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The effect of minimum wages on physical and mental health in China

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Abstract

Since 2004 the employment regulations in China require that nominal minimum wages should be adjusted at least once every two years in all the provinces. We exploit these variations to study the impact of minimum wage on the health of workers. Considering data from the Wave 1 of the World Health Organization (WHO)'s Study on Global Aging and Adult Health in China (2007-2010), we use ten health and well-being domains (*mobility, memory, learning, sleep, vision, pain, discomfort. depression and anxiety*) as the dependent variables in an ordered probit model. Our final sample includes about 1825 observations for each health domain considered. We find that the *real minimum wage* is negatively and significantly related to all the health outcomes These negative effects are mostly found for employees in the private sectors and with a full-time contract. We also consider "reporting heterogeneity", estimating Hierarchical Ordered Probit (HOPIT) models. Although reporting heterogeneity is present in nine out the ten health domains, correcting for it does not change our conclusions significantly, since the results for *real minimum wage* we obtain in the HOPIT model are very similar to those obtained in the ordered probit model.

Keywords: minimum wage; self-reported health; China.

JEL Classifications: I18, J31

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1. Introduction

The 2004 Regulation on Minimum Wages implemented by the Chinese central government is a reform of the minimum wage policy in China which requires provincial governments to adjust nominal minimum wages at least once every two years. The aim of the reform is made clear by the Guidelines of the Eleventh Five-Year (2006-2010) Plan for the National Economic and Social Development of the People's Republic of China. According to the Guidelines, execution of the minimum wage policy and the gradual increase of the minimum wage rates are among the methods to reduce income disparity.

The reform and its goal are backed by a strand of literature in economics exploring the impact of minimum wage on poverty and income inequalities. According to Neumark et al. (2006), the economic rationale for increasing minimum wages is to improve the economic conditions of low-income families and to reduce income disparities. There is some empirical evidence, also for China, that an increase in the minimum wage reduced wage disparities and income inequality (e.g., Xiao and Xiang 2009, Lin and Yun 2016, and Majchrowska and Strawinski 2018), although other papers found a negative impact on non-wage benefits (e.g., Long and Yang 2016).

The reduction of income inequality stemming from the increase in minimum wage can also produce indirect beneficial effects, for instance on the health of workers. Increasing income for poor families can help to increase their ability to access health services in case of need and to improve their living conditions, inducing healthier lifestyles. However, in a country like China, where – despite the government regulation fixing five days per week as the standard work schedule - people work much more, minimum wage increases might be adversely linked to health because of a deterioration of working conditions. For instance, facing a higher minimum wage, firms can require additional effort from workers and/or additional working days. Therefore, considering the potential impact on productivity, the net effect of the increase in the minimum wage on health becomes uncertain.

The assessment of the net impact of minimum wage on health in China is the research question that we address in this paper. Our empirical analysis is based on individual-level data from Wave 1 of the World Health Organization's Study on Global Aging and Adult Health (SAGE), which was conducted in China during the years 2007-2010. These data provide several measures of self-reported physical and mental health status for a representative sample of Chinese citizens.

Our findings show that minimum wage is negatively associated with the health of workers. Therefore, the negative impact of the minimum wage (due, e.g., to a more stressful working environment) overcomes the positive effect of the minimum wage (because of, e.g., the improved access to healthcare services). In particular, reinforcing this interpretation, negative effects are found especially for employees working in the private sector (compared to individuals working in the informal sector and self-employed) and with a full-time contract (compared to individuals with part-time work). The magnitude of these effects is relatively small, but it is not negligible.

The impact of minimum wage is estimated by exploiting provincial variations in minimum wage rates, introduced by the 2004 Regulation on Minimum Wages. Minimum wages feature large cross-sectional and intertemporal variation in China (Kong et al. 2021, Geng et al. 2022). They can be considered exogenous since the health status of workers is not taken into account by provincial governments when determining the minimum wage rate. This assumption is supported by the empirical literature. Dreger et al. (2019) and Li et al. (2019) show that although minimum wage regulation stresses the relevance of economic factors in the determination of appropriate levels, the development of minimum wages is largely driven by geographical dependencies and spillovers; also, supply-side characteristics of health care (such as the number of hospital beds per capita) do not affect the setting of minimum wages. We further assess the exogeneity of minimum wages by running a placebo regression. In detail, we use individuals who are self-employed or who are working in the informal sector as the placebo group. The health status of individuals in the placebo group is very unlikely to be affected by minimum wage since the minimum wage policy is not applied to these individuals. We find no evidence of a relationship between minimum wage and health for the placebo group, further reinforcing the causal interpretation of our results.

Another threat to identification is "reporting heterogeneity" characterizing survey data. The degree to which self-reported survey data are comparable across individuals, socio-economic groups or populations has been debated extensively, usually with regard to measures of health status (for example, Jürges 2007, Bago d'Uva et al. 2008, Lindeboom and van Doorslaer 2004, Iburg et al. 2002, Manderbacka 1998, Kempen et al. 1996, Kerkhofs and Lindeboom 1995, Idler and Kasl 1995) and health-related disability (Kapteyn et al. 2007). To check if the results obtained by estimating ordered probit models can be biased by "reporting heterogeneity", we exploit the "vignettes" questions related to health which are provided in the WHO dataset and estimate Hierarchical Ordered Probit (HOPIT) models. Vignettes represent hypothetical descriptions of fixed levels of a latent construct, such as health, and are described through hypothetical scenarios. Since the vignettes are fixed and pre-determined, any systematic variation across individuals in the rating of the vignettes can be attributed to differences in reporting behaviour (Rice et al. 2012). The use of the HOPIT model allows to make data reported by different individuals comparable and to provide a solution to the issue of reporting heterogeneity. We do find reporting heterogeneity in nine out of the ten health domains we consider. However, correcting for reporting heterogeneity does not affect our conclusions significantly, since the results for real minimum wage we obtain in the HOPIT model are very similar to those obtained in the ordered probit model.

Our paper makes a contribution to two strands of literature. First, our paper is primarily related to the literature exploring the impact of minimum wage on the health of workers. Second, we speak to the literature on the impact of minimum wage in China. As for the literature discussing the link between minimum wages and health, it provides mixed results stressing the role of improved access to healthcare services due to better economic conditions, the reduced stress induced by better household financial conditions, or a change in the behavior of workers toward healthier lifestyles. Most of these papers focus on developed countries, such as the US, the UK, and Spain (Leigh et al. 2019, Lenhart 2017a).

A number of papers focus on the USA and the UK. As for the US, some papers consider the impact of minimum wage on eating behavior and its impact on health. For instance, Meltzer and Chen (2011) study the impact of minimum wage rates on body weight, finding that a one-dollar increase in the minimum wage is related to a 0.06 decrease in the average Body Mass Index. On the contrary, more recently, Andreyeva and Ukert (2018) find that the 2009 minimum wage increase is positively associated with the probability of being obese and negatively associated with daily fruit and vegetable intake, while it does not influence healthcare access. There are also studies focusing on the heterogeneity across socio-demographic groups regarding the effects of minimum wage on health. As for gender differences, e.g., Horn et al. (2017) report that in the US minimum wage leads to worse health outcomes for men, particularly among the unemployed; however, they find both worsening general health and improved mental health following minimum wage increases among women. As for racial differences, in the US white women have been shown to be more likely to report better health with a minimum wage increase while Hispanic men report worse health (Averett et al. 2017).

Besides the US, several studies focus on the effects on health outcomes of the introduction of the British National Minimum Wage in the UK in 1999. Reeves et al. (2017) show that the income of low-wage workers increases due to the introduction of minimum wage, and this lowers the probability of experiencing mental illness. On the contrary, Kronenberg et al. (2017) conclude that the introduction of minimum wage does not have an impact on the mental health of low-wage earners. Lenhart (2017b) finds that the introduction of the national minimum wage improves self-reported health status and reduces the presence of health conditions of low-wage workers due to income increase. The potential channels for these effects are health behaviors, leisure expenditures, and reduced stress due to improved financial conditions.

With regard to China, to the best of our knowledge, the study of Chen (2021) is the only one investigating the influence of a minimum wage increase on the health of workers. By using data on low-skilled workers from the 2014 and 2016 waves of the China Labor-force Dynamic Survey (CLDS), the author shows that minimum wage increases significantly improve health, measured through self-reported health status and the presence of health conditions (such as being overweight, reporting physical pain or emotional problems). This effect is particularly relevant for rural workers and individuals who are 35 and above. We had to Chen (2021) by considering a different dataset, a different time span (2014-2016), and – more importantly – including in the sample all workers, and not only low-skilled workers. In addition, we also control for individual reporting heterogeneity, which might bias the results. Differently from Chen (2021), we find evidence of a small but negative effect on health of workers, likely working via a deterioration of working conditions.

Second, we add to the literature on the impact of minimum wage in China. Besides Chen (2021), this literature has been almost exclusively focused on the impact of minimum wages on labor market outcomes.[1] Since the seminal paper of Card and Krueger (1994), the impact of minimum wages on employment, working hours and productivity has been extensively investigated in several countries. Regarding China, Jia (2014) shows that employment is not influenced by a minimum wage increase for males, but men's working hours do increase. On the contrary, a minimum wage increase is likely to cause a reduction in female employment, while women's

[1] Some studies have recently tried to assess the impact of changes in minimum wages on firm's market power. Du and Wang (2020), for instance, have studied the impact of minimum wage on firm markup in China. They find that minimum wage generates a positive effect on firm markup.

working hours are not affected. Huang et al. (2014) find that an increase in minimum wages causes an increase in employment among high-wage firms and a reduction among low-wage firms. Mayneris et al. (2016) find that increases in minimum wage rates decrease employment because of firms' failures between 2003 and 2005, but they have no effect on employment in the surviving firms.[2] The authors explain this result by referring to an increase in productivity, leading to no effect on employment and profitability among the surviving firms that faced a cost shock due to the 2004 reform. The authors estimate that, on average, 20% of the firm-level and city-level productivity increase in China was caused by the minimum wage increase.

Firms can have also adjusted their production and investments behaviour to alleviate the labour cost increase they experienced due to the minimum wage growth which followed the reform of 2004. Haepp and Lin (2017) analyse the impact of Chinese minimum wage regulations on the firm decision to invest in physical and human capital. They report significant negative effects of the minimum wage on human capital investment rates, but no effects overall on fixed capital investment rates.[3] Differently, Geng et al. (2022), by exploiting discontinuities in minimum wage policies at county borders, report that minimum wages induce firms to increase capital investments. A similar result has been found by Du et al. (2022), who show that exposure to higher minimum wages increased a firm's investments in financial assets. Kong et al. (2021), by using data on all contiguous county pairs in China, report that minimum wages significantly and negatively affect entrepreneurship, measured as the total number of new firm registrations per 10,000 people.

As for the effect of minimum wage regulation on inequality among workers, the results are mixed. On the one hand, Xiao and Xiang (2009) find that the increases in minimum wage rates reduced the gap between the average wages across regions: a 10% increase in the minimum wage raised the wage of those in the 10^{th} percentile by 0.75% and in the 20^{th} percentile by 0.42%, and narrowed the 90^{th}-10^{th} percentile gap by 0.87%. Along these lines, using county-level data from 2002-2009, Lin and Yun (2016) find that the increase in the minimum wage reduces income inequality by decreasing the income gap between the bottom and the median of the income distribution. On the other hand, Wang and Gunderson (2012) find that the minimum wage increase in 2003 had no effect on per capita annual wages for both rural and urban households, but it had a negative effect on employment in low-growth regions. Long and Yang (2016) provide evidence of private firms cutting non-wage benefits, such as pension and insurance, when faced with a minimum wage increase, suggesting that the overall compensation package for workers had not been affected.[4]

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[2] Different effects of minimum wages for different groups of workers are also found by Holtemöller and Pohle (2020) for Germany. The authors show that the introduction of a nationwide statutory minimum wage in 2015 had a robust negative effect of minimum wage on marginal employment and a robust positive effect on regular employment. The overall effect on employment in terms of number of jobs was negative. It looks that low-wage employees who remained employed ended up as better off at the expense of those who have lost their jobs due to the minimum wage.

[3] These results hold for most firms, however foreign-owned firms are an exception, since the likelihood that they invest in human capital does not decrease in response to the policy.

[4] When considering another developing country, Malaysia, Saari et al. (2016) show that minimum wages lead to a reduction in poverty. Poverty reduction in their paper is mainly explained by an increase in total income rather than a shift in income distribution.

Our paper contributes to the previous literature in several ways. Our study is the first one which investigates the influence of minimum wage on the health of workers in China, by considering a sample representative of the whole population. Moreover, we consider as health outcomes a set of ten health conditions, which represent both physical and mental health. Our finding of a negative (small, but not negligible) impact on health is robust to several robustness checks and to the presence of reporting heterogeneity.

The remainder of the paper is structured as follows. Section 2 describes the minimum wage policy in China and the 2004 reform. Section 3 presents the data and offers some preliminary descriptive statistics. The empirical strategy is discussed in Section 4, while our results are presented in Section 5. Section 6 briefly concludes the paper.

2. Minimum wage regulation in China

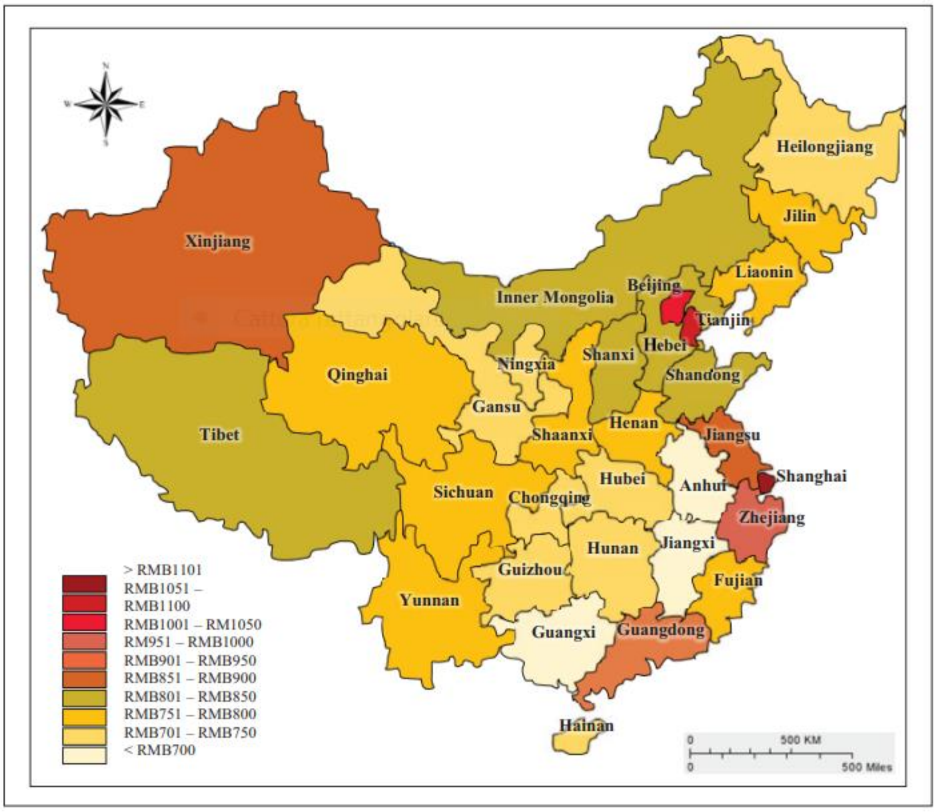
The latest Regulations on Minimum Wages in China were passed on December 30th, 2003 and were implemented on March 1st, 2004 (The State Council 2004). The Regulations were included in the Labour Contract Law, the primary source of labour law in China, which took effect in 2008 (e.g., Wang and Gunderson, 2012). In comparison to the 1993 version, the coverage of 2004 Regulations was extended to private non-enterprise units (i.e., civil organizations which may include private schools, private hospitals, private libraries, private scientific and technological institutions), and employees in part-time workers. Moreover, the penalties applied to those not respecting Regulations on minimum wage were increased from a range of 20-100% of the owed wage to a higher range of 100-500%. Notice that these penalties are effective, as 93.2% of active firms claimed an average wage equal to or higher than the local minimum wage since the 2004 reform (Mayneris et al. 2016).

The 2004 Regulations aimed at increasing monthly salaries for Chinese workers, which were far behind those of workers in other countries in 2004. Average monthly salaries earned by manufacturing workers were only 141 USD in China, compared to 342 USD in Mexico and over 2,500 USD in the US (e.g., Mayneris et al. 2016). Minimum wages have to be set by provincial governments based on a number of variables such as minimum living costs of the local employees and the people supported by them, the urban residents' consumption price index (CPI), the social insurance premiums and the public accumulation funds for housing paid by the employees, the average salary for workers, the level of economic development and the employment rate. Minimum wages have to be granted to workers, without including in them subsidies such as overtime pay, nightshift compensation, supplements for working in an extreme environment, and other non-wage benefits precribed by national laws, regulations and policies.

Differently from other countries (e.g., the UK and Germany), the 2004 Regulations do not define a general national minimum wage standard, leaving to the provincial governments to determine minimum wages. In particular, provincial governments set out multiple minimum wages for the province. Then, cities and counties within the province choose their own minimum wage level according to their local situation (Mayneris et al. 2016). For example, in 2009 the Anhui province had six different minimum wages (390, 420, 460, 500, 540, 560 RMB) which are the lowest in the country; the Gansu province had four different minimum wages (500, 540, 580 and 620 RMB);

and the Guangdong province had seven different minimum wages (530, 580, 670, 770, 860, 900 and 1000 RMB) which are the highest in the country. Furthermore, according to the 2004 Regulations, nominal minimum wages (both monthly and hourly standard wages) should be adjusted at least once every two years. Among the 32 provincial administrative regions (excluding Hong Kong and Macau), nominal minimum wages were increased in 14 regions in 2007, 22 regions in 2008 and 30 regions in 2010; however, there were no changes in any regions in 2009. The absence of changes in 2009 is due to the fact that, because of the global financial crisis, at the end of 2008 the Ministry of Human Resources and Social Security issued policy guidelines allowing for a postponement in the minimum wage change (Jia 2014). Figure 1 illustrate the distribution of minimum wages at provincial level, based on data averaged between 2004 and 2015 and classified by range. Most of the provinces in central China are characterized by relatively low levels of minimum wages, compared with many coastal provinces in the East and Xinjiang in the West. Shanghai is the province characterized by the highest minimum wage, followed by Tianjin and Beijing.

Figure 1: Distribution of minimum wage level in China by provinces.



Note: Minimum wage is based on average 2004-2015

3. Data and descriptive statistics

Our empirical analysis is based on individual-level data from Wave 1 of the World Health Organization's Study on Global Aging and Adult Health (SAGE), which was conducted in China during 2007-2010. SAGE has already been used in a number of studies on China (Kumar et al., 2015; Weir et al., 2014; Wu et al., 2013) and it is part of a WHO program collecting comprehensive longitudinal information on the health and well-being of adults and the aging process. In particular, SAGE collects data on adults aged 18 years old and over, oversampling people aged 50 years old and over. Seven provinces (Zhejiang, Shandong, Guangdong, Hubei, Jilin, Shaanxi, and Yunnan), mostly coastal provinces, are included in our sample.[5] One urban and one rural site were randomly selected in each province. The primary sampling unit is the township/community within each city. Overall, 55 townships/communities are included in our sample.

We linked the data at the individual level from SAGE with city-level minimum wage data and other city-level data. Data about nominal minimum wage at the city level, which is the main independent variable in our analysis, were obtained from the Bureau of Labour Statistics website. We assigned to each individual the nominal wages that were in force during the month when the individual was surveyed. The nominal minimum wage is measured in RMB. We also deflate the nominal minimum wage by the provincial consumer price index (CPI) (2005=100) from the National Bureau of Statistics of China. The mean value for the real minimum wage is 563 RMB, which corresponds to about 80 USD in 2007.[6] Data regarding the population density at the city level were obtained from the China City Statistical Yearbook. Population density is measured as 1000 people per squared km, and its mean value is 0.36.

As we are interested in the effect of minimum wage on health for the population potentially subject to this regulation, we restricted the sample to participants who are currently employed and whose source of household income includes salaries or wages. We only include in our sample females aged 18 to 54 and males aged 18 to 59 (as the retirement age is 55 years old for females and 60 years old for males in China). We also limit the sample to those who had been living continuously in the village/town/city where they were interviewed for at least 3 years, to avoid the results of our empirical analysis being biased by cross-regional spillover effects. Our final sample includes about 1825 observations for each health domain considered, over the period 2007-2010.

We use as dependent variables ten ordinal health outcome measures comprised in SAGE, which are *mobility*, *memory*, *learning*, *sleep*, *see far*, *see close*, *pain*, *discomfort*, *depression*, and *anxiety*. These measures are self-reported by the respondents and describe their physical and mental health status. Definitions of these health domains are provided in Table 1, while Table 2 provides a

[5] The province of Shanghai was also sampled in SAGE. However, we excluded this province from our sample for a number of reasons. First, the levels of population density, wages and real minimum wages are much higher than in the other provinces considered; therefore, the province of Shanghai can be considered as an outlier. Second, when considering a dummy variable for Shanghai, this dummy variable results as highly correlated with population density (98%) and real minimum wages (t-1) (about 70%). Therefore, the inclusion of this dummy in our regression model would create a serious multicollinearity issue. Indeed, we have run a tentative regression model using a sample which includes the observations from the province of Shanghai. The mean of the variance inflation factors (VIFs) for such estimates is about 70. The mean of VIFs shows how much the variance of the coefficient estimate is being inflated by multicollinearity. There is no formal cut-off value to use with the mean of VIFs for determining the presence of multicollinearity, however values exceeding 10 are often regarded as indicating multicollinearity (Green 2003). Therefore, the results obtained using a sample which includes Shanghai appear as seriously affected by a multicollinearity bias.

[6] In December 2007 1 USD was equal to about 7.3 RMB

description of the vignettes for an illustrative domain, *mobility*.[7] Both the health domains and the vignettes are measured on a four-categorical scale. Individuals were asked "*Overall in the last 30 days, how much difficulty did [name] have with… [health outcome]?*" and they could choose their response among the following categories: *extreme/severe*, *moderate*, *mild,* or *none*.[8]

Table 1: The definitions of health outcomes (SAGE WHO questionnaire)

Health Outcome	Questionnaire (In the last 30 days, how much …)
Mobility	difficulty did you have in vigorous activities?
Memory	difficulty did you have with concentrating or remembering things?
Learning	difficulty did you have in learning a new task?
Sleep	difficulty did you have with sleep?
See far	difficulty did you have in seeing and recognising an object or a person you know across the road (from a distance of about 20 metres)?
See close	difficulty did you have in in seeing and recognising an object at arm's length (for example, reading)?
Pain	bodily aches or pains did you have?
Discomfort	bodily discomfort did you have?
Depression	of a problem did you have with feeling sad, low or depressed?
Anxiety	of a problem did you have with worry or anxiety

Answer categories	
1	*Extreme/ Cannot do*
2	*Severe*
3	*Moderate*
4	*Mild*
5	*None*

We include as controls in our regression model some individuals' demographic characteristics which have been proven to be relevant determinants of health, such as *age* (a continuous variable measured in years), *gender* (dummy variable, male is the reference category), *marital status* (dummy variable, married vs not-married, being married is the reference category) and *education* (dummy variables, primary or secondary school degree vs high school or college degree, having a primary or secondary school degree is the reference category). We also include the *annual household income* (a continuous variable indicating total household income from all sources and measured in 1000 RMB), the *individual annual wages* (in 1000 RMB), and *other sources of income* (a dummy which indicates if the respondent receives some income from other sources different from

[7] The description of the vignettes for the full set of domains considered in our study is provided by SAGE.

[8] In the original SAGE dataset the health outcomes and vignettes are measured on a five categorical scale, where the possible response categories are *extreme, severe, moderate, mild, none.* Since the percentage of respondents who choose the categories *extreme* and *severe* is very limited, we decided to aggregate those two categories.

work, such as earnings from selling or trading financial products; entail of property; pension, contributory pension fund, provident fund or social security benefit; Interest and dividends).

Table 2: The description of vignettes, *mobility* domain

Vignettes (*mobility*)	
	1. [Alan] is able to walk distances of up to 200 metres without any problems but feels tired after walking one kilometre or climbing up more than one flight of stairs. He has no problems with day-to-day physical activities, such as carrying food from the market.
	2. [Alejandro] has a lot of swelling in his legs due to his health condition. He has to make an effort to walk around his home as his legs feel heavy.
	3. [Miriam] does not exercise. She cannot climb stairs or do other physical activities because she is obese. She is able to carry the groceries and do some light household work.
	4. [Abigail] has no problems with walking, running or using her hands, arms and legs. She jogs 4 kilometres twice a week.
	5. [Vladimir] is paralyzed from the neck down. He is unable to move his arms and legs or to shift body position. He is confined to bed.

Overall in the last 30 days, how much difficulty did [name] have in vigorous activities?

Answer categories	
1	*Extreme/ Cannot do*
2	*Severe*
3	*Moderate*
4	*Mild*
5	*None*

We also control for some variables related to the employment status of workers. Among those variables, we account for *the type of employment*, which is measured as a categorical variable, where the categories are *professionals* (senior officials, managers, and professionals), *service workers* (technicians and associate professionals; clerks; service and shop workers and shop) and *blue collars* (which is the reference category). We also control for the *job sector*, a categorical variable, where the categories are *informal/self-employed* and *public/ private* (which is the reference category); and for the *type of contract,* a dummy variable where the categories are *full-time* (the reference category) and *part-time*.

Additionally, we control for some characteristics of the living environment of the respondents by including in our empirical model three variables. The first variable is *safety*, a dummy that reports the self-perception of the respondents about safety in terms of crime and violence at the neighborhood level (where *safe* is the reference category). The other variables are *population density*, a continuous variable (1000 people per Km^2) measured at the city level, and *urban*, a dummy variable that picks up the difference between urban and rural areas. We also control for unobserved residual heterogeneity by including province-fixed effects and year-fixed effects.

Descriptive statistics of the health outcomes for the full sample are shown in Table 3. On average, people have none or mild difficulty in their physical and mental health. Moreover, descriptive statistics for the main explanatory variable and control variables are presented in Table 4. The mean nominal minimum wage is around 563 RMB. The average age of the sample is 49. Men represent about 65% of the sample, and about 93% of the individuals in the sample are married. The average population density is about 360 persons per square km at the city level, 60% of the interviewed live in an urban area, and about 33% of people do not feel safe around their neighborhood.

Table 3: Summary statistics for the health outcomes

Health Domain	Observations	Mean	St. Dev.	Min	Max
Mobility	1,824	4.460	0.863	2	5
Memory	1,824	4.745	0.542	2	5
Learning	1,824	4.632	0.626	2	5
Sleep	1,825	4.706	0.599	2	5
See far	1,826	4.812	0.485	2	5
See close	1,826	4.552	0.697	2	5
Pain	1,823	4.617	0.639	2	5
Discomfort	1,823	4.608	0.631	2	5
Depression	1,823	4.854	0.415	2	5
Anxiety	1,824	4.854	0.413	2	5

Table 4: Summary statistics for the main explanatory variable (nominal minimum wage) and control variables

	Variable	Observations	Mean	St. Dev.	Min	Max
City characteristics	population density	1,824	0.36	0.24	0.140242	1.04046
Neighbourhood	not safe	1,824	0.33	0.47	0	1
characteristics	urban	1,824	0.40	0.49	0	1
Demographic characteristics	age	1,824	48.66	8.21	18	59
	female	1,824	0.35	0.48	0	1
	single	1,824	0.07	0.25	0	1
Education	primary	1,824	0.17	0.37	0	1
	secondary	1,824	0.52	0.50	0	1
	High school / college	1,824	0.31	0.46	0	1
Income	wages	1,824	7,556.80	12,238.51	0	200,000
	household_income	1,824	28,599.06	42,859.78	0	900,000
	other_income	1,824	0.38	0.48	0	1
	rmwage	1,824	563.11	110.35	426.2712	738.8701
Job categories	professionals	1,824	0.08	0.28	0	1
	Service workers	1,824	0.18	0.38	0	1
	Blue collar	1,824	0.74	0.44	0	1
Job characteristics	full_time	1,824	0.72	0.45	0	1
	part time	1,824	0.28	0.45	0	1
Job sectors	public	1,824	0.28	0.45	0	1
	private	1,824	0.17	0.38	0	1
	Self-employed	1,824	0.50	0.50	0	1
	informal	1,824	0.04	0.20	0	1
Provinces	Guangdong	1,824	0.18	0.39	0	1
	Hubei	1,824	0.05	0.22	0	1
	Jilin	1,824	0.10	0.30	0	1
	Shaanxi	1,824	0.18	0.39	0	1
	Shandong	1,824	0.26	0.44	0	1
	Yunnan	1,824	0.08	0.27	0	1
	Zhejiang	1,824	0.14	0.35	0	1
years	2007	1,824	0.47	0.50	0	1
	2008	1,824	0.09	0.28	0	1
	2009	1,824	0.36	0.48	0	1
	2010	1,824	0.08	0.28	0	1

4. Empirical strategy

4.1. Baseline specification

Following the approach by, e.g., Horn et al. (2017), Reeves et al. (2017), Clark et al. (2020), and Chen (2021), we adopt an *ordered probit model* to estimate the impact of real minimum wage on health. We consider the following specification:

$$h_{icpt} = \beta_0 + \beta_1 MW_{cpt-1} + \beta_2 X_{icpt} + \alpha_p + ð_t + u_{icpt} \quad (1)$$

where h_{pcit} is the health outcome indicator of individual *i* in city *c* in province *p* in year *t*; MW_{pct} is the real monthly minimum wage of city c in year t-1; X_{pcit} is a vector of control variables at the individual, household, and city level; α_p is the province fixed effect; $ð_t$ is the year fixed effect, and u_{pcit} is the error term. Similar to Horn et al. (2017) and Chen (2021), we use a 1-year lag in the real minimum wage to examine its effect on health outcomes.

To interpret β_1 in Eq. (1) as a causal effect of the minimum wage, we require any variations in the error term u_{icpt} to be unrelated to the real minimum wage. This assumption holds only if the unobserved and idiosyncratic health determinants captured by u_{icpt} are uncorrelated with the real minimum wages set by provincial governments. For example, although we include several controls in the model, as well as province and year fixed effects, there may still be other policies or city-level changes that occur simultaneously with minimum wage increases, resulting in u_{icpt} being correlated with minimum wage. Cities with higher minimum wages, for instance, may be more likely to invest in health promotion and polices to favour access to health care services. Using a lagged minimum wage is helping in reducing these problems. However, we can further rule out endogeneity issues by both making reference to previous literature studying the determinants of the levels of minimum wages in Chinese provinces and by running a placebo test.

First, when considering the previous literature on the determinants of minimum wages, there is no evidence that population health does play a role. For instance, Huang et al. (2014) explore the determinants of minimum wage change and find little evidence that economic conditions, like local growth or unemployment, have explanatory power in predicting minimum wage changes despite the current regulation requiring local provincial governments to account for these variables.[1] This result is supported also by Dreger et al. (2019) and Li et al. (2019), who show that the development of minimum wages has been largely driven by geographical dependencies and spillovers. Spatial spillovers reflect the geographical pattern of provinces and can arise for several reasons, including competition between local policymakers.[2] Dreger et al. (2019) exploit data from the Chinese National Bureau of Statistics and consider minimum wage levels for 31 provinces from 2004 to 2014. They assume first-order spatial autocorrelation and

[1] By making reference to minimum wages in China in the period 2002-2008, Hau et al. (2020) provide evidence that local business cycle variables do not predict local minimum wage changes. They argue that the timing of the minimum wage change is determined by internal party politics.

[2] "Cross-section autocorrelation patterns could arise because of common infrastructure and migration flows but can also stem from regional competition between policymakers. On the one hand, local authorities may have an incentive to keep minimum wages at rather low levels to improve cost competitiveness. On the other hand, higher minimum wages can indicate the sound economic performance of a region. Even skilled workers might be attracted, as a more generous minimum wage represents an advanced level of development. Officials from regions with stronger GDP growth have a better chance of being promoted by the central government. Their ability to manage economic challenges is perceived to be higher, implying better career opportunities in the Communist Party. In any case, minimum wages in competitive regions are a benchmark when determining wage levels (Dregen et al. 2019, p. 46-47).

take into consideration spillovers between provinces sharing a common border. Their results show the existence of strong provincial ties in the development of minimum wages. Once these spatial effects are considered, the role of economic variables in the determination of minimum wages declines, and their impact is much smaller than what should be expected. However, since the provinces we consider in our analysis do not share common borders (except Hubei and Shaanxi, which share a small border), we can exclude that spillover effects are a relevant issue for our analysis.

Li et al. (2019) collected a panel data set of city-level minimum wage standards from China's government websites from 2004 to 2012. The final data set for the analysis of minimum wage standards includes 252 prefecture-level cities in 25 provincial-level administrative units. Differently from Dreger et al. (2019), the authors consider two definitions of the spatial lag in their analysis: (i) a *contiguity matrix*, where a city's neighbors are defined as prefecture cities that share borders with it, and (ii) an *inverse distance-based weighting matrix*, which assumes that closer cities have stronger impacts on a city than cities farther away. They find strong evidence of spatial interdependence in minimum wage levels. Among the city-level socio-economic characteristics which may affect minimum wages, Li et al. (2019) consider also the number of beds in hospitals (standardized by population). Interestingly, the number of beds in hospitals is never significant in their regression model. Hence, the characteristics of the supply of health care are not relevant for the determination of minimum wages, a result that further reinforces the exogeneity of minimum wages concerning health.[3]

As for the placebo test, following Horn et al. (2017), Clark et al. (2020), and Chen (2021) we define a "placebo group", a group of workers that should not be affected by minimum wage increases and consider an interaction term with the minimum wage variable. We include in the "placebo group" individuals who are self-employed or individuals who are working in the informal sector. This placebo group is very unlikely to be affected by minimum wage increases. However, Ai and Norton (2003) caution about the interpretation of interaction terms in non-linear models. First, although the directly estimated coefficient of the interaction term might be zero, the partial effect for an interaction term could be non-zero. Second, standard significance tests on the coefficients of the interaction term are not reliable. Third, the interaction effect is conditional on the independent variables and may have different signs for different values of the covariates. For all these reasons, in running the placebo test we collapse the self-reported ordered categorical health variables into dummy variables assuming value 1 for "excellent" and "very good" health, and 0 for "fair" and "poor/very poor" health, and employ the linear probability model instead of an ordered probit model. Defining the "placebo group" as the treatment group, we estimate the following specification:

$$h_{icpt} = \beta_0 + \beta_1 MW_{cpt-1} + \beta_2 Treat_{icpt} + \beta_3 MW_{cpt-1} \times Treat_{icpt} + \beta_4 X_{icpt} + \alpha_p + ð_t + u_{icpt} \quad (2)$$

[3] Appendix A.1 provides a brief description of the Chinese healthcare system for interested readers.

where $Treat_{icpt}$ is a dummy variable equal to one if individual i in city c , province p, year t is a member of the treatment ("placebo") group and zero otherwise. All the other variables are the same as in Eq. (1). The placebo test is based on the coefficient β_3 in Eq. (2), which measures the causal effect of minimum wage increases on health for the treatment group. If there is evidence of a significant relationship between minimum wage and health for the placebo group, the estimates of Eq. (1) are likely affected by an omitted variable bias.

4.2 Robustness checks

We consider several robustness checks for our baseline estimates. First, for all the health domains, we also estimate linear probability models collapsing the self-reported ordered categorical health variable into a dummy variable like in the placebo test exercise.

Second, we test the effects of real minimum wages for different sub-groups. We consider subgroups by gender, as women are considered one of the target groups for the minimum wage policy (Wang and Gunderson, 2012). We further analyze the effect of minimum wages on health by job sectors (public sector, private sector, self-employed). Lastly, we run the regression for subsamples defined by the type of contract, either full-time or part-time.

Third, we consider the issue of reporting heterogeneity. Reporting of health outcomes in our data is via ordered categorical variables, which are assumed to be a discrete representation of some underlying latent scale. If individuals map the latent scale to the response categories in a consistent way, irrespective of their socio-demographic characteristics or other individual characteristics, then their reporting behavior can be considered homogeneous. Under these circumstances, the standard ordered probit estimator would be appropriate to model the data because it assumes a set of constant thresholds in the mapping of the latent scale to the response categories. However, when individuals use *different* thresholds when mapping the latent construct to the available response categories, reporting heterogeneity (also known as "differential reporting behavior" or "differential item functioning" (DIF)) becomes an issue. Systematic variation in reporting behavior can be examined with regard to the individual characteristics of the respondents, such as socio-economic characteristics like education and income (Bago d'Uva et al., 2008).

To check if the ordered probit model estimates are affected by reporting heterogeneity, we estimate a HOPIT model. The HOPIT model, originally put forward by Tandon et al. (2003) (see also Terza, 1985) is an extension of the ordered probit model which allows variability in the thresholds across individuals. The method relies on the use of anchoring vignettes. Vignettes represent hypothetical descriptions of fixed levels of a latent construct, such as health, and are described through hypothetical scenarios. Since the vignettes are fixed and pre-determined, any systematic variation across individuals in the rating of the vignettes can be attributed to differences in reporting behavior (Rice et al., 2012). Accordingly, based on the answers given to the vignette questions, the response thresholds (also called "cut-points") can be modelled as a function of the individual characteristics of respondents. Individuals are asked to evaluate the vignettes adopting the same scale they use to evaluate their own experiences, therefore the information "extracted" from vignettes can be used to adjust the self-reported data provided by respondents. By adopting the thresholds observed for a typical respondent (e.g. the average) as a benchmark, responses of other individuals can be "anchored" (that is re-scaled). This adjustment allows to make data reported by different individuals comparable and to provide a solution to the issue of reporting heterogeneity.

The use of vignettes to identify reporting heterogeneity relies on the following two assumptions, *response consistency*, and *vignette equivalence*. *Response consistency* requires that an individual uses the same reporting style for both the self-assessment and the rating of the hypothetical situation described in the vignettes. *Vignette equivalence* states that 'respondents may differ with each other in how they perceive the level of the variable portrayed in each vignette, but any differences must be random and hence independent of the characteristic being measured' (King et al., 2004, p. 194).

The HOPIT model consists of two parts. In the first part, vignettes are used to identify the response thresholds as a function of relevant characteristics (reporting behavior equation). The second part evaluates the effect of individual characteristics (such as sociodemographic characteristics) on the underlying individual health status while accounting for differences in reporting behavior estimated in the first part (health equation). A more technical description of the HOPIT model can be found in Appendix A.2.

5. Empirical results

5.1. The impact of minimum wages on health

Table 5 presents the ordered probit model estimates for the ten health outcomes (described above in Section 4) when considering the full sample. Besides reporting the coefficient relative to the main independent variable (one year lagged *real minimum wage*), we also include in Table 5 coefficients regarding the area characteristics (*population density safety*, *urban*) and the main socio-demographic characteristics (*age, female*, *single, household income*, *wages, other income* and *high school/college*) (results regarding the full specification are reported in Table A1 of the Appendix A.3). In all the health domains, the minimum wage has a negative influence on health, and related coefficients are highly statistically significant ($p<0.001$) in most of the domains. The other coefficients which appear statistically significant are those related to variables describing the area characteristics. To check that multicollinearity is not an issue for the chosen model specification, we calculate the variance inflation factors (VIFs) for the regressors specified in the regression model.[4] The mean of the VIFs is equal to 6.88, suggesting that multicollinearity is not an issue for our estimates.

[4] The model estimated to compute the VIFs is a linear one.

To provide some information about the magnitude of the impact of real minimum wage on health, Table 6 shows the marginal effects (ME) for the *real minimum wage (t-1)* (in 1000 RMB), for individuals with a low, average, and high minimum wage. The marginal effects represent the change in the probability of being in the best health category (reporting "excellent" for the health domains considered) due to a marginal increase in the *real minimum wage*. The marginal effects are computed as the average of the individual marginal effects. We find some non-linearities for the domains more related to physical health (*mobility*, *memory*, *learning*, *sleep*, *see far*, *see close*, *pain*, *discomfort*). The magnitude of the ME increases (in absolute terms) when passing from the "low wage" to the "average wage" group, and then decreases when passing from the "average wage" to the "high wage" group. However, for the domains more related to mental health (*depression* and *anxiety*), the relationship seems to be linear, since the magnitude of ME decreases when the wage of the individuals increases The latter finding is fully consistent with the previous empirical literature, which shows that higher minimum wages mainly affect the bottom of the wage distribution (Majchrowska and Strawinski 2018).

Some back-of-the-envelope calculations show that the magnitude of the effect of a potential increase in the *real minimum wage* on individual health is small but not negligible. Consider, for instance, the average increase in the *real minimum wage* in one year, that is a 20 RMB increase in the real minimum wage. The implications for individuals with "average wage" is a reduction in the probability of being in the best health category of 2.7% for the domain of *mobility*; for the domain of *memory*, such reduction would be 4.9%, while for the domain of *learning* it would be 4.4%.

To reinforce the causal interpretation of our results, we provide a placebo test in the lower panel of Table 7. Linear probability model estimates show that minimum wage still hurts the self-reported health status of the reference group (individuals employed in the private and public sector), and the effects are statistically significant for half of the domains. On the contrary, the coefficients of the interaction term between minimum wage and the "placebo group" (which includes self-employed and individuals working in the informal sector) are never statistically significant, meaning that minimum wages have no significant effects on the health of individuals in the placebo group, that are not affected by the minimum wage regulation.

Table 5: Ordered Probit Model, estimates, full sample

	mobility	memory	learning	sleep	see_far	see_close	pain	discomfort	depression	anxiety
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
real minumum wage (t-1) (in 1000 RMB)	-3.681**	-7.633***	-6.319***	-3.172+	-4.221**	-6.375***	-7.166***	-5.629***	-5.534***	-4.706**
	-1.15	-1.286	-1.778	-1.639	-1.357	-1.523	-1.22	-1.127	-1.358	-1.673
population density	1.619**	2.822***	2.619***	1.073+	1.765***	2.029***	1.747***	1.595***	1.846***	1.727**
	-0.506	-0.466	-0.631	-0.595	-0.449	-0.582	-0.453	-0.426	-0.545	-0.63
not safe	-0.212**	-0.342***	-0.268**	-0.255***	-0.292**	-0.156+	-0.283***	-0.278***	-0.314***	-0.354***
	-0.081	-0.084	-0.086	-0.06	-0.093	-0.088	-0.07	-0.079	-0.082	-0.077
urban	0.387*	0.17	0.067	0.344*	-0.122	0.315+	0.658***	0.540***	0.322+	0.340+
	-0.194	-0.151	-0.18	-0.163	-0.158	-0.185	-0.152	-0.156	-0.167	-0.178
household income (in 1000 RMW)	2.46E-04	0.005+	0.001	-0.001	-0.002*	0.002	0.002	0.001	0.003	0.002
	-0.002	-0.003	-0.001	-0.001	-0.001	-0.002	-0.002	-0.001	-0.002	-0.002
wages (in 1000 RMW)	0.013***	0.004	0.003	0.006	0.011+	0.001	0.011*	0.010**	0.016**	0.010*
	-0.004	-0.004	-0.003	-0.004	-0.005	-0.003	-0.005	-0.004	-0.005	-0.004
other income	0.052	0.063	0.011	0.038	0.144	-0.103	0.064	0.09	0.073	-0.003
	-0.085	-0.082	-0.061	-0.058	-0.089	-0.075	-0.073	-0.073	-0.097	-0.093
age	-0.039***	-0.055***	-0.058***	-0.019***	-0.033***	-0.077***	-0.019***	-0.026***	-0.014*	-0.015*
	-0.006	-0.007	-0.008	-0.004	-0.007	-0.009	-0.005	-0.005	-0.007	-0.006
female	-0.179**	-0.101	-0.077	-0.167*	-0.127	-0.207**	-0.150*	-0.119+	-0.179+	-0.214*
	-0.059	-0.077	-0.082	-0.072	-0.092	-0.071	-0.07	-0.065	-0.096	-0.086
single	-0.278*	-0.138	-0.211+	-0.189	-0.206	-0.321*	0.017	0.055	-0.407**	-0.537***
	-0.132	-0.15	-0.126	-0.128	-0.153	-0.142	-0.109	-0.123	-0.15	-0.131
High school / college	0.096	0.132	0.145+	0.009	0.177+	0.135	0.128+	0.153+	-0.12	-0.084
	-0.102	-0.104	-0.083	-0.098	-0.102	-0.09	-0.075	-0.083	-0.112	-0.113
aic	3332.887	2065.256	2586.237	2453.03	1823.569	2842.08	2712.547	2746.115	1550.696	1559.719
bic	3481.624	2213.994	2734.974	2601.782	1972.336	2990.847	2861.269	2894.837	1699.419	1708.456
N	1824	1824	1824	1825	1826	1826	1823	1823	1823	1824

Note: Coefficients and standard errors are presented for each health domain. Other controls included in the specification: self-employed and informal sector, professionals, service workers, part time, province fixed effects, year fixed effects. + p< 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 6: Ordered Probit, marginal effects for the real minimum wage (t-1) (in 1000 RMB), for individuals with low, average and high wage

			average		
LOW wage	**(<1921 RMB)**	467 obs	**ME**	**sd**	**t stat**
mobility_activity			-1.209	0.256	-4.728
memory			-2.251	0.709	-3.176
learning			-2.155	0.505	-4.266
sleep			-0.953	0.168	-5.680
see_far			-0.881	0.345	-2.555
see_close			-1.916	0.669	-2.864
pain			-2.435	0.429	-5.680
discomfort			-1.971	0.317	-6.222
depression			-1.328	0.379	-3.502
anxiety			-1.115	0.306	-3.645
AVERAGE wage (>1912.8 & <=2375 RMB)		602 obs			
mobility_activity			-1.343	0.179	-7.497
memory			-2.443	0.681	-3.588
learning			-2.219	0.475	-4.668
sleep			-1.090	0.127	-8.595
see_far			-0.965	0.346	-2.787
see_close			-2.230	0.467	-4.777
pain			-2.645	0.312	-8.492
discomfort			-2.086	0.234	-8.921
depression			-1.194	0.334	-3.577
anxiety			-1.025	0.267	-3.839
HIGH wage	**(>2375 RMB)**	756 obs			
mobility_activity			-1.117	0.313	-3.566
memory			-1.242	0.808	-1.538
learning			-1.431	0.742	-1.929
sleep			-0.719	0.255	-2.816
see_far			-0.897	0.383	-2.344
see_close			-1.735	0.801	-2.167
pain			-1.747	0.731	-2.390
discomfort			-1.446	0.505	-2.866
depression			-0.810	0.445	-1.820
anxiety			-0.702	0.363	-1.936

Note: The marginal effects report the change in the percentage of individuals in the best health category due to a unit increase in the real minimum wage (in 1000 RMB). Marginal effects are computed as the average of the individual marginal effects.

5.2. Robustness checks

We run several robustness checks. First, in the upper panel of Table 7 we report the estimated coefficients and standard errors for real minimum wage (t-1) obtained through a linear probability model for the ten health domains considered. These results are consistent with those obtained by estimating the ordered probit model, since real minimum wage has a negative influence on health and the coefficients are statistically significant, with the exception of *depression* and *anxiety*.

Second, we run ordered probit models stratifying the sample by gender, sector of employment and type of contract. Results are reported in Table 8. Panel A includes the results for sub-groups by gender (men, n.=1186; women, n.=638). The coefficients estimated for men and women remain negative and highly statistically significant in most of health domains. Coefficients across the two sub-groups are fairly similar for *memory, learning, see_close, depression* and *anxiety.* We do find that men are more affected than women for *mobility, sleep, pain* and *discomfort*, while *see_far* is the only domain for which women are affected more than men. Panel B of Table 8 reports the effect of *real minimum wage* on health for sub-groups by sector of employment. We consider individuals who are self-employed (n.=921), work for the public sector (n.=508) and for the private sector (n.=318).[1] Coherently with the placebo test, we find that individuals working in the private sector seem to be particularly affected by the *real minimum wage* policy: for these individuals, the effects are negative and statistically significant (and even larger than in the model estimated on the full sample) in 5 out of 10 domains. For the other two sub-groups, some coefficients even turn positive, albeit not statistically significant. Panel C of Table 8 presents stratification by type of contract, distinguishing between individuals working full-time (n.=1318) and part-time (n.=514). The *real minimum wage* maintains a negative and statistically significant effect for individuals in full time employment for all domains. On the contrary, the effects for part time workers appear to be less consistent and less statistically significant. Overall, our stratification exercises show that the negative effects on health are mostly driven by workers in the private sector under a full-time contract.

Third, as a final robustness check, we discuss the issue of reporting heterogeneity. Table 9 reports the coefficients for *real minimum wage (t-1)* (in 1000 RMB) estimated by the HOPIT model (*health equation*, see Appendix A.2). These coefficients are compared to those derived from the standard ordered probit model, which assumes fixed thresholds across all individuals.[2] The coefficients from the HOPIT model are negative as those in the ordered probit model and have a similar (high) level of statistical significance. Table 10 presents results of tests for homogeneity in reporting behaviour for the ten health outcomes. For each of the socio-demographic characteristics considered, p-values from a Wald test of the joint significance of

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[1] We do not consider individuals working in the informal sector, since this is a very small percentage of the sample (about 3%).

[2] To identify the parameters of an ordered probit model it is customary to fix the constant and variance to 0 and 1 respectively (for example, see Greene 2003). We follow a similar identification strategy in the HOPIT model; hence, the coefficients from the two models are comparable.

the estimated coefficients across the four thresholds of the HOPIT model are reported. Rejection of the null indicates the thresholds are functions of the respective socio-demographic characteristic. Results are shown by *real minimum wage*, *population density*, *safety*, *age*, *male*, *primary school* and *high school/college*. In addition to separate tests for each variable, the first column reports a joint test across all socio-demographic characteristics. For all domain combinations (with the exception of *mobility*), the null hypothesis of homogenous reporting can be rejected. The results indicate greater reporting heterogeneity by *real minimum wage,* compared to the other variables. The reporting style of the individuals is affected by this variable in 5 out of the 10 health outcomes considered. Table 11 shows the coefficient and the standard error for the *real minimum wage* in the cut point equations of the HOPIT model. The variation in the estimated coefficients illustrates the existence of differential reporting behaviour due to the *real minimum wage* in 5 out of 10 domains (*memory*, *sleep*, *see_far*, *see_close*, *depression*). Such coefficients indicate that the reporting style of the individuals with regard to *real minimum wage* is consistent with the difference we observe in the coefficients for *real mimimum wage* in the ordered probit and HOPIT models reported in Table 9. As an example, in the domain of *memory* the coefficient for the cut-point mu4 is negative and statistically significant, which means that individuals with higher *real mimimun wage* are more likely to report to be in the top categories of health. This is fully compatible with the results shown in Table 9, where for such domain the effect of the *real minimum wage* is larger (in absolute terms) in the HOPIT than in the ordered probit model. On the contrary, for *see far* and *see close* the most significant coefficient is present in mu3 and it is positive. This means that individual with higher minimum wage are more likely to report a lower level of health (*fair* health instead of *good* health). This is fully compatible with the results shown in Table 9, where for such domains the coefficients of the *real minimum wage* in the HOPIT are smaller (in absolute terms) and less statistically significant than in the ordered probit model.

Finally, Table 12 shows the marginal effect (ME) for the *real minimum wage (t-1)* (in 1000 RMB) in the HOPIT model. The marginal effects represent the change in the probability of being in the best health category (reporting “excellent” for the health domains considered) due to a marginal increase in the *real minimun wage*. As before, the marginal effects are computed as the average of the individual marginal effects, when all individuals adopt the reporting style of a respondent with average chatacteristics. The marginal effects for *real minimun wage* in Table 12 largely confirm our main results: the magnitudes are very similar to those obtained through the estimation of the ordered probit model reported in Table 6, although only slightly smaller.

Table 7: Linear Probability Model, estimates for the placebo test

Basic specification	**mobility**	**memory**	**learning**	**sleep**	**see_far**	**see_close**	**pain**	**discomfort**	**depression**	**anxiety**
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
real minumum wage (t-1) (in 1000 RMB)	-1.529***	-0.495**	-0.416*	-0.594***	-0.256*	-1.252***	-0.602**	-0.530***	-0.069	0.04
	-0.241	-0.146	-0.186	-0.166	-0.12	-0.198	-0.179	-0.142	-0.078	-0.081

Placebo test	**mobility**	**memory**	**learning**	**sleep**	**see_far**	**see_close**	**pain**	**discomfort**	**depression**	**anxiety**
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
real minumum wage (t-1) (in 1000 RMB)	-1.253***	-0.372+	-0.167	-0.367	-0.208	-1.247***	-0.443+	-0.366+	-0.08	-0.014
	-0.352	-0.189	-0.252	-0.22	-0.161	-0.228	-0.226	-0.207	-0.129	-0.143
real minumum wage (t-1) (in 1000 RMB)	-0.219	-0.098	-0.198	-0.181	-0.038	-0.005	-0.127	-0.131	0.008	0.043
* self employment/informal sector	-0.177	-0.096	-0.153	-0.129	-0.069	-0.123	-0.151	-0.151	-0.08	-0.083

Note: Coefficients and standard errors are presented for each health domain. + p< 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 8: Ordered Probit Model, estimates for real minumum wage (t-1) (in 1000 RMB) stratified by sub-samples

Panel A: by GENDER		mobility	memory	learning	sleep	see_far	see_close	pain	discomfort	depression	anxiety
	obs	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
FULL SAMPLE	1826	-3.681**	-7.633***	-6.319***	-3.172+	-4.221**	-6.375***	-7.166***	-5.629***	-5.534***	-4.706**
		-1.15	-1.286	-1.778	-1.639	-1.357	-1.523	-1.22	-1.127	-1.358	-1.673
MEN	1186	-5.038***	-7.409***	-6.673**	-4.521+	-3.121*	-6.875***	-9.035***	-6.823***	-5.810**	-5.155*
		-1.294	-1.397	-2.39	-2.345	-1.587	-1.782	-2.098	-1.292	-2.01	-2.397
WOMEN	638	-0.422	-7.133**	-6.023**	-0.645	-7.147***	-6.032**	-4.919**	-4.179*	-5.682*	-4.436+
		-2.399	-2.253	-1.999	-1.786	-1.943	-2.021	-1.89	-1.977	-2.566	-2.533

Panel B: by SECTOR OF EMPLOYMENT		mobility	memory	learning	sleep	see_far	see_close	pain	discomfort	depression	anxiety
		b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
FULL SAMPLE	1826	-3.681**	-7.633***	-6.319***	-3.172+	-4.221**	-6.375***	-7.166***	-5.629***	-5.534***	-4.706**
		-1.15	-1.286	-1.778	-1.639	-1.357	-1.523	-1.22	-1.127	-1.358	-1.673
SELF EMPLOYMENT	921	3.39	-22.938*	-6.309+	-1.021	1.411	0.907	-1.079	-2.283	-3.517	-6.057*
		-2.277	-9.383	-3.522	-3.29	-4.517	-2.398	-1.681	-1.945	-3.772	-2.863
PUBLIC SECTOR	508	-3.367+	-1.707	-3.057	-2.459	-2.459	-5.929+	-6.899+	-4.631	-5.682*	89.577**
		-1.905	-3.933	-3.863	-2.528	-2.815	-3.186	-3.72	-3.663	-2.566	-34.6
PRIVATE SECTOR	318	-3.446	-12.420**	-3.251	1.252	-6.191	-14.083***	-10.233**	-4.631	-10.099*	-3.41
		-2.528	-3.9	-3.202	-3.406	-4.604	-3.702	-3.744	-3.663	-4.056	-2.925

Panel C: TYPE OF CONTRACT		mobility	memory	learning	sleep	see_far	see_close	pain	discomfort	depression	anxiety
		b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
FULL SAMPLE	1826	-3.681**	-7.633***	-6.319***	-3.172+	-4.221**	-6.375***	-7.166***	-5.629***	-5.534***	-4.706**
		-1.15	-1.286	-1.778	-1.639	-1.357	-1.523	-1.22	-1.127	-1.358	-1.673
FULL TIME	1318	-5.373***	-6.288***	-5.419**	-4.753*	-4.956**	-7.855***	-7.544***	-6.312***	-6.838***	-5.784**
		-1.349	-1.602	-2.052	-1.986	-1.698	-1.85	-1.501	-1.454	-1.556	-2.019
PART TIME	514	3.12	-12.778	-3.527	-0.591	6.155*	7.514*	-4.77	-3.132	-14.150+	-23.530**
		-4.127	-10.111	-7.127	-3.973	-2.741	-2.962	-4.021	-4.653	-7.534	-8.899

Note: Coefficients and standard errors are presented for each health domain. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 9: Ordered Probit and HOPIT estimates for real minumum wage (t-1) (in 1000 RMB)

	mobility	memory	learning	sleep	see_far	see_close	pain	discomfort	depression	anxiety
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
OPROBIT	-3.681**	-7.633***	-6.319***	-3.172+	-4.221**	-6.375***	-7.166***	-5.629***	-5.534***	-4.706**
	-1.15	-1.286	-1.778	-1.639	-1.357	-1.523	-1.22	-1.127	-1.358	-1.673
HOPIT	-3.839***	-8.565***	-7.067***	-2.380+	-1.536	-2.933*	-7.311***	-5.185***	-5.424**	-4.517**
	-1.09	-1.615	-1.349	-1.282	-1.417	-1.35	-1.313	-1.233	-1.762	-1.684

Note: Coefficients and standard errors are presented for each health domain. + p< 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 10: HOPIT Model, test for homogeneous reporting (χ2 test, p-values)

	Overall	real minum wage (t-1)	Population density	not safe	age	female	household income	wages	high school/college
mobility_activity	0.323	0.264	0.278	0.120	0.141	0.125	0.784	0.921	0.834
memory	0.001	0.006	0.238	0.911	0.861	0.828	0.667	0.552	0.071
learning	0.001	0.145	0.023	0.787	0.726	0.360	0.362	0.357	0.479
sleep	1.3E-08	0.001	0.132	0.613	0.005	0.116	0.001	0.118	0.107
see_far	3.5E-10	0.020	0.002	0.252	0.090	0.079	0.570	0.068	0.812
see_close	7.6E-18	3.9E-12	4.6E-06	0.005	1.8E-04	0.310	0.115	0.019	0.129
pain	0.003	0.900	0.338	0.234	0.949	0.095	0.288	0.297	0.008
discomfort	0.001	0.500	0.660	0.162	0.610	0.043	0.401	0.393	0.037
depression	0.000	0.039	0.592	0.016	0.522	0.314	4.4E-05	0.277	0.114
anxiety	0.001	0.832	0.627	0.083	0.414	0.249	0.001	0.122	0.358

Note: p-values are derived for tests of homogeneity in reporting through a χ2-statistics.

Table 11: HOPIT Model, coefficients and standard errors of the cut points for real minimum wage (t-1) (in 1000 RMB)

	mu2	mu3	mu4
mobility	0.327	-0.442	-0.607
	-0.285	-0.447	-0.415
memory	0.264	-0.548	-0.978**
	-0.431	-0.506	-0.37
learning	-0.366	-0.05	-0.518
	-0.456	-0.454	-0.356
sleep	0.747+	0.546	-1.449***
	-0.408	-0.402	-0.431
see_far	0.403	1.892***	0.48
	-0.435	-0.519	-0.477
see_close	0.920+	2.373***	-0.692+
	-0.531	-0.435	-0.38
pain	0.091	-0.052	-0.239
	-0.423	-0.47	-0.332
discomfort	0.618	-0.134	-0.071
	-0.469	-0.468	-0.325
depression	0.951**	-1.163*	-0.11
	-0.341	-0.533	-0.394
anxiety	0.242	0.041	-0.046
	-0.353	-0.514	-0.41

Note: Coefficients and standard errors are presented for each health domain. + p< 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 12: HOPIT Model, marginal effects for real minimum wage (t-1) (in 1000 RMB)

ME for real minum wage	average ME	sd	t stat
mobility_activity	-1.270	0.296	-4.297
memory	-2.083	1.034	-2.015
learning	-2.069	0.808	-2.561
sleep	-0.671	0.204	-3.283
see_far	-0.523	0.205	-2.555
see_close	-0.904	0.314	-2.878
pain	-2.240	0.722	-3.104
discomfort	-1.625	0.476	-3.416
depression	-1.043	0.399	-2.614
anxiety	-0.876	0.330	-2.654

Note: The marginal effects report the change in the percentage of individuals in the best health category due to a unit increase in the real minimum wage (in 1000 RMB). Marginal effects are computed as the average of the individual marginal effects.

6. Concluding remarks

We estimate the impact of real minimum wages on ten different health outcomes exploiting the variations of minimum wages across cities and years in China. The empirical analysis relies on individual-level data from SAGE, involving many different types of workers. Negative effects are mostly found for employees in the private sectors and with a full-time contract. The magnitude of the effects is small, but not negligible. A potential explanation for our findings is that, when assessing the net impact of minimum wages on health, the negative impact of minimum wage overcomes the positive one. In fact, on the one hand, a real minimum wage increase might improve health through higher income or a reduction in income inequality (as found by Chen, 2021). However, on the other hand, a real minimum wage increase might worsen health as it could lead to a deterioration of working conditions, like for instance a more stressful working environment.

Unfortunately, we are unable to provide evidence on this mechanism. Information on working conditions are not available in the SAGE dataset. Differently, the number of working hours per month per individual is available in the SAGE dataset, but working hours are endogenous to both minimum wage and health. However, results from the previous literature support our hypothesis that the number of working hours is a channel of transmission from minimum wages to health. It has been shown that in China a minimum wage increase leads to an increase in the working hours per week, at least for men (Jia 2014). The latter finding is significantly different from many findings for developed countries, where it has been shown that a minimum wage increase may lead to a decrease in working hours. This difference can be justified in the light of the different wage payment and minimum wage policies adopted in China compared with developed countries. For example, an *hourly* minimum wage is adopted in the USA for all workers, while it is adopted in China for part-time workers only. China adopts a *monthly* minimum wage for most full-time workers. Therefore, differently from developed countries, where firms may easily reduce working hours to lower production costs, firms in China may choose to reduce employment or increase working hours to lower costs (Jia 2014). Since many firms do not dot pay any additional wage for overtime hours, or they pay less than the legally required standards for overtime work (Ye et al. 2015), the presence of a monthly minimum wage in China induces firms to take advantage of the current wage system by increasing working hours.

Since the negative effect of minimum wage on health can be explained by the worsening of working conditions, in order to reduce such negative effect, it would be important to adopt stricter regulations on working conditions, and also to control that firms are compliant with such regulations. There is evidence, for instance, that many Chinese firms are not compliant with the existing overtime pay regulations (Ye et al. 2015). According to results presented here, implementing a minimum wage policy and increasing compliance with the regulation of working conditions can be important for the health and wellbeing of Chinese workers.

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Appendix A.1: The Chinese Health System

China's health administration is organized through a four-level hierarchical structure. The National Health Commission (NHC) is at the top and it is in charge of the national health development planning and management of the healthcare system. At a second level there are the provincial health commissions, which are responsible for organising and supervising providers. At a third level there are the prefecture/municipal-level health commissions, which draft local regulations and coordinate resource allocations; finally, at the bottom, there are the county/district health commissions, which are mostly responsible for implementing provincial health policies. (Wang et al. 2020).

The health delivery system is mixed, comprising both public and private providers. In China in 2012 there were about 900,000 primary health centres (PHC) - 52% of which were public facilities, and the rest equally split between private for- profit and private not-for-profit – and about 23,000 hospitals, of which just under 58% were public, about 15% were private not-for-profit and just under 28% private for-profit (World Bank 2019). Most of outpatient and inpatient services are provided by secondary and tertiary general hospitals, while specialised hospitals provide mental, dental and oral health services (Meng et al. 2015). Hospitals have been increasingly endowed with more and more autonomy over their daily operations (while traditionally they operated under a "command and control" model); however, the government still exerts administrative power over several managerial aspects (i.e. bed numbers, managers appointment etc). As a result, public hospitals are subject to public organisations and political authorities (Wang et al. 2020).

The Chinese healthcare system is financed through a mix of public insurance models. Total health expenditure is funded through government (central and local) taxation, social contributions and out-of-pocket payments. Two primary public insurance schemes coexist to collect revenues. The first is a mandatory public insurance scheme for urban employees (cost-sharing with employers), which covers around 300 million workers; the second is a voluntary public insurance scheme for non-working urban and rural residents including students and children, which covers around 1 billion residents. Those who are not enrolled in these two schemes are covered by a Medical Assistant Program (MAP), Supplementary private health insurance exists to provide coverage for services not covered by public insurance. Patient cost-sharing, through both deductibles and co-payments, is adopted to reduce unnecessary utilisation of healthcare services and the possibility of moral hazard (Wang et al. 2020).

Appendix A.2. The HOPIT model

The HOPIT model consists of two parts: (i) the *reporting behaviour equation* and (ii) the *health equation*.

Reporting behaviour equation. To identify the thresholds as a function of respondent characteristics, let H_{ik}^{v*} represent underlying health status for vignette k, rated by individual $\boldsymbol{i}$. Given that each vignette is fixed, it is assumed that the expected value of the underlying latent scale depends solely on the corresponding vignette, such that:

$$H_{ik}^{v*} = K_{ik}\eta_k + \varepsilon_{ik}^{v}, \qquad \varepsilon_{ik}^{v}|K_i \sim N(0,1) \tag{1}$$

where K_{ik} is the vector of vignettes, η_k is a conformably dimensioned vector of parameters and ε_{ik}^{v} is an idiosyncratic error term. H_{ik}^{v*} is unobservable to the researcher and instead we observe the vignette rating, h_{ik}^{v} on a five-point scale ranging from very bad' to `very good'. We assume the observed category of h_{ik}^{v} is related to H_{ik}^{v*} through the following mechanism:

$$h_{ik}^{v} = j \quad if \quad \mu_i^{j-1} \le H_{ik}^{v*} < \mu_i^{j} \tag{2}$$

for $\mu_i^0 = -\infty, \mu_i^5 = \infty, \forall\, i,k; \quad j = 1,\ldots,5$

Should the thresholds represent fixed constants, common to all individuals, then the above mapping defines the ordered probit model. For the HOPIT model the thresholds are assumed to be functions of covariates, x such that:

$$\mu_i^j = X_i \gamma^j \tag{3}$$

where γ^j, $j = 1,\ldots 5$ are parameters to be estimated along with η_k. Further, we assume an ordering of the thresholds such that $\mu_i^1 < \mu_i^2 < \ldots < \mu_i^5$. We call a non-parallel shift of the thresholds the case in which the degree of reporting heterogeneity varies across thresholds, for instance, it is greater at some levels of health than others.

Health equation. The latent level of health experienced by individual i can be expressed as:

$$H_i^{s*} = Z_i\beta + \varepsilon_i^{s}, \qquad \varepsilon_i^{s}|Z_i \sim N(0,\sigma^2) \tag{4}$$

where Z_i represents a set of regressors predictive of health. In our study the health equation described above is modelled by the specification of equation (1). As with the vignettes, H_i^{s*}

represents an unobserved latent variable and we assume that the observed categorical response, h_i^s, relates to H_i^{s*} in the following way:

$$h_i^s = j \quad if \quad \mu_i^{j-1} \leq H_i^{s*} < \mu_i^j \tag{5}$$

for $\mu_i^0 = -\infty, \mu_i^5 = \infty, \forall i; \quad j = 1, \ldots, 5$

where μ_i^j are defined by (3) with γ^j fixed and it is assumed that H_{ik}^{v*} and H_i^{s*} are independent for all $i = 1, \ldots, N$ and $k = 1, \ldots, V$. Note that $\hat{\sigma}^2$ in (4) is identified due to the thresholds being fixed through the reporting behaviour equation.

It follows that the probabilities associated with each of the five response categories are given by:

$$Pr(h_i = j) = \Phi(\mu_i^j - Z_i\beta) - \Phi(\mu_i^{j-1} - Z_i\beta), \qquad j = 1, \ldots, 5 \tag{6}$$

where $\Phi(.)$ is the cumulative standard normal distribution.

Appendix A.3: Table A1: Ordered Probit Model, estimates for the full specification, full sample

	mobility	memory	learning	sleep	see_far	see_close	pain	discomfort	depression	anxiety
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
real minumum wage (t-1) (in 1000 RMB)	-3.681**	-7.633***	-6.319***	-3.172+	-4.221**	-6.375***	-7.166***	-5.629***	-5.534***	-4.706**
	-1.15	-1.286	-1.778	-1.639	-1.357	-1.523	-1.22	-1.127	-1.358	-1.673
population density	1.619**	2.822***	2.619***	1.073+	1.765***	2.029***	1.747***	1.595***	1.846***	1.727**
	-0.506	-0.466	-0.631	-0.595	-0.449	-0.582	-0.453	-0.426	-0.545	-0.63
not safe	-0.212**	-0.342***	-0.268**	-0.255***	-0.292**	-0.156+	-0.283***	-0.278***	-0.314***	-0.354***
	-0.081	-0.084	-0.086	-0.06	-0.093	-0.088	-0.07	-0.079	-0.082	-0.077
household income (in 1000 RMW)	2.46E-04	0.005+	0.001	-0.001	-0.002*	0.002	0.002	0.001	0.003	0.002
	-0.002	-0.003	-0.001	-0.001	-0.001	-0.002	-0.002	-0.001	-0.002	-0.002
wages (in 1000 RMW)	0.013***	0.004	0.003	0.006	0.011+	0.001	0.011*	0.010**	0.016**	0.010*
	-0.004	-0.004	-0.003	-0.004	-0.005	-0.003	-0.005	-0.004	-0.005	-0.004
age	-0.039***	-0.055***	-0.058***	-0.019***	-0.033***	-0.077***	-0.019***	-0.026***	-0.014*	-0.015*
	-0.006	-0.007	-0.008	-0.004	-0.007	-0.009	-0.005	-0.005	-0.007	-0.006
female	-0.179**	-0.101	-0.077	-0.167*	-0.127	-0.207**	-0.150*	-0.119+	-0.179+	-0.214*
	-0.059	-0.077	-0.082	-0.072	-0.092	-0.071	-0.07	-0.065	-0.096	-0.086
single	-0.278*	-0.138	-0.211+	-0.189	-0.206	-0.321*	0.017	0.055	-0.407**	-0.537***
	-0.132	-0.15	-0.126	-0.128	-0.153	-0.142	-0.109	-0.123	-0.15	-0.131
High school / college	0.096	0.132	0.145+	0.009	0.177+	0.135	0.128+	0.153+	-0.12	-0.084
	-0.102	-0.104	-0.083	-0.098	-0.102	-0.09	-0.075	-0.083	-0.112	-0.113
Self-employed abd informal sector	-0.016	-0.066	-0.019	0.011	-0.053	-0.001	-0.087	-0.051	-0.104	-0.06
	-0.086	-0.12	-0.104	-0.097	-0.122	-0.099	-0.098	-0.098	-0.109	-0.097
professionals	0.113	0.213	0.297+	0.215	-0.182	0.127	0.420**	0.270**	0.095	-0.003
	-0.104	-0.245	-0.172	-0.143	-0.151	-0.136	-0.128	-0.098	-0.107	-0.114
service workers	0.142	0.259+	0.270*	0.272**	0.137	0.136	0.270**	0.172+	0.18	0.025
	-0.087	-0.151	-0.123	-0.098	-0.132	-0.111	-0.1	-0.092	-0.133	-0.132
part time	-0.003	0.073	0.049	-0.008	-0.053	-0.004	0.033	-0.071	0.16	0.083
	-0.106	-0.096	-0.088	-0.096	-0.107	-0.089	-0.081	-0.089	-0.119	-0.129
other income	0.052	0.063	0.011	0.038	0.144	-0.103	0.064	0.09	0.073	-0.003
	-0.085	-0.082	-0.061	-0.058	-0.089	-0.075	-0.073	-0.073	-0.097	-0.093
urban	0.387*	0.17	0.067	0.344*	-0.122	0.315+	0.658***	0.540***	0.322+	0.340+
	-0.194	-0.151	-0.18	-0.163	-0.158	-0.185	-0.152	-0.156	-0.167	-0.178
guangdong	-0.248	-1.120***	-1.057***	-0.930***	-0.012	-0.553*	-0.931***	-0.832***	-0.788**	-0.775*
	-0.197	-0.221	-0.273	-0.256	-0.236	-0.221	-0.211	-0.208	-0.302	-0.307
hubei	-0.366	-1.104***	-0.671*	-0.977**	0.306	-0.503+	-1.437***	-1.239***	-1.172**	-0.812+
	-0.317	-0.247	-0.329	-0.347	-0.354	-0.292	-0.248	-0.264	-0.366	-0.44
jilin	0.15	0.746+	0.926+	-0.263	0.545	0.242	-0.316	-0.201	-0.408	-0.274
	-0.456	-0.387	-0.496	-0.475	-0.578	-0.618	-0.378	-0.399	-0.44	-0.539
shaanxi	0.166	-0.738***	-0.880***	-0.459*	0.015	0.057	-0.574***	-0.535**	-0.536*	-0.569*
	-0.211	-0.182	-0.188	-0.23	-0.186	-0.2	-0.164	-0.167	-0.247	-0.238
shandong	-0.078	0.642+	0.824+	-0.136	0.132	-0.075	-0.122	-0.261	-0.074	0.074
	-0.337	-0.355	-0.457	-0.39	-0.523	-0.528	-0.31	-0.331	-0.313	-0.415
yunnan	0.204	0.463	0.989+	-0.618	-0.086	-0.296	-0.728*	-0.668+	-0.868*	-0.531
	-0.395	-0.385	-0.517	-0.427	-0.559	-0.555	-0.352	-0.383	-0.412	-0.469
year2008	0.267*	0.218+	0.359***	0.249	0.194*	0.533***	0.445***	0.264**	0.161	0.286*
	-0.121	-0.128	-0.093	-0.194	-0.085	-0.124	-0.107	-0.081	-0.159	-0.135
year2009	0.066	-0.43	-0.682	0.091	0.305	0.701	0.544+	0.379	0.580*	0.308
	-0.275	-0.334	-0.455	-0.321	-0.519	-0.503	-0.279	-0.291	-0.271	-0.372
year2010	0.074	-0.11	-0.485	0.262	0.339	0.66	0.947**	0.678*	0.877**	0.691+
	-0.297	-0.357	-0.48	-0.373	-0.541	-0.521	-0.334	-0.341	-0.328	-0.393
cut1										
_cons	-4.911***	-8.593***	-8.152***	-4.997***	-5.950***	-8.890***	-6.550***	-6.331***	-5.882***	-5.743***
	-0.602	-0.702	-0.868	-0.718	-0.827	-0.871	-0.658	-0.671	-0.804	-0.853
cut2										
_cons	-4.270***	-8.009***	-7.325***	-4.188***	-5.086***	-7.774***	-5.658***	-5.395***	-5.260***	-5.042***
	-0.617	-0.704	-0.888	-0.732	-0.805	-0.826	-0.643	-0.649	-0.772	-0.843
cut3										
_cons	-3.532***	-6.816***	-6.133***	-3.308***	-4.233***	-6.728***	-4.534***	-4.203***	-4.230***	-4.026***
	-0.624	-0.691	-0.892	-0.743	-0.766	-0.818	-0.643	-0.638	-0.767	-0.83
aic	3332.887	2065.256	2586.237	2453.03	1823.569	2842.08	2712.547	2746.115	1550.696	1559.719
bic	3481.624	2213.994	2734.974	2601.782	1972.336	2990.847	2861.269	2894.837	1699.419	1708.456
N	1824	1824	1824	1825	1826	1826	1823	1823	1823	1824

Note: Coefficients and standard errors are presented for each health domain. + p< 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.