportion of adults in the household	0.65	0.23
Married Proportion	Proportion of married individuals in the household	0.50	0.25
High Caste Brahmin	=1 if household is high caste Brahmin; =0 otherwise	0.05	0.22
High Caste Non-Brahmin	=1 if household is high case non-Brahmin; =0 otherwise	0.16	0.37
OBC	=1 if household belongs to other backward classes (OBC); =0 otherwise	0.34	0.47
Dalit	=1 if household is Dalit; =0 otherwise	0.22	0.41
Adivasi	=1 if household is Adivasi; =0 otherwise	0.09	0.28
Muslim	=1 if household is Muslim; =0 otherwise	0.12	0.32
Sikh/Jain/Christian	=1 if household is Sikh or Jain or Christian; =0 otherwise	0.03	0.17
Urban	=1 if household is in an urban area; =0 otherwise	0.32	0.47
Age	Age of individual	49.76	13.57
Male	=1 if individual is male; =0 otherwise	0.85	0.35
Married	=1 if individual is married; =0 otherwise	0.81	0.39
Literate	=1 if individual is literate; =0 otherwise	0.67	0.47
N		38873	

Table A2. Sensitivity Check, Reference groups defined by districts

	H_1	H_2
VARIABLES	[1]	[2]
RD	0.017	0.003
	(0.026)	(0.003)
Household Level Controls	Y	Y
Reference Group Controls	Y	Y
State Fixed Effects	Y	Y
Observations	38,921	38,921
Adjusted R-squared	0.065	0.082

Notes: H_1 and H_2 denote illness indexes with lower (higher) values corresponding to better (worse) health. See text for definition of H_1 and H_2. For household level controls and reference group controls see Table 1. All reference group variables are calculated by leaving out the focal individual. Robust standard errors in parentheses. The omitted categories include proportion of children in the household, social group dummy indicating whether or not a household is a Sikh/Jain or Christian, and proportion of households in the reference group who are Sikhs/Jains or Christians. All regressions include a constant. *** p<0.01, ** p<0.05, * p<0.1.