Title: Economic hardship related stress and health of Chinese elderly

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In this research we study the effect of stress due to poverty at old ages in China. Specifically we look at whether psychological stress due to economic hardship in old ages affects aging in terms of activities of daily living (ADL) limitations and cognitive impairment along with the onset of Cardio- and cerebro-vascular and infectious diseases. Using data from two recent waves of the nationally representative Chinese Longitudinal Healthy Longevity Survey (CLHLS) we find that economic hardship related stress do have significant effects on the onset and continuation of ADL limitations and cognitive impairment after controlling for variables reflecting lifetime economic hardship that may affect stress. The results also find moderating effect of support from children, participation in social activities and lifestyle behaviors like exercise and regular consumption of vegetables.

Motivation:

An important aspect of population aging across the globe is the effect of poverty on the wellbeing of the aging population (Barrientos, Gorman, & Heslop, 2003; Heslop & Gorman, 2002). This is particularly important for developing countries with limited social welfare program. Here we focus on China which has one of the largest aging populations in the world (approximately 185 million persons aged 60 and above in 2011) with a significant proportion of them below or near poverty and with a minimal social welfare system (O'Keefe, Cai, Giles, & Wang, 2012; R. Sun, 2002).

Several studies have explored the consequences of poverty on different aspects of life including health outcomes. However there are very few studies that explore the effect of psychological stress due to economic hardship and its consequences among the aging population in developing countries. Exceptions include (Yeung & Xu, 2012) and (Thanakwang, 2013) who examine the effect of subjective economic hardship on mortality among Chinese and Thai elderly population respectively. However those studies concentrated only on mortality and the oldest old and used subjective measure of economic hardship to identify stress.

Significance of this research

Psychological stress of social hierarchy is widely discussed in case of occupation (Ferrie, Shipley, Smith, Stansfeld, & Marmot, 2002; Marmot et al., 1991; Singh-Manoux, Marmot, & Adler, 2005) as well as socio-economic inequality (Kawachi, Kennedy, & Wilkinson, 1999; Wilkinson, 1992). The main contribution of this study is to examine the effect of stress due to economic hardship beyond age 60 on health outcomes separately from the effect of lifetime economic hardship on stress.

In China, the proportion of population aged 60 and above is projected to increase from about 12% in 2000 approximately 34% by 2050 (United Nations, 2010 Medium variant). 22.9% (approximately 42.4 million) of individuals aged 60 and above live below poverty (CHARLS Research Team, 2013). Thus there is a pressing need to understand the implications of economic hardship related stess among the aging population in China.

Poverty among aging population in China

The CHARLS Research Team (2013) also identified few other important characteristics of poverty among aging population in China. The consumption poverty rate is significantly higher for the elderly than for those aged 45 to 59 (poverty rate 15.1%). However income poverty differences are even higher with 28.5% among the elderly living below poverty compared to 19.6% among those aged 45 to 59. Among the elderly, the consumption poverty rate is much higher for those with rural hukou[1] (28.9%) than for those with urban hukou (9.5%) and higher for women (24.0%) compared to men (21.8%).

There are several dimensions of poverty at old age in China. First there is issue of support from family - mainly the children. One child policy introduced in 1979, has taken its toll as there are far fewer persons to take care both physically and financially of the rapidly rising aging population (Y. Zhang & Goza, 2006). Second is the withdrawal of the state from different public programs and particularly in case of health (Duckett, 2012). This is more evident in the rural areas than in the urban areas where there is much better provision of social security and publicly provided health and medical care a consequence of the hukou system.

Privatization of the health care delivery system resulted in increasing pressure on out of pocket medical expenditures and the effects are once again different between rural and urban areas. Between1998 and 2003, the rural areas saw very high rates of increase in clinical and hospital expenses (Center for Health Statistics and Information, 2004). The out-of-pocket cost of health care had increased to 40 percent by 1997, 49 percent by 2000, and reached its peak of 59 percent in 2006 (England, 2005; Xuedan You & Kobayashi, 2011). The pressure was significantly higher in rural areas where 85.8 percent of elderly did not have medical insurance in 2003 (Center for Health Statistics and Information, 2009). Several studies find evidence of healthcare induced poverty which were not necessarily because of catastrophic expenditures (Liu, Rao, & Hsiao, 2011; Liu, Rao, Wu, & Gakidou, 2008; Van Doorslaer et al., 2006)

Recent reforms (New Community Medical System (NCMS)) introduced between 2003 and 2008 (Mao, 2005) made little difference in reducing out-of-pocket expenses (Lei & Lin, 2009; X. Sun, Sleigh, Carmichael, & Jackson, 2010; Wagstaff, Yip, Lindelow, & Hsiao, 2009; X. You & Kobayashi, 2009). Others found difficulty

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[1] The hukou system (household registration system) initiated in the late 1950s is used by the Chinese government to allocate socioeconomic benefits, such as income, housing, social security, medical care, education and retirement benefits, according to one's residence in rural or urban areas (Cheng & Selden, 1994) . Several research has shown that the hukou system is the main contributing factor to rural-urban economic and social inequality(Selden, 1999; Wu & Treiman, 2007).

in NCMS enrollment among more vulnerable populations like aging (Brown & Theoharides, 2009), women 65+ (Jiang et al., 2011), and sicker individuals (Babiarz, Miller, Yi, Zhang, & Rozelle, 2012; Brown & Theoharides, 2009).

Data:

We use two recent waves (2008 and 2011) of the Chinese Longitudinal Healthy Longevity Survey data to explore the effect of stress at baseline on health outcome in the subsequent wave. The Chinese Longitudinal Healthy Longevity Survey (CLHLS), is a nationally representative panel survey launched in 1998 and followed-up in 2000, 2002, 2005 and 2008 and 2011. The sample was randomly collected from half of the counties and cities in 22 of China's 31 provinces, which constitutes about 85% of the total population in China (Yi, 2008).

Analytical strategy:

The main focus of this study is to isolate the effect of stress which is due to economic hardship at older ages from other factors (childhood, SES, lifestyle) which may result in adverse health outcomes. Individuals in economic hardship at older ages are more likely to be in economic hardship during the course of their life. This requires that we separate the effect of lifetime stressors from those that occurs after age 60.

For the elderly population, stress due to economic hardship may occur through two main pathways – loss of bargaining power in financial decisions within household and subjective economic status in society. Psychological stress due to economic hardship is not directly identifiable from the dataset. As a measure of psychological stress we use a subjective indicator of anxiety. Since the stress variable will have measurement error in identifying the effect of stress due to economic hardship, we will instrument it using bargaining power within household and subjective SES.

Scientific studies highlight two ways in which stress can affect health outcomes. Repeated episodes of stressful situations results in strain on several organs and tissues (McEwen, 1998; Seeman, McEwen, Rowe, & Singer, 2001; Segerstrom & Miller, 2004). In addition it results in shortening of parts of the human chromosomes called telomeres (Epel et al., 2004). Consequently it leads to increased risk of cardiovascular and cerebrovascular diseases, cognitive and physical decline, suppressed immune system and mortality.

Following the literature we focus on the following stress related health outcomes – i) Self reported limitations in activities of daily living - bathing, dressing, toilet, indoor transfer, continence and eating; ii) A mini mental state examination specially constructed for Chinese elderly; iii) Presence of either cerebro-vascular or cardio-vascular diseases (Hypertension, Heart Disease, Stroke, cerebro-vascular disease); iv) Presence of infectious diseases (Bronchitis, emphysema, asthma, pneumonia, pulmonary tuberculosis, Gastric or duodenal ulcer)

Following other studies exploring effect of early childhood conditions and socio-economic conditions on health and health trajectories using the CLHLS data (Gu & Zeng, 2004; Yeung & Xu, 2012; Yi, Gu, & Land, 2007; Z. Zhang, Gu, & Hayward, 2010; Zimmer, Martin, Nagin, & Jones, 2012), we additionally control for childhood socio-economic conditions (went to bed hungry in childhood, father's occupation at childhood (agriculture or not) and education (some years of schooling or not)); socioeconomic status at baseline (age (continuous), ethnicity (Han or not), current residence in rural area, primary lifetime occupation (Agriculture or not) and current marital status; support (proximity of living children (co-resident / in the same village/neighborhood or not) and participation in social activities in a regular basis) and lifestyle factors (currently smoke/drink, currently exercise and eats vegetables almost every day)

The basic regression models considered here are the following

Model I: Bivariate Probit

Prob (Anxiety due to economic hardship)   = f_1 (***Limited role in household financial decision, subjective SES: Poor,*** Childhood SES, Current SES, Support, Lifestyle)

Prob (Adverse health outcome at followup) = f_2 (Childhood SES, Current SES, Support, Lifestyle, Anxiety)

The above set of equations is estimated jointly (in seemingly unrelated regression framework) using STATA <biprobit> for those who did not have the adverse health outcome at baseline (to study onset) and for those who had the adverse health outcome at followup (to study continuation).

At this stage we ignore those who are missing at follow-up. At least part of them – those who die between waves – may be a cause of concern since medical research indicates that stress raises probability of all-cause mortality.

We also consider a multinomial probit model where instead of the having two possible outcomes, the categories of the adverse health outcome is defined as No, Yes and Dead by the followup survey. This model jointly determines the occurrence of the adverse outcome as well as death and therefore addresses the attrition problem due to death which is very likely non-random. However the multinomial probit model includes anxiety, household decision making variable and the subjective SES variable as independent variables. So it is not possible to isolate the effect of stress due to economic reason and the coefficients for anxiety only accounts for effect not accounted by actual and subjective economic hardship.

Model II: Multinomial Probit

Prob (Adverse health outcome or death at followup) = f_3 (Childhood SES, Current SES, Support, Lifestyle, Anxiety, ***Limited role in household financial decision, subjective SES: Poor***)

Finally we plan to expand the model estimated using bivariate probit to have a two equation model where anxiety and the adverse health outcome (with three possible outcomes – No, Yes and Dead) will be jointly estimated in a seemingly unrelated regression model using a probit and multinomial probit respectively with the same set of controls used in the bivariate probit specification.

Model III: Seemingly Unrelated Regression

Prob (Anxiety due to economic hardship) = f_4 (***Limited role in household financial decision, subjective SES: Poor,*** *Childhood SES, Current SES, Support, Lifestyle*)

Prob (Adverse health outcome or death at followup) = f_5 (Childhood SES, Current SES, Support, Lifestyle, Anxiety)

Preliminary results:

The Bivariate Probit model: Tables 1 & 2

The results show that psychological stress (measured here by anxiety) due to economic hardship do have a significant role in the onset and continuation of some adverse conditions, but not for others. In all specifications anxiety is significantly determined by subjective SES though decision making power within household is not significant in determining anxiety in three cases (No ADL limitation at baseline, No cognitive impairment at baseline, and No cardio or cerebro vascular conditions at baseline). Anxiety, participation in social activities and lifestyle factors, along with age are the only factors significant in explaining the onset of ADL limitations for those who did not have a limitation at the base period. Anxiety is also significant for continuation of ADL limitation while other significant factors are proximity to children and participation in social activities. In case of onset of cognitive impairment, anxiety does not play any significant role though it plays a significant role in case of continuation of cognitive impairment.

However the data does not show any significant positive effect (odds ratio 0.276) of onset of cardio- or cerebro-vascular condition and no significant effect on the continuation of those conditions. This is a case where the results may be significantly affected by mortality. The data also does not show any significant effect of anxiety on infectious conditions, though there is a significant effect of anxiety on the continuation of those conditions. This once again may be biased due to attrition due to mortality.

Multinomial Probit model: Tables 3 & 4:

Multinomial probit regression with death as an outcome removes the problem of attrition due to death. However anxiety variable here reflects anxiety due to reasons other than economic hardship. Objective measure of economic hardship is controlled by the SES variables while the subjective measures are captured by the two variables on decision making within household and subjective SES.

Subjective stress subject SES plays a significant role in both onset and continuation of ADL limitation and cognitive impairment as well as the probability of death. In cases of medical conditions, it is significantly related to death but not to onset. Participation in household financial decision is significantly related only in case of onset of ADL limitations and continuation of cognitive impairment. It is significantly related to death for those who already had ADL limitations and cognitive impairment at baseline as well as those with or without cerebro and cardio-vascular diseases and infectious diseases.

Next Steps

This study finds that economic hardship related stress does have significant effect on ADL limitations and cognitive impairment after controlling for socio-economic status. The effect of subjective measures of economic hardship on health conditions cannot be established.

One possibility is that because of access problem in the rural areas, some of these conditions are not adequately diagnosed. To explore whether low diagnosis is a problem for the lack of significant effect, we also explore the relation for individuals currently residing in urban areas and those who are lower than 75 years of age (not reported) who are less likely to have accessibility problems. The results were not different (still insignificant). Another possible explanation probably lies in the observation in case of China that chronic conditions like cardio and cerebro vascular conditions are more common among individuals with higher socio-economic status (Feng, Purser, Zhen, & Duncan, 2011; Zimmer & Kwong, 2004).

We intend to finalise our conclusions after reviewing results from the seemingly unrelated regression methods discussed above.

Table 1

Sample	No ADL limitation at baseline		ADL limitation at baseline		MMSE>=21 at Baseline		MMSE<21 at Baseline	
VARIABLES	ADL limitation at Follow up	Anxiety: Always/Often/ Not Able	ADL limitation at Follow up	Anxiety: Always/Often/ Not Able	MMSE<21 at Follow up	Anxiety: Always/Often/ Not Able	MMSE<21 at Follow up	Anxiety: Always/Often/ Not Able
HH financial decision: None or own only		1.100		2.373***		1.043		1.466***
		(0.0701)		(0.544)		(0.0856)		(0.132)
Subjective SES: Poor		1.525***		2.213***		1.535***		1.615***
		(0.108)		(0.465)		(0.138)		(0.153)
Childhood Poverty	1.086	1.055	0.886	1.044	0.915*	1.013	1.007	1.118
	(0.0677)	(0.0723)	(0.165)	(0.211)	(0.0456)	(0.0814)	(0.0939)	(0.123)
Father's occupation at childhood: Agri	1.024	0.943	1.132	1.306	0.887*	0.907	0.899	1.137
	(0.0788)	(0.0771)	(0.268)	(0.333)	(0.0544)	(0.0847)	(0.110)	(0.158)
Education	0.976	0.919	1.206	0.945	0.737***	0.917	0.849*	1.156
	(0.0629)	(0.0646)	(0.249)	(0.205)	(0.0404)	(0.0790)	(0.0795)	(0.130)
Age	1.038***	1.014***	1.018	0.995	1.031***	1.003	1.024***	1.010
	(0.00419)	(0.00451)	(0.0131)	(0.0142)	(0.00389)	(0.00609)	(0.00640)	(0.00663)
Female	0.931	1.314***	1.019	1.147	1.088	1.300***	1.016	1.101
	(0.0655)	(0.0972)	(0.214)	(0.259)	(0.0634)	(0.113)	(0.0974)	(0.131)
Current Residence: Rural	1.037	1.076	1.136	0.662*	0.868***	1.137	1.007	0.872
	(0.0670)	(0.0760)	(0.250)	(0.154)	(0.0465)	(0.0977)	(0.0874)	(0.0880)
Han Ethnicity	1.258	1.746***	1.413	1.955	0.935	1.568**	0.527***	1.985**
	(0.182)	(0.278)	(0.628)	(1.183)	(0.0893)	(0.287)	(0.115)	(0.528)
Occupation: Agri	0.890	0.848**	1.034	1.115	0.951	0.805**	0.904	0.870
	(0.0631)	(0.0649)	(0.237)	(0.272)	(0.0566)	(0.0735)	(0.0915)	(0.0985)
Currently Married	1.018	0.995	0.982	1.084	0.856***	0.975	0.790***	1.070
	(0.0627)	(0.0636)	(0.206)	(0.247)	(0.0430)	(0.0758)	(0.0658)	(0.105)
Any Children - co-resident/same village/neighborhood	1.041	0.889*	0.683**	0.855	0.930	0.897	0.895	0.896
	(0.0666)	(0.0588)	(0.132)	(0.184)	(0.0482)	(0.0720)	(0.0813)	(0.0941)
Do not participate in social activities	1.240***	0.900	1.845*	0.829	1.007	0.859*	1.090	1.121
	(0.0962)	(0.0670)	(0.634)	(0.319)	(0.0569)	(0.0707)	(0.152)	(0.192)
Current: Smoke or Drink	0.850**	0.966	0.743	0.413***	0.907*	0.916	1.019	0.827
	(0.0552)	(0.0669)	(0.187)	(0.104)	(0.0496)	(0.0764)	(0.0941)	(0.0995)
Current: Exercise	0.982	0.999	1.011	0.862	0.988	1.074	0.895	0.848
	(0.0606)	(0.0652)	(0.219)	(0.215)	(0.0496)	(0.0831)	(0.0794)	(0.0911)
Eats vegetables almost daily	0.786***	0.893*	1.239	0.687**	1.087	0.784***	1.125	0.991
	(0.0461)	(0.0555)	(0.220)	(0.124)	(0.0568)	(0.0589)	(0.0880)	(0.0919)
Anxiety :Binary	1.976*		2.374*		1.513		3.911***	
	(0.737)		(1.123)		(0.791)		(0.923)	
Constant	0.0124***	0.0542***	0.0644**	0.305	0.120***	0.146***	0.352*	0.0585***
	(0.00488)	(0.0233)	(0.0799)	(0.443)	(0.0406)	(0.0816)	(0.206)	(0.0379)
Observations	8,854	8,854	1,428	1,428	5,865	5,865	4,405	4,405
Log Likelihood	-6.850e+07	-6.850e+07	-5.473e+06	-5.473e+06	-8.950e+07	-8.950e+07	-3.040e+07	-3.040e+07

(Notes: Odds Ratios, SE in parenthesis, *** p<0.01, ** p<0.05, * p<0.1

Table 2

Sample	No cardio-cerebro vascular cond. at baseline		Cardio-cerebro vascular cond. at baseline		No infectious cond. at baseline		Infection cond. at baseline	
VARIABLES	Cardio-cerbro vascular cond. at Follow up	Anxiety: Always/Often/Not Able	Cardio-cerbro vascular cond. at Follow up	Anxiety: Always/Often/Not Able	Infectious cond. at Follow up	Anxiety: Always/Often/Not Able	Infectious cond. at Follow up	Anxiety: Always/Often/Not Able
HH financial decision: None or own only		1.061		1.489***		1.243***		1.266*
		(0.0697)		(0.150)		(0.0840)		(0.170)
Subjective SES: Poor		1.567***		1.737***		1.649***		1.768***
		(0.126)		(0.182)		(0.123)		(0.250)
Childhood Poverty	1.065	1.030	1.008	1.081	0.941	1.092	0.944	1.047
	(0.0587)	(0.0816)	(0.0769)	(0.117)	(0.0561)	(0.0803)	(0.107)	(0.160)
Father's occupation at childhood: Agriculture	0.977	0.959	1.136	0.959	1.015	0.970	0.951	1.131
	(0.0693)	(0.0968)	(0.0995)	(0.118)	(0.0758)	(0.0880)	(0.123)	(0.193)
Education	0.939	0.904	0.952	1.000	0.901*	0.991	0.995	0.764*
	(0.0548)	(0.0756)	(0.0785)	(0.114)	(0.0557)	(0.0765)	(0.117)	(0.115)
Age	1.007*	1.020***	0.989**	1.012	1.003	1.019***	0.991	1.000
	(0.00380)	(0.00507)	(0.00564)	(0.00766)	(0.00468)	(0.00450)	(0.00788)	(0.0106)
Female	1.064	1.390***	1.098	1.175	0.818***	1.299***	0.767**	1.088
	(0.0679)	(0.125)	(0.0918)	(0.125)	(0.0561)	(0.103)	(0.0935)	(0.163)
Current Residence: Rural	1.037	1.022	1.057	1.059	0.999	1.040	0.915	0.917
	(0.0596)	(0.0825)	(0.0884)	(0.120)	(0.0672)	(0.0792)	(0.107)	(0.134)
Han Ethnicity	1.308**	1.946***	1.044	1.295	0.942	1.826***	0.749	2.616***
	(0.142)	(0.473)	(0.192)	(0.327)	(0.120)	(0.321)	(0.183)	(0.969)
Occupation: Agriculture	0.865**	0.832**	1.018	0.864	0.992	0.857*	1.255*	0.677**
	(0.0554)	(0.0745)	(0.0898)	(0.106)	(0.0730)	(0.0699)	(0.152)	(0.109)
Currently Married	0.873**	0.882*	1.193**	1.333***	0.974	1.033	0.902	0.983
	(0.0475)	(0.0653)	(0.0920)	(0.130)	(0.0607)	(0.0709)	(0.0958)	(0.137)
Any Children - co-resident/same village/neighborhood	1.072	0.900	1.158*	0.962	1.105	0.878*	1.215*	1.208
	(0.0615)	(0.0699)	(0.0869)	(0.108)	(0.0676)	(0.0621)	(0.135)	(0.177)
Do not participate in social activities	0.929	0.893	0.966	0.935	1.129*	0.957	1.516***	0.951
	(0.0597)	(0.0841)	(0.0826)	(0.108)	(0.0792)	(0.0810)	(0.199)	(0.154)
Current: Smoke or Drink	0.963	0.961	0.932	0.926	0.956	0.938	1.051	0.772*
	(0.0546)	(0.0821)	(0.0778)	(0.105)	(0.0583)	(0.0723)	(0.115)	(0.115)
Current: Exercise	0.921	0.957	1.121	0.920	1.044	0.987	1.069	1.055
	(0.0501)	(0.0787)	(0.0825)	(0.0862)	(0.0629)	(0.0699)	(0.110)	(0.134)
Eats vegetables almost daily	0.843***	0.973	1.173*	0.715***	1.014	0.891*	0.906	0.784
	(0.0437)	(0.0715)	(0.0975)	(0.0695)	(0.0586)	(0.0579)	(0.0981)	(0.119)
Anxiety :Binary	0.276***		0.731		0.842		3.803***	
	(0.0584)		(0.397)		(0.423)		(1.769)	
Constant	0.376***	0.0323***	1.824	0.0738***	0.268***	0.0311***	1.235	0.119**
	(0.129)	(0.0172)	(0.937)	(0.0533)	(0.108)	(0.0135)	(0.911)	(0.117)
Observations	7,034	7,034	2,991	2,991	8,427	8,427	1,507	1,507
Log Likelihood	-7.210e+07	-7.210e+07	-4.410e+07	-4.410e+07	-7.010e+07	-7.010e+07	-1.920e+07	-1.920e+07

*(Notes: Odds Ratios, SE in parenthesis, *** p<0.01, ** p<0.05, * p<0.1*

Table 3

Sample	No ADL limitation at baseline		ADL limitation at baseline		MMSE>=21 at Baseline		MMSE<21 at Baseline	
VARIABLES	ADL limitation at Follow up	Dead	ADL limitation at Follow up	Dead	MMSE<21 at Follow up	Dead	MMSE<21 at Follow up	Dead
HH financial decision: None or own only	1.268*	1.078	1.093	1.598**	1.088	1.055	1.602***	1.837***
	(0.157)	(0.119)	(0.260)	(0.360)	(0.145)	(0.171)	(0.222)	(0.258)
Subjective SES: Poor	1.307***	1.495***	1.695**	2.180***	1.185**	1.504***	1.293**	1.986***
	(0.103)	(0.105)	(0.448)	(0.593)	(0.0810)	(0.127)	(0.137)	(0.225)
Childhood Poverty	1.220**	1.272***	1.142	1.127	1.100	1.358***	1.314**	1.215
	(0.114)	(0.109)	(0.293)	(0.276)	(0.0995)	(0.146)	(0.156)	(0.157)
Father's occupation at childhood: Agri	1.089	0.823**	0.877	1.550*	0.878*	0.770***	1.014	0.987
	(0.0895)	(0.0627)	(0.208)	(0.349)	(0.0596)	(0.0673)	(0.126)	(0.136)
Education	1.026	0.925	1.358	0.926	0.844**	0.853	0.917	0.838
	(0.105)	(0.0912)	(0.395)	(0.259)	(0.0704)	(0.0941)	(0.150)	(0.149)
Age	0.969	0.948	1.295	0.967	0.664***	0.924	0.815*	0.760**
	(0.0833)	(0.0742)	(0.317)	(0.232)	(0.0491)	(0.0869)	(0.0994)	(0.101)
Female	1.057***	1.089***	1.021	1.046***	1.043***	1.096***	1.037***	1.076***
	(0.00565)	(0.00501)	(0.0159)	(0.0139)	(0.00538)	(0.00641)	(0.00803)	(0.00838)
Current Residence: Rural	0.900	0.627***	1.091	0.612**	1.130	0.666***	1.057	0.616***
	(0.0816)	(0.0535)	(0.278)	(0.143)	(0.0864)	(0.0681)	(0.132)	(0.0835)
Han Ethnicity	1.061	1.275***	1.008	1.352	0.829***	1.155	0.933	1.136
	(0.0903)	(0.103)	(0.277)	(0.352)	(0.0599)	(0.110)	(0.108)	(0.152)
Occupation: Agri	1.434*	0.935	1.987	1.455	0.936	0.854	0.529**	0.601*
	(0.267)	(0.119)	(1.033)	(0.685)	(0.119)	(0.121)	(0.149)	(0.181)
Currently Married	0.834*	1.056	1.012	1.109	0.912	1.054	0.830	0.945
	(0.0778)	(0.0918)	(0.289)	(0.292)	(0.0735)	(0.108)	(0.110)	(0.138)
Any Children - co-resident/same village/neighborhood	1.063	0.971	1.073	0.833	0.825***	0.928	0.756**	0.771**
	(0.0883)	(0.0715)	(0.285)	(0.197)	(0.0570)	(0.0807)	(0.0834)	(0.0956)
Do not participate in social activities	1.031	1.101	0.567**	0.894	0.884*	1.046	0.820	0.953
	(0.0898)	(0.0853)	(0.139)	(0.230)	(0.0626)	(0.0939)	(0.0997)	(0.129)
Current: Smoke or Drink	1.279**	0.988	1.928	0.989	0.992	0.886	1.118	1.153
	(0.133)	(0.0949)	(0.818)	(0.374)	(0.0766)	(0.0899)	(0.205)	(0.262)
Current: Exercise	0.811**	0.940	0.605*	0.811	0.872*	0.921	0.957	0.833
	(0.0689)	(0.0752)	(0.171)	(0.200)	(0.0640)	(0.0861)	(0.118)	(0.108)
Eats vegetables almost daily	0.971	0.848**	0.957	0.417***	0.982	0.797**	0.814*	0.750**
	(0.0793)	(0.0649)	(0.265)	(0.105)	(0.0666)	(0.0704)	(0.0941)	(0.101)
Anxiety :Binary	0.712***	0.818***	1.100	1.110	1.106	0.945	1.163	0.897
	(0.0549)	(0.0556)	(0.240)	(0.226)	(0.0761)	(0.0783)	(0.121)	(0.0998)
Constant	0.002***	0.000***	0.0281**	0.011***	0.052***	0.000***	0.144***	0.004***
	(0.000917)	(0.000192)	(0.0424)	(0.0144)	(0.0242)	(0.0003)	(0.108)	(0.00362)
Observations	12,112		3,259		7,319		8,040	
Log Likelihood	-7.770e+07		-7.297e+06		-9.670e+07		-3.470e+07	

(Notes: Odds Ratios, SE in parenthesis, *** p<0.01, ** p<0.05, * p<0.1

Table 4

Sample	No cardio-cerebro vascular cond. at baseline		Cardio-cerebro vascular cond. at baseline		No infectious cond. at baseline		Infection cond. at baseline	
VARIABLES	Cardio-cerbro vascular cond. at Follow up	Dead	Cardio-cerbro vascular cond. at Follow up	Dead	Infectious cond. at Follow up	Dead	Infectious cond. at Follow up	Dead
HH financial decision: None or own only	1.169	1.236*	0.862	1.329*	1.129	1.433***	0.966	1.121
	(0.146)	(0.149)	(0.125)	(0.209)	(0.139)	(0.153)	(0.212)	(0.245)
Subjective SES: Poor	0.927	1.471***	0.947	1.520***	1.084	1.620***	1.119	1.512***
	(0.0689)	(0.121)	(0.0933)	(0.178)	(0.0861)	(0.120)	(0.163)	(0.233)
Childhood Poverty	0.827**	1.156	0.878	1.211	1.009	1.314***	1.464**	1.087
	(0.0775)	(0.117)	(0.108)	(0.168)	(0.101)	(0.119)	(0.240)	(0.201)
Father's occupation at childhood: Agri	1.079	0.842*	1.012	0.951	0.910	0.886	0.927	0.671**
	(0.0829)	(0.0745)	(0.104)	(0.121)	(0.0722)	(0.0711)	(0.140)	(0.113)
Education	0.979	0.977	1.191	0.873	1.023	0.967	0.954	0.733
	(0.0976)	(0.111)	(0.141)	(0.134)	(0.103)	(0.100)	(0.169)	(0.152)
Age	0.938	0.965	0.929	0.857	0.871*	0.945	0.918	0.813
	(0.0762)	(0.0874)	(0.102)	(0.116)	(0.0720)	(0.0789)	(0.146)	(0.137)
Female	1.007	1.079***	0.983**	1.057***	1.008	1.072***	0.987	1.091***
	(0.00519)	(0.00543)	(0.00727)	(0.00895)	(0.00581)	(0.00514)	(0.0106)	(0.0111)
Current Residence: Rural	0.972	0.642***	1.136	0.641***	0.733***	0.613***	0.696**	0.486***
	(0.0830)	(0.0650)	(0.127)	(0.0880)	(0.0626)	(0.0543)	(0.114)	(0.0937)
Han Ethnicity	1.059	1.179*	1.071	1.418**	1.010	1.226**	0.883	1.264
	(0.0843)	(0.108)	(0.119)	(0.197)	(0.0895)	(0.105)	(0.139)	(0.207)
Occupation: Agri	1.230	0.834	1.042	1.180	0.903	0.854	0.753	0.810
	(0.177)	(0.119)	(0.257)	(0.312)	(0.145)	(0.117)	(0.240)	(0.244)
Currently Married	0.859*	0.873	1.030	1.433**	0.998	1.084	1.184	1.116
	(0.0761)	(0.0868)	(0.121)	(0.210)	(0.0961)	(0.0996)	(0.201)	(0.199)
Any Children - co-resident/same village/neighborhood	0.852**	0.867	1.245**	1.122	0.972	0.925	0.859	0.952
	(0.0650)	(0.0754)	(0.128)	(0.136)	(0.0818)	(0.0725)	(0.125)	(0.149)
Do not participate in social activities	1.171**	1.123	1.220*	1.223	1.154*	1.144	1.370**	1.037
	(0.0933)	(0.101)	(0.124)	(0.159)	(0.0939)	(0.0954)	(0.211)	(0.170)
Current: Smoke or Drink	0.923	0.983	0.962	0.889	1.162	0.949	1.751***	1.449*
	(0.0847)	(0.113)	(0.112)	(0.138)	(0.111)	(0.0994)	(0.319)	(0.289)
Current: Exercise	0.958	0.905	0.911	0.995	0.948	0.950	1.023	0.841
	(0.0752)	(0.0843)	(0.101)	(0.133)	(0.0767)	(0.0800)	(0.153)	(0.144)
Eats vegetables almost daily	0.895	0.854*	1.174*	0.682***	1.045	0.826**	1.097	0.669***
	(0.0675)	(0.0768)	(0.115)	(0.0880)	(0.0835)	(0.0689)	(0.157)	(0.104)
Anxiety :Binary	0.781***	0.772***	1.257**	1.042	1.016	0.885*	0.831	0.718**
	(0.0559)	(0.0601)	(0.126)	(0.122)	(0.0768)	(0.0631)	(0.119)	(0.110)
Constant	0.313**	0.001***	2.637	0.005***	0.129***	0.001***	1.484	0.001***
	(0.146)	(0.001)	(1.817)	(0.00382)	(0.0666)	(0.001)	(1.442)	(0.00114)
Observations	10,809		4,255		12,649		2,323	
Log Likelihood	-8.120e+07		-4.630e+07		-7.940e+07		-2.160e+07	

(Notes: Odds Ratios, SE in parenthesis, *** p<0.01, ** p<0.05, * p<0.1

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