Published in final edited form as:

Health Place. 2019 July ; 58: 102117. doi:10.1016/j.healthplace.2019.04.007.

Relative deprivation of assets defined at multiple geographic scales, perceived stress and self-rated health in China

Yosuke Inoue¹, Annie Green Howard^{1,2}, Aki Yazawa³, Naoki Kondo^{4,5}, Penny Gordon-Larsen^{1,6}

¹Carolina Population Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, 27516, USA

²Department of Biostatistics, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, 27516, USA

³Research Center for Child Mental Development, University of Fukui, Yoshida-gun, Fukui, 910-1193, Japan

⁴Department of Health and Social Behavior, School of Public Health, The University of Tokyo, Bunkyo-ku, Tokyo, 113-0033, Japan

⁵Department of Health Education and Health Sociology, School of Public Health, The University of Tokyo, Bunkyo-ku, Tokyo, 113-0033, Japan

⁶Department of Nutrition, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, 27516, USA

Abstract

Relative deprivation (RD) may increase psychosocial stress, which could result in poor health. We examined the associations between asset-based RD indicators, defined at multiple geographic scales (i.e., within community; within area (urban/rural) of a province; within province; and across country), and self-rated health in China. A generalized structural equation model was used to estimate both the direct association between RD and self-related health and the indirect association through psychological stress measures. Results showed that higher RD was associated with the higher odds of reporting poor or very poor health, both directly and indirectly through psychological stress. This association was observed irrespective of the geographic scale at which reference groups were defined.

1. Introduction

A large body of literature suggests that income inequality engenders a sense of relative deprivation (i.e., failing to meet the desirable standard of living set by the rest of society) (Adjaye-Gbewonyo and Kawachi, 2012). As argued in social comparison theory (Runciman, 1966), an undesirable difference in access to goods and services with others, particularly those with whom one compares oneself (i.e., reference group), may increase psychosocial

stress. Long-term exposure to stress has been associated with dysregulated immune and cardiovascular function and adverse lifestyle behaviors (e.g., smoking, excessive alcohol consumption and drug abuse) (Kawachi and Subramanian, 2014, Adjaye-Gbewonyo and Kawachi, 2012). Relative deprivation has been shown to associate with a variety of negative health outcomes including depressive symptoms (Gero et al., 2017, Miyakawa et al., 2012), poor self-rated health (Kondo et al., 2008, Subramanyam et al., 2009, Miyakawa et al., 2012), psychological distress (Sakurai et al., 2010), functional disability (Kondo et al., 2009) and mortality (Kondo et al., 2015, Yngwe et al., 2012).

In contrast to high-income countries where the association between relative deprivation and negative health outcomes have been extensively studied, studies from low to middle and transitional countries have remained scarce (Modrek et al., 2012, Salti and Abdulrahim, 2016, Salti, 2010). This may be an important omission as it is possible that a fair amount of people feel stressed through upward social comparison given the large income inequality in low- and middle-income countries (Ravallion, 2014). For example, China, which was first classified as a lower middle-income country in 1997 and has been an upper middle-income since 2010 (World Bank Group, 2019), may be an important setting to examine the association between relative deprivation and health given its expanding income inequality (Jain-Chandra et al., 2018). More importantly, Easterlin et al. (2012) found that the improvement in life satisfaction of Chinese people was much smaller than expected from the great extent of economic growth during the period between 1990 and 2010, addressing that the expansion of income inequality and the deterioration of social safety net may underlie this phenomenon.

There are a few studies that investigated the association between relative deprivation and health-related outcomes in China. For example, Sun et al. (2012) used a self-reported questionnaire on relative deprivation among Chinese urban youths and showed that those who perceived their relative income to be lower than that of their peers tended to report worse general health, higher depression and higher psychological stress. Oshio et al. (2011) examined the association between relative deprivation (assessed with Yitzhaki index, an income-based index of relative deprivation) and happiness in three Asian countries (i.e., China, Korea and Japan), showing that in China being more deprived was associated with lower happiness. The association between the Yitzhaki index and self-rated health was also examined in Taiwan (Kuo and Chiang, 2013) and Hong Kong (Chan et al., 2017), with stronger associations observed in the former.

We extended these previous studies in the following manner. First, we used alternative definitions of reference groups across multiple geographic scales (i.e., *within community*; *within area (official urban/rural status) of a province*; *within province*; and *across country*). This approach might be particularly relevant in China where the household registration system (*Hukou*) has caused barriers to residential relocation within China, particularly from rural to urban areas (Gong et al., 2012). According to social comparison theory, we hypothesize that a difference in lifestyle relative to peers with similar attributes (e.g., people living in the same community) is more detrimental to health than lifestyle differences with people who have less in common. Second, we employed an asset-based measure of relative deprivation; asset-based measures have been shown to be stable measures of socio economic

status against fluctuation in income/expenditure or short-term economic shock (Howe et al., 2012). Third, following the approach of Kuo and Chiang (2013), we applied a pathway model (i.e., generalized structural equation model) to employ a multilevel mediation analysis, essentially examining the contribution of the direct pathway from relative deprivation to self-rated health as well as the indirect association from relative deprivation to self-rated health through psychological health.

The aim of the study, therefore, is to investigate the association between relative deprivation and self-rated health in China, while focusing on (i) the difference in the magnitude of association between relative deprivation and self-rated health across multiple geographic scales (i.e., within community; within area of a province; within province; and across country) and (ii) the indirect association between relative deprivation and self-rated health through psychological stress.

2. METHODS

2.1. China Health and Nutrition Survey

Data came from the CHNS, which is an ongoing longitudinal household-based survey since 1991 that focuses on investigating how the societal and economic transformations of Chinese society impact nutrition and health of the population. Study communities were chosen through a multistage random cluster design; we randomly selected cities/counties from income strata (low; middle; and high) within each province and then randomly selected study communities from each city/county. 20 households were selected from each study communities.

For this study, we used data collected in wave 2015 (i.e., the latest wave of the survey available) in 316 communities across the following 15 provinces (north: Beijing, Liaoning, Heilongjiang and Shanxi; central: Shanghai, Jiangsu, Zhejiang, Shandong, Henan, Hubei, Hunan and Chongqing; south: Guangxi, Guizhou and Yunnan). Out of 17,316 adult individuals who participated in the survey in 2015, we excluded those who had missing responses for psychological stress ($n = 3,333$), those with missing information on self-reported health ($n = 40$), household asset ($n = 105$) and urbanization index ($n = 321$). As a result, we had an analytic sample of 13,517 in the subsequent analyses.

2.2. Outcome variable

Information on self-rated health, which has been previously shown to be associated with medically certified health conditions (Wu et al., 2013) or subsequent health outcomes (Shen et al., 2014; Dong et al., 2018) in China, was obtained by asking “how do you rate your health compared to people at your age”. Response options include *very poor*, *poor*, *fair*, *good* and *excellent*. As it was not normally distributed, we combined these responses to make a binary outcome for poor health (1: *very poor* and *poor*; 0: *fair*, *good* and *excellent*).

2.3. Relative deprivation

We calculated relative deprivation using differences between a given individual relative to his/her reference group (e.g., relative to others in their same community, in their same

province, or within urban strata within their province). We used information on the following 14 items to define relative deprivation (i.e., color television; washing machine; refrigerator; air conditioner; electric fan; computer; tablet computer; camera; microwave oven; electric cooking pot; pressure cooker; telephone; smartphone; and VCD/DVD). These items were chosen from the list of items the CHNS have been collecting information on since the earliest wave while we excluded health-related items (i.e., exercise bike/treadmills, massage chair and air purifier) and items the possession of which did not necessarily mean affluence in today's context (i.e., sewing machine, cell-phone (non-smartphone) and satellite dish). We calculated relative deprivation of individual i as follows:

$$RD_i = \frac{\sum_j W_j d_{ij}}{\sum_j W_j} \quad d_{ij} = \begin{cases} 1, & \text{if person}_i \text{ did not possess item}_j \\ 0, & \text{if person}_i \text{ possessed item}_j \end{cases},$$

where W_j denotes the proportion of participants who possessed item j in individual i 's reference group (described below). This equation assumes that lack of an item which everybody else in the reference group possessed make the individual feel more deprived, compared to lack of an item which was possessed by fewer number of participants (Whelan and Maitre, 2013, Bellani, 2013).

To examine how different geographic scales with which we defined relative deprivation were linked differently with self-rated health, we defined four sets of reference groups (i.e., *participants living in each community*; *participants in the same area (urban/rural) of a province*; *participants living in the same province*; and all CHNS study participants).

2.4. Psychological stress

Participants' psychological stress was assessed using the 10-item Perceived Stress Scale (PSS), which was originally developed by Cohen et al. (Cohen and Williamson, 1988) and validated in Chinese population (reliability: Cronbach's alpha = 0.86; validity: Pearson's correlation = 0.67 [with the Beck Depression Inventory Revised] and 0.58 [with the Beck Anxiety Inventory]) (Wang et al., 2011). We asked the participants to what extent they agree with the statement on their feelings in the previous month, such as "In the last month, how often have you been upset because of something that happened unexpectedly?", "In the last month, how often have you felt that you were unable to control the important things in your life?" and "In the last month, how often have you felt nervous and stressed?". Response options to each question ranges from 0 (never) to 4 (very often) and were summed to generate a composite score (range: 0 – 40) with a higher score indicating higher perceived psychological stress. We used the score as a continuous variable since it was not developed as a diagnostic instrument and does not have any cut-off values.

2.5. Covariates

Information was collected on the following socio-demographic variables: age (in years), education attainment (primary school or less; junior high school; high school; post-secondary education), current marital status (married; not married), current working status (working; not working), absolute household income (low; middle; high). Absolute income

was computed based on information on several economic activity domains, which were collected from household heads. We used a 12-component study-specific urbanization index which was previously developed to capture the degree of urbanization in the study communities (Jones-Smith and Popkin, 2010); the index was categorized into tertile (low, middle and high).

2.6. Statistical analysis

A generalized structural equation model (GSEM) was used to investigate the association between relative deprivation, perceived psychological stress and self-rated health. More specifically, we regressed self-rated health (binary) on relative deprivation (continuous), perceived psychological stress (continuous) and covariates while simultaneously regressing perceived psychological stress scale on relative deprivation and covariates. These variables were all treated as observed variables in the GSEM. We used four different reference groups to assess relative deprivation indicators (within community, within urban strata of a province, within province, or across country), which we entered individually in the models. Clustering by community was controlled by incorporating random intercepts at community level. Models were adjusted for age, age squared, sex, educational attainment, marital status, current employment, and absolute household income and urbanization.

As we standardized relative deprivation indicators (i.e., divided by their inter-quartile range (IQR) values), results are shown in terms of odds ratios (OR) of reporting poor or very poor health per IQR change in relative deprivation indicators; this is equivalent to the ORs among more deprived participants (i.e., the third quartile in relative deprivation indicators), compared to less deprived participants (i.e., the first quartile). In addition, the proportion of indirect association (i.e., the association via psychological stress) to the total association was calculated by dividing coefficients of indirect association by those of total association (non-exponentiated values).

We additionally conducted the following three sets of analyses to deepen our understanding of the association between relative deprivation and self-rated health. First, we stratified the analysis by household income tertile to examine if the association between relative deprivation and self-rated health was consistently observed across income gradients. Second, we stratified the analysis by governmental urban/rural classification of the communities to see if the association between relative deprivation and self-rated health differed in urban versus rural communities. Third, we excluded participants with very low household income (i.e., the lowest household income quintile) as a more specific test of relative deprivation, rather than that for living under absolute poverty. Fourth, we conducted a sensitivity test to examine whether missingness on PSS items influenced our central results. As the 'gsem' in Stata did not allow us to use multiple imputation or full information likelihood estimation options, we used multiple imputation for individuals missing PSS data in a multilevel logistic model (outcome: self-rated health; predictors: PSS and relative deprivation) to examine the extent to which the results were affected by missing data.

All statistical analyses were conducted using Stata 15.0 (Stata Corp, College Station, TX). We used a generalized structural equation model ('gsem' command), using a maximum likelihood estimator. The level of statistical significance was set at $p < 0.05$ (two-tailed).

3. RESULTS

Table 1 shows the basic characteristics of the study participants. Mean PSS was 23.0 (SD = 6.1) and approximately seven percent of the sample reported their health status to be poor.

Table 2 shows the proportions of participants who possessed the 14 items, stratified by tertile of relative deprivation indicators. Most of the participants possessed color television (95.1 – 100%). Washing machine, refrigerator, electric cooking pot and electric fan were also common across the sample, with more than half of participants with these household assets even in the most deprived tertile. In contrast, air conditioners, computers, tablet computers and cameras were considerably different across tertiles.

Table 3 shows results of generalized structural equation model to investigate the direct association between relative deprivation and self-rated health as well as the indirect association through psychological stress, across different comparative areas (e.g., relative to community, relative to full country). Direct association between relative deprivation and reporting poor or very poor health ranged from 1.30 – 1.40 times higher at the worst 25% vs. the least deprived 25% status across the different reference groups) while indirect association through psychological stress ranged from 1.03 – 1.05 across the different reference groups. Contribution of the indirect association to the total association tended to be larger when relative deprivation was defined relative to full country versus relative to individuals living in the same community.

When stratified by household income tertile (Table 4), the inter-quartile increase in the relative deprivation within the low household income group was associated with higher odds of reporting poor or very poor health compared to those within the high household income group; however, the contribution of indirect association was relatively larger among the high income group than those reported among low and middle household income tertiles. When we stratified by urban/rural (Table 5), we observed higher odds of reporting poor or very poor health in rural vs. urban communities. The contribution of the indirect association through psychological stress tended to be larger in urban than in rural communities.

When the analysis was confined to those who were in the second to fifth quintile, inter-quartile change in the relative deprivation score was linked with 1.23 – 1.31 times higher the odds of reporting poor or very poor health for direct association and 1.26 – 1.37 times higher odds for total association (Supplementary Table 1).

While participants who were excluded from the analysis differed from the analytic sample on some sociodemographic characteristics (Supplementary Table 2), we confirmed that our model results for the 13,517 individuals with complete PSS observations were not substantially different from our model results in the sample of 16,584 individuals which include those with missing PSS data (using multiple imputation), suggesting that the original results were robust to missing data (Supplementary Table 3).

4. DISCUSSION

Using data from the China Health and Nutrition Survey wave 2015, we showed that asset-based relative deprivation was associated with higher odds of reporting poor or very poor health in China, independent of absolute socioeconomic status. When we examined the indirect association (i.e., association between relative deprivation and self-rated health through psychological stress), its contribution was estimated to range from 11.0 – 12.8%, depending on the reference group. We found a stronger estimated effect when a larger geographic scale was used as a reference group to define relative deprivation than when a smaller geographic scale (i.e., community) was used.

While our finding that participants with higher relative deprivation were more likely to report poor health is consistent with previous studies on relative deprivation, a comparative larger estimated effect was observed when we defined the relative deprivation reference group across country, compared to when the relative deprivation reference group was defined as those living in the same community. Our finding was different from that posited by social comparison theory, which assumes that an undesirable difference relative to people who share similar attributes (i.e., who live in a smaller reference group) is more detrimental than that with people with less similarity (i.e., compared to people from across the entire country).

Others have provided inconsistent findings about how the breadth of reference group influences the magnitude of the association between relative deprivation and health outcomes (Kawachi and Subramanian, 2014, Adjaye-Gbewonyo and Kawachi, 2012). Eibner and Evans (2005) used income-based indicators of relative deprivation in the U.S. collected in 1988–1991 and reported stronger associations when the reference group was defined using information on state of residence, age group, race and education attainment compared to when it was defined exclusively using residential state. On the other hand, Wolff et al. (2010) using information on subjective social status of U.S. individuals who participated in a mail survey in 2007 reported stronger associations at a broader definition of reference group (i.e., others in American society vs. others of the same race/ethnicity within the same neighborhood).

One of the possible interpretations of our finding is that participants consider their social status relative to individuals living in the same community as well as to individuals living in other parts of China. Now that China has become more globalized in terms of widespread TV and internet coverage and that Chinese individuals have more opportunities to travel across the country than earlier periods, Chinese individuals might have greater ability to evaluate their own SES relative to the entire country. This is in contrast to the findings reported by Knight et al. using data collected in 2002 showing rural China people were satisfied with their lives, and suggested that it might have resulted from the fact that most people compared themselves to individuals living in close geographic proximity; three-quarters of the participants reported their main reference group to be either neighbors (28.6%), relatives (7.0%) or people in the village (39.6%) (Knight et al., 2009). In our study, we defined reference groups (i.e., participants did not self-report their reference groups), our

findings suggest that societal changes may have transformed the way people compare their social standing relative to others.

Our structural equation findings, which separated the indirect association (i.e., association between relative deprivation and self-rated health through psychological stress) and the direct association (i.e., association between relative deprivation and self-rated health) suggest the presence of a psychological pathway linking relative deprivation and poor health. Our finding is in line with Kuo and Chiang (2013) that showed that depressive symptoms attenuated the association between relative deprivation and self-rated health in Taiwan; while relative deprivation by 10,000 Taiwan dollars was associated with 1.48 – 1.57 times higher the prevalence ratios of reporting poor health depending on the definitions of reference group, it was attenuated to 1.30 – 1.35 times when depressive symptoms were adjusted in the models.

However, given the limited contribution of indirect association in our study (i.e., 11.0 – 12.8%), other factors must have played a role in the association between relative deprivation and self-rated health. First, there may be some forms of psychological stress that were not captured by the PSS questionnaire. For example, none of the questions directly asked how psychologically stressed they were because of upward social comparison. Second, some participants who are most deprived might still suffer from absolute poverty (e.g., lack of basic needs, such as social welfare and medical service). While such cases are deemed rare in previous studies on relative deprivation that were conducted in developed countries, the issue of separating absolute poverty and relative poverty warrants some attention in the context other than high-income countries. One of the interpretations provided by Chan et al. (2017) for their weaker associations between relative deprivation and self-reported health was that Hong Kong has more equitable public health system and multiple health policies for the poor. In our study, when we confined our analysis to those in the second and fifth quintile of absolute household income (i.e., excluded those in the poorest tertile), we observed a similar positive association between relative deprivation and self-rated health (Supplementary table 1), which suggested that the observed trend in this study was not solely related to absolute poverty.

In stratified analyses by household income tertiles or by official urban/rural classification of the communities, we found associations between relative deprivation and self-rated health within each income and urbanization strata. It is also of note that the magnitudes of the total or direct association were larger in low vs. high income tertiles and in rural vs. urban communities while the contributions of indirect association suggested an opposite trend (i.e., larger in high vs. low income tertiles; in urban vs. rural communities). These patterns observed in our study contributes to the literature on relative deprivation and health as previous studies conducted in Japan (Kondo et al., 2009) and Sweden (Yngwe et al., 2003, Yngwe et al., 2012) reported that the association between relative deprivation and negative health outcomes (i.e., functional limitation, self-rated health and mortality) tended to be larger in higher income groups. One of the possibilities is that the observed association between relative deprivation and self-rated health may relate to differences by household income and by urban/rural status or our findings may relate to difference in how we defined relative deprivation (income-based vs. asset-based indicators).

Our study extends previous studies by showing that higher relative deprivation was associated with higher odds of reporting poor or very poor health even when we used information on household asset to define relative deprivation. This might be of interest to those who conduct similar research in the low and middle-income countries where income has been shown to be subject to measurement issues (e.g., greater volatility and seasonality). In addition, Sweet (2011) pointed out that material possessions or consumption patterns (i.e., symbolic capital) may be a more salient basis for social comparison than income of others which participants might not necessarily know.

There are several study limitations that should be addressed. First, the cross-sectional nature of the study prevented us from making any causal inferences. Future studies incorporate temporal ordering of the exposure (relative deprivation), mediator (psychological stress) and outcome (self-rated health). The current design cannot omit the possibility that those who have worse health status fall into a more deprived category or that those who were sick felt more psychologically stressed. In addition, psychological stress and self-reported health were subject to a common method bias. Second, there are several unobserved variables, such as the amount of savings and the access to social welfare services that might have helped to operationalize relative deprivation measures. In addition, future studies could directly assess relative deprivation by asking participants to rate themselves relative to specific reference groups. Third, the PSS might not capture variation in psychological stress experienced by our participants. Fourth, a fair number of participants had missing PSS items ($n = 3,333$, 19.2%) while our sensitivity results suggested that the original results were robust to missing data.

5. Conclusion

Our cross-sectional study showed that in China, higher relative deprivation was associated with higher odds of reporting poor or very poor health. The association was statistically significant in all models using different reference groups for comparison, with stronger association when using relative deprivation compared to individuals across the entire country versus relative to individuals living in the same community. Contribution of the association between relative deprivation and poor health via psychological stress ranged from 11.0 – 12.8% of the association, which suggested the presence of a psychological pathway linking relative deprivation and poor health while other pathways might have also existed.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Funding

This research uses data from China Health and Nutrition Survey (CHNS). We are grateful to research grant funding from the National Institute of Health (NIH), the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD, R01 HD30880; P2C HD050924), the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK, R01 DK104371), the NIH Fogarty D43 TW009077 for financial support for the CHNS data collection and analysis files since 1989, the China-Japan Friendship Hospital, Ministry of Health for support for CHNS 2009, Chinese National Human Genome Center at Shanghai since 2009, and Beijing Municipal

Center for Disease Prevention and Control since 2011. We thank the National Institute for Nutrition and Health, China Center for Disease Control and Prevention. We also are thankful to general support from the Carolina Population Center, the University of North Carolina at Chapel Hill. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. Y.I. is financially supported by the Nippon Foundation International Fellowship program.

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Table 1.
Basic characteristics of study participants in the China Health and Nutrition Survey (2015).

Variables	Values
N	13517
Age, mean [SD]	51.4 [15.0]
Female, n (%)	7153 (52.9)
Education, n (%)	
Primary school or less	2020 (14.9)
Junior high school	2113 (15.6)
High school	4349 (32.2)
Attained further education	4994 (37.0)
Missing	41 (0.3)
Household income, n (%)	
Low	4331 (32.0)
Middle	4437 (32.8)
High	4453 (32.9)
Missing	296 (2.2)
Marital status, n (%)	
Married	11661 (86.3)
Missing	175 (1.3)
Currently working, n (%)	6519 (48.2)
Urbanization index, n (%)	
Low	4529 (33.5)
Middle	4495 (33.3)
High	4493 (33.2)
Psychological stress scale, mean [SD]	23.0 [6.1]
Poor or very poor self-rated health, n (%)	913 (6.8)
Relative deprivation, median [IQR]	
Within community	0.16 [0.08, 0.27]
Within urban strata of a province	0.20 [0.11, 0.32]
Within province	0.21 [0.12, 0.34]

Variables	Values
Across country	0.24 [0.14, 0.38]
The number of people in reference group, median [IQR]	
Within community	40 [35, 46]
Within urban strata of a province	579 [355, 595]
Within province	902 [852, 965]

Table 2.

Proportion of people who possessed the 14 items in the China Health and Nutrition Survey (2015), shown by tertile of relative deprivation indicators.

	Total sample participants	RD relative to community			RD relative to urban strata of a province			RD relative to province			RD relative to full country		
		T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
Color television	98.3	100.0	99.2	95.1	100.0	99.3	95.6	100.0	99.3	95.6	100.0	99.4	95.6
Washing machine	91.5	99.2	95.2	77.0	100.0	98.0	75.7	100.0	98.3	75.5	99.9	98.1	76.5
Refrigerator	92.7	99.7	96.0	79.4	99.9	99.0	78.4	100.0	99.3	78.2	99.9	99.4	78.6
Air conditioner	60.2	72.5	59.8	44.0	78.6	63.3	37.2	77.8	65.5	36.1	93.9	65.4	20.5
Electric fan	79.8	89.3	79.2	67.7	93.0	79.9	65.5	92.6	78.0	68.1	94.3	81.5	63.3
Computer	50.7	75.5	46.9	21.4	84.8	48.5	16.1	88.6	47.2	13.8	89.2	50.2	11.7
Tablet computer	21.7	36.0	16.4	8.2	40.3	17.1	6.3	42.5	16.2	5.1	47.1	14.2	3.0
Camera	22.7	37.1	18.4	8.0	43.4	17.8	5.4	45.6	16.4	4.7	50.1	15.0	2.1
Microwave oven	40.0	55.5	36.0	23.4	63.5	36.6	18.0	66.2	36.7	15.4	79.4	33.2	6.2
Electric cooking pot	90.5	97.1	90.7	81.5	99.5	92.2	79.1	99.6	93.6	77.7	99.6	96.5	75.4
Pressure cooker	56.9	74.8	54.5	35.1	80.9	53.5	34.3	81.1	56.0	31.9	83.1	60.0	26.8
Telephone	37.3	47.9	34.3	26.2	52.1	34.2	24.4	54.2	33.2	23.3	60.4	33.7	17.0
Smartphone	71.8	92.7	72.1	42.9	97.6	75.7	39.7	97.5	78.7	37.1	97.2	76.1	41.4
VCD/DVD	19.3	30.7	15.4	8.2	32.9	16.2	8.0	33.3	16.2	7.6	31.7	17.0	8.9

RD: relative deprivation; T1: the first tertile (the least deprived group); T2: the second tertile; T3: the third tertile (the most deprived group).

Direct association between relative deprivation across four reference groups and reporting poor and very poor health as well as the indirect association through psychological stress among participants in the China Health and Nutrition Survey (2015).

Table 3.

	<u>Direct Association</u>		<u>Indirect association through psychological stress</u>		<u>Total association</u>		<u>Contribution of indirect association through psychological stress</u>
	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	
RD relative to community	1.30	(1.20, 1.42)	1.03	(1.02, 1.05)	1.35	(1.23, 1.47)	11.0%
RD relative to urban strata of a province	1.35	(1.22, 1.49)	1.04	(1.02, 1.06)	1.40	(1.27, 1.55)	11.4%
RD relative to province	1.37	(1.23, 1.52)	1.04	(1.02, 1.06)	1.43	(1.28, 1.59)	11.7%
RD relative to full country	1.40	(1.25, 1.58)	1.05	(1.03, 1.07)	1.48	(1.31, 1.66)	12.8%

OR: odds ratio; CI: confidence interval; RD: relative deprivation

Models examined the association between relative deprivation indicator and self-rated health individually and were adjusted for age, age-squared, sex, absolute household income (low, middle and high), education attainment, marital status, current employment and urbanization of the community (low, middle and high). Results are shown in terms of odds ratios per interquartile change in the relative deprivation indicators and 95% confidence intervals. Contribution of indirect association through perceived stress was calculated by dividing coefficients of indirect association by those of total association (non-exponentiated values).

Table 4.

Direct association between relative deprivation across four reference groups and reporting poor and very poor health as well as the indirect association through psychological stress among participants in the China Health and Nutrition Survey (2015), stratified by household income tertile.

	<u>Direct Association</u>		<u>Indirect association through psychological stress</u>		<u>Total association</u>		<u>Contribution of indirect association through psychological stress</u>
	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	
RD relative to community							
Low household income	1.50	(1.31, 1.71)	1.04	(1.02, 1.07)	1.56	(1.36, 1.79)	9.6%
Middle household income	1.20	(1.01, 1.41)	1.01	(0.98, 1.04)	1.21	(1.02, 1.43)	5.2%
High household income	1.16	(0.98, 1.37)	1.04	(1.01, 1.06)	1.20	(1.02, 1.42)	20.2%
RD relative to urban strata of a province							
Low household income	1.61	(1.38, 1.87)	1.05	(1.02, 1.08)	1.69	(1.44, 1.98)	9.6%
Middle household income	1.18	(0.98, 1.42)	1.02	(0.99, 1.04)	1.20	(0.99, 1.44)	8.8%
High household income	1.16	(0.96, 1.40)	1.04	(1.01, 1.07)	1.21	(1.00, 1.46)	21.4%
RD relative to province							
Low household income	1.60	(1.36, 1.87)	1.05	(1.02, 1.09)	1.68	(1.43, 1.98)	10.2%
Middle household income	1.16	(0.97, 1.40)	1.02	(0.99, 1.05)	1.19	(0.98, 1.43)	11.1%
High household income	1.18	(0.97, 1.44)	1.04	(1.02, 1.07)	1.24	(1.01, 1.51)	20.3%
RD relative to full country							
Low household income	1.61	(1.36, 1.91)	1.06	(1.03, 1.10)	1.71	(1.44, 2.03)	11.1%
Middle household income	1.21	(0.99, 1.49)	1.03	(1.00, 1.07)	1.25	(1.02, 1.55)	14.6%
High household income	1.19	(0.97, 1.47)	1.06	(1.02, 1.09)	1.26	(1.02, 1.55)	23.5%

OR: odds ratio; CI: confidence interval; RD: relative deprivation

Models examined the association between relative deprivation indicator and self-rated health individually and were adjusted for age, age-squared, sex, absolute household income (low, middle and high), education attainment, marital status, current employment and urbanization of the community (low, middle and high). Results are shown in terms of odds ratios per interquartile change in the relative deprivation indicators and 95% confidence intervals. Contribution of indirect association through perceived stress was calculated by dividing coefficients of indirect association by those of total association (non-exponentiated values).

Table 5.

Direct association between relative deprivation across four reference groups and reporting poor and very poor health as well as the indirect association through psychological stress among participants in the China Health and Nutrition Survey (2015), stratified by official urban/rural status.

	<u>Direct Association</u>		<u>Indirect association through psychological stress</u>		<u>Total association</u>		<u>Contribution of indirect association through psychological stress</u>
	OR	(95%CI)	OR	(95%CI)	OR	(95%CI)	
RD relative to community							
Urban communities	1.19	(1.03, 1.38)	1.05	(1.02, 1.08)	1.25	(1.08, 1.45)	21.7%
Rural communities	1.36	(1.23, 1.52)	1.02	(1.01, 1.04)	1.40	(1.25, 1.56)	7.3%
RD relative to urban strata of a province							
Urban communities	1.21	(1.04, 1.42)	1.06	(1.03, 1.09)	1.29	(1.09, 1.51)	22.8%
Rural communities	1.44	(1.26, 1.63)	1.03	(1.01, 1.05)	1.48	(1.30, 1.68)	7.2%
RD relative to province							
Urban communities	1.20	(1.03, 1.39)	1.06	(1.03, 1.09)	1.27	(1.09, 1.47)	23.1%
Rural communities	1.47	(1.29, 1.68)	1.03	(1.01, 1.05)	1.52	(1.32, 1.74)	7.2%
RD relative to full country							
Urban communities	1.23	(1.05, 1.44)	1.06	(1.03, 1.09)	1.31	(1.11, 1.54)	22.8%
Rural communities	1.54	(1.31, 1.80)	1.04	(1.01, 1.07)	1.60	(1.37, 1.88)	8.5%

OR: odds ratio; CI: confidence interval; RD: relative deprivation

Models examined the association between relative deprivation indicator and self-rated health individually and were adjusted for age, age-squared, sex, absolute household income (low, middle and high), education attainment, marital status, current employment and urbanization of the community (low, middle and high). Results are shown in terms of odds ratios per interquartile change in the relative deprivation indicators and 95% confidence intervals. Contribution of indirect association through perceived stress was calculated by dividing coefficients of indirect association by those of total association (non-exponentiated values).