

Better health in times of economic hardship?*

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Abstract

There is increasing evidence of the procyclical relationship between positive macroeconomic conditions and mortality rates. However, evidence is pretty much restricted to the US context with the exception of evidence from Germany. Cross-country comparisons show ambiguous results, with some evidence that procyclical fluctuations of mortality are not very strong. Motivated by the deep and long-lasting economic recession originated in 2008, this paper examines the impact that economic hardship may have had on individuals' health behaviours and health. We use data from the Health Survey for England for the period 2004-2011. Typically, to capture macroeconomic conditions, a measure of regional unemployment has been used. However, unemployment figures may not reflect accurately the market dynamics. Thus, in our estimates we include both regional unemployment rates and the unemployment growth rate to better capture if individuals' health outcomes in already deprived regions suffer a stronger negative impact during times of economic hardship. Our preliminary results indicate that fruit consumption and likelihood of drinking are positively associated with unemployment and therefore there is a countercyclical effect of macro conditions on these two variables. As per the morbidity variables there is a negative association between unemployment and longstanding illness, blood, mental and digestive disorders. This suggests the presence of a procyclical effect of economic conditions on morbidity and it is in line with some of the findings in the literature.

Keywords: economic crisis, health, morbidity, food intake, unemployment, IMD, England

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1. Introduction

The relationship between macroeconomic conditions and health outcomes has been extensively studied in the literature, but a clear image of this relationship is yet to be established. Evidence is often limited to few countries (such as the US, UK, Sweden and Germany), while different approaches have provided different results.

It has been shown that risk factors such as smoking increase during economic expansions (Ruhm 2000; Ruhm 2005), which are accompanied by a reduction in physical activity and a less healthy diet (Ruhm 2000), while with the exception of suicide, fatalities demonstrate a pro-cyclical pattern (Ruhm 2000). According to another study from the same author (Ruhm 2003), physical health worsens during economic upturns, but there is some evidence that the opposite holds for mental health outcomes. Similar findings regarding the association of recessions with lower mortality rates are provided by Neumayer (2004) for the case of Germany. In general, changes in mortality and morbidity appear to be partly attributed to change in behaviour. For example, shorter working hours allow for a healthier lifestyle, while there is also a decrease in the amount of tobacco consumed (Ruhm, 2005) and a decrease in alcohol consumption (Ruhm and Black, 2002). A negative link between the economic environment and health has also been established by Tapia-Granados (2005), Tapi-Granados and Diez-Roux (2009) and Gerdtham and Ruhm (2006).

There is, however, a wealth of evidence arguing the exact opposite, as other studies suggest that there is a negative relationship between the macroeconomic environment and health (see for example Brenner and Mooney 1983; Brenner 1987). There is evidence that unemployment is correlated with weight gain (Charles and DeCicca 2008;) and worse mental health (Charles and DeCicca 2008; Gallo et al. 2006; Bartley 1994). Deterioration of physical health has also been attributed to involuntary job loss (Gallo et al 2009; Gallo et al 2004; Martikainen 1990).

The ambiguity of the effects of the economic climate on health is underlined by a study by Suhrcke and Stuckler (2012). The authors suggest that the direction of the impact of a recession on health depends on various factors, such as the level of income. Gerdtham and Johansson (2005) also find less clear results on the effects on health, which appear to depend on indicators such as gender.

Despite the differences in previous studies' findings, evidence from the literature appears to support the view that mental health appears to worsen during economic downturns, while physical health worsens during periods of positive economic growth rates. The recent recession in Europe is also beginning to attract attention in the literature. Although the full effects of the economic downturn are yet to unfold, some first studies have studied the impact on health, while further research is expected to provide additional insight. As the worst example in terms of economic downturn, the recent case of Greece has dominated recent studies. Using household data from the EU Statistics on Income and Living Conditions (EU-SILC), Kentikelenis et al. (2011) found that self-reported health deteriorated in Greece as a result of the economic crisis. These findings were confirmed by another study that addressed the same question with the use of a control group (Vandoros et al. 2013).

Stuckler et al (2011) provided empirical evidence that the 2008 recession led to an increase in suicides in the EU, but also to a decrease in road traffic accidents. With regards to the latter, a recent study showed that bad financial news in general, and the announcement of austerity measures in particular, may lead to a (temporary yet significant) increase in road traffic accidents (Vandoros et al. 2013). Furthermore, using an interrupted time series approach, a study on Spain (which also suffered from recession and high unemployment) demonstrated that suicides increased as a result of the economic downturn (Lopez-Bernal et al., 2013). This finding is in line with previous studies that provide evidence on the positive association between suicides and recessions (Barr et al., 2012; Reeves et al., 2012). Additional evidence from the recent recession in Europe also appears to support the view that recessions are associated with worse health outcomes (see for example Karanikolos et al. (2013) and Zavras et al. (2013)).

Previous research has also focused on lifestyle factors as determinants of health outcomes. Alcohol consumption has been shown to increase mortality rates and negatively affect life expectancy (Brainerd and Cutler (2005); Grubaugh and Rexford (1994); Berger and Messer (2002); Cremieux et al. (2005); Cremieux et al. (1999), Cochrane et al (1978)). Although a study by Brainerd and Cutler (2005) showed little support about the effects of dietary habits on mortality, Berger and Messer (2002) found empirical evidence that a strong link does exist between consumption of fat and mortality. Smoking is also an important determinant of health outcomes and various studies have empirically shown the link between tobacco consumption and increased mortality or lower life expectancy (Cremieux et al. (2005); Cremieux et al. (1999), Berger and Messer (2002), Grubaugh and Rexford (1994)).

Against this background, the objective of this study is to analyse the impact of the recession on nutrition patterns and intermediate health indicators, based on the assumption that they are the ground for risk factors that eventually trigger the final fatal outcomes identified in the literature. This paper advances the literature by (a) focusing on morbidity rather than mortality; (b) providing evidence from the recent downturn in the UK; and (c) by utilising detailed information on individuals, not only from a socio-economic and behavioural perspective, but also from a clinical point of view.

The remaining of the paper is organised as follows: Section 2 discusses the household survey data and presents some summary statistics and trends in health behaviours. Section 3 explains the empirical strategy used to capture the effect of the recession on all the indicators that we are analysing. Section 4 provides the results and a brief discussion of the implications. Section 4 concludes and also sets the goals for future research.

2. Data

We use data from the Health Survey for England for the period 2004-2011. The Health Survey for England is a yearly survey taken from a representative sample of all private households in England. The survey comprises all individuals in the household. Our sample has been restricted to those individuals aged 18 and above. In addition to socio-economic characteristics, the survey includes information socio-demographic characteristics, healthy lifestyles as well as health conditions. We first discuss the variables we have used as dependent variables and later the explanatory variables.

Dependent variables

To capture individual morbidity, health-related and health behaviours and lifestyle characteristics, we have selected a number of variables from the survey. The selection of variables has been restricted to those questions that were included in the survey in all waves used. There are lifestyle variables such as physical activity or eating habits that ideally should be part of the analysis as they well reflect individuals' behaviours but these were variables included in some waves but not in all of them. Therefore, the selection of dependent variables has been limited to those available for the full period of study. A list of the variables is reported in Table 1 below.

Table 1. Health related variables – dependent variables

Variables	Description	Mean	St. Deviation	Max	Min
Vegetables	Total portion of vegetables (inc salad) eaten the day before	1.533	1.304	25	0
Fruit	Total portion of fruit eaten the day before	2.193	1.959	30	0
BMI	Body Mass Index	27.431	5.196	81.811	10.607
Cigdaily	Number of cigarettes smoked a day-including non-smokers	2.929	6.837	86	0
Medicines	# prescribed medicines taken	1.676	2.56	22	0
Drinking	Whether currently drinking	1.159	0.365	1	0
Longill	Whether has longstanding illness	1.549	0.498	1	0
Blood	Blood & related organs	0.008	0.088	1	0
Mental	Mental disorders	0.040	0.195	1	0
Heart	Heart & circulatory system	0.128	0.334	1	0
Digestive	Digestive system	0.050	0.217	1	0

Eating habits: We include the total portion of vegetables and the total portion of fruits eaten the day before as endogenous variables because they constitute health behaviours that may be affected by adverse economic conditions. Figure 1 and 2 below show the average consumption of vegetables and fruits computed from our sample data from 2004 to 2011. There is a clear increasing trend that suddenly drops after 2008.

Figure 1. Average Consumption of Vegetables

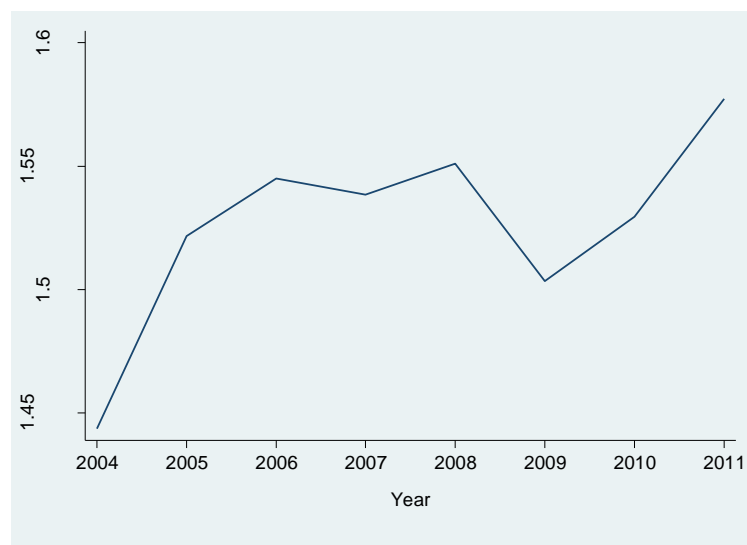
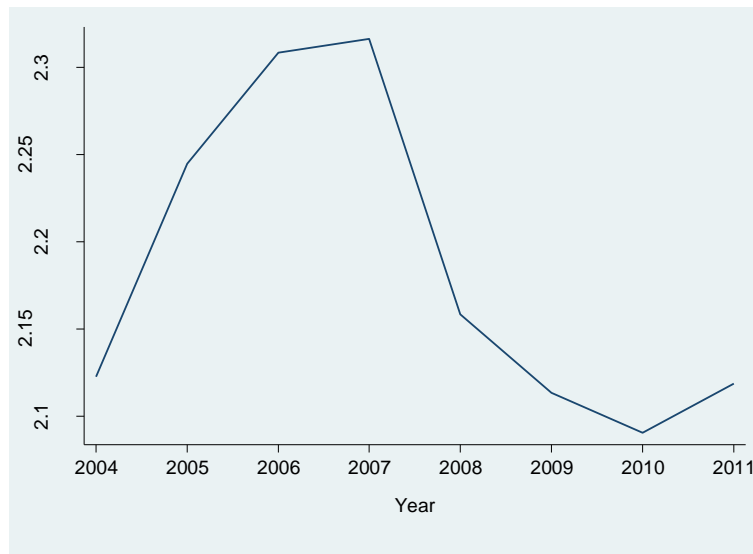


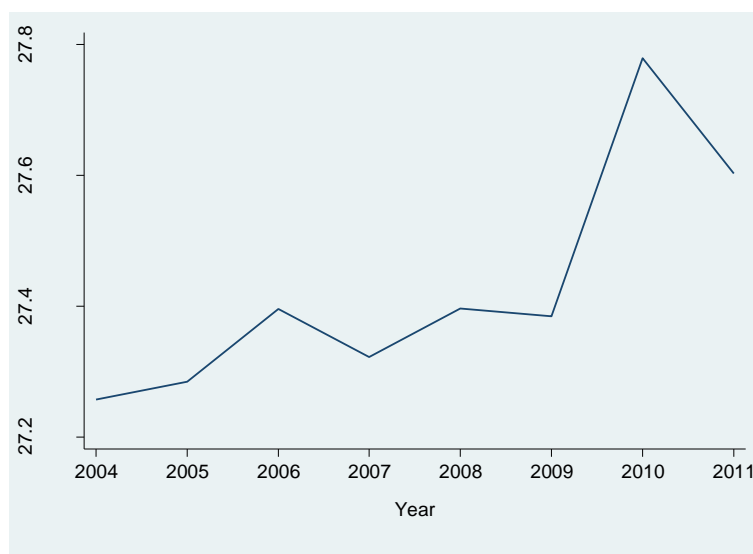
Figure 2. Average consumption of Fruit



Smoking and Drinking: In addition, we include as variables cigarette consumption and drinking habits. The variable *cigdaily* accounts for the number of cigarettes consumed per day – including those who do not smoke. Drinking habits are captured as a dummy taking value one when the individual states he drinks nowadays. Note that this variable does not account for the drinking intensity. Clearly, a more refined variable shall be explored in the future to differentiate heavy drinkers from those who do not drink or that drink moderately.

BMI: Body Mass Index (BMI) is included as a relatively immediate health outcome measure. Higher BMI is associated with higher risk of high blood pressure, diabetes and cardiovascular disease. As we can see in Figure 3 there has been an increase in average BMI over time.

Figure 3. Average BMI



Health conditions: Other health outcome measures included relate to the presence of a health condition. We include a dummy that captures if the individual has any long standing illness, disability or infirmity, capturing any long-term condition that affects the individual. This variable is a proxy for general health; however it does not differentiate between conditions that may differ in severity and daily activities. Consequently, we add four dummy variables that capture whether the individual has any blood and related organs condition, mental disorder, heart and circulatory system and digestive-system problem. These variables do not distinguish between conditions, but again the selection was determined by variable availability.¹

Economic Cycle variables

To capture the presence of an economic downturn that could potentially affect health outcomes and health behaviours we use a set of variables.

Deprivation: We first consider the Index of Multiple Deprivation (IMD) of the region where the individual lives. This is a measure of deprivation computed for England per each small area level. The score is ranked from least to most deprived on seven domains: income, employment, health and disability, education, crime, barriers to housing and services, and living environment deprivation. The IMD is computed for each Lower layer Super Output Areas (LSOA). This is a dummy variable with five categories (IMD1 to IMD5) classified from least deprived to most deprived area. This variable contains a domain on employment and therefore it is expected to partially capture macroeconomic fluctuations. IMD also has the advantage of being able to classify degrees of deprivation instead of a single measure of a negative economic fluctuation.

Unemployment: Typically, the literature has used a measure of regional unemployment to capture macroeconomic conditions. We use unemployment at the Government Office Region obtained from the Office for National Statistics. However, unemployment figures can be imperfect and not reflect accurately immediate market dynamics. Thus, we will also include a variable that captures the growth in unemployment rate. This is to examine if individuals in regions that were already deprived suffered a bigger impact during economic hardship. We also use a lag of the unemployment rate to check if there is any lagged effect of macroeconomic conditions on our health variables of interest.

¹ For instance, some waves include questions on the General Health Questionnaire (GHQ-12), which is a measure of psychological wellbeing but it is not included in waves 2007 and 2011. Specific questions on whether individuals have been diagnosed with diabetes, heart attack or stroke exist in a number of waves, but these questions were omitted in waves 2007 and 2010. These variables would be good proxies for a number of health outcomes but as they are not available consecutively we are restricted to use more general measures as the ones defined in Table 1.

2008-Recession Indicator Variable: In addition, we have included a dummy ($y_{2008} = 1$ if year ≥ 2008 and 0 from 2009 onwards) that differentiates the pre-2008 period from the post-crisis year. This indicator variable captures any effect on health behaviours and intermediate health outcomes that may have operated beyond the variation of unemployment and/or deprivation. We expect this indicator variable to have an effect - immediately or with a delay - so that healthy behaviours suffer a decline, which may exacerbate the negative effect of the recession on health outcomes in the longer run. In posterior versions, we plan to study what is the exact time when exactly the effect of the recession not explained by unemployment and deprivation is highest.

Control variables

The descriptive statistics of the other control variables included in the empirical specification are shown in Table 2 below.

Table 2. Explanatory Variables

Variable	Description	Mean	St. Deviation	Max	Min
Sex	1 if female	1.544	0.498	1	0
Age	Age last birthday	48.933	17.061	97	18
Hhsize	Household size	2.620	1.281	12	1
Loginc	Log of equivalised income	10.031	0.810	12.477	5.537
Marital Status	Single	0.232	0.422	1	0
	Married	0.576	0.494	1	0
	Separated/Divorced	0.122	0.327	1	0
	Widowed	0.070	0.255	1	0
Ethnicity	White	0.922	0.268	1	0
	Mixed	0.009	0.096	1	0
	Black/Black British	0.039	0.194	1	0
	Asian/Asian British	0.022	0.145	1	0
	Other	0.008	0.090	1	0
Highest Qualifications	Degree (or equivalent)	0.327	0.469	1	0
	ALevel	0.126	0.332	1	0
	GCSE	0.264	0.441	1	0
	Foreign	0.016	0.126	1	0
	FTStudent	0.036	0.187	1	0
	Noquals	0.230	0.421	1	0
Econact	Employed	0.594	0.491	1	0
	Unemployed	0.037	0.188	1	0
	Retired	0.230	0.421	1	0
	Inactive	0.140	0.347	1	0

Individual characteristics: In addition to the economic conditions variables we also control for a number of variables such as age, household size, sex, legal marital status, ethnicity, highest qualification obtained and employment status. The model also includes equivalised income, which is total household income adjusted by the household size according to the following weights: 1.0 to the first adult; 0.5 to the second and each subsequent person aged 14 and over; 0.3 to each child aged under 14. This variable is in logarithmic terms.

Time Trend: Beyond the variables in Table 2, to be able to control for trends in the dependent variables that are not explained by the independent variables included, we incorporate yearly time. It is well-known that there have been several public health policies aimed at encouraging healthier lifestyles that could have had a coetaneous effect on nutrition habits, smoking and drinking and intermediate health outcomes. For instance, the “Five a Day” campaign or the smoking ban implemented in 2007 may well have had an effect on some of the related outcomes. These are unobserved and captured by the time dummies.

3. Empirical Strategy

In order to capture the effect that macroeconomic conditions since 2008 have had on intermediate health outcomes and health behaviour, we use the following empirical specification:

$$health_{it} = \beta_0 + \beta_1 x_{it} + \beta_3 econ_{it} + u_{it}$$

Where $health_{it}$ represents any of the health variables defined in the previous section corresponding to individual i in period t . The socio-economic characteristics of the individual are captured in x_{it} and $econ_{it}$ are the different measures of the macroeconomic conditions that exist in the region where the individual lives.

Some of the dependent variables considered in the analysis are continuous whereas some of the other variables are binary dependent variables. Therefore we use standard OLS regression analysis for those continuous dependent variables and limited dependent variable models for the dummies. In particular, we estimate probit models of the type:

$$P(\text{health}_{it} = 1) = \Phi(\beta_0 + \beta_1 x_{it} + \beta_3 \text{econ}_{it} + u_{it}),$$

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

The vector of explanatory variables includes the income variable *loginc* and, as it is well-known, wealth, health outcomes and health behaviours can be simultaneously determined, that is, those with better health and having healthier lifestyles are more likely to have higher income, and reversely wealthier individuals tend to be healthier. Therefore we use instrumental variables approach treating income as endogenous. We instrument income using two instrumental variables that are correlated with income and that satisfy the standard moment condition of not being correlated to the error term, $E(u_{it} | z_{it}) = 0$. The two instruments are: the *number of bedrooms* and the *tenure of the household*. These variables are associated with income but pre-determined and thus not necessarily related to immediate changes in health intermediate outcomes or health behaviours. We accept the validity of our instruments on the grounds of the Durbin-Wu-Hausman test for the OLS estimates and the Wald test for the probit estimates. All our regressions are estimated using a robust variance matrix. Finally, given that individuals in the same household can be interviewed our estimates also cluster by household.

4. Results

We show our results in Tables 3, 4 and 5. Table 3 uses the Index of Multiple Deprivation (IMD) variable and the indicator variable *y2008* (which takes value 1 from 2008 onwards) to capture the impact of the economic downturn on the dependent variables. Table 4 uses three measures of unemployment (current unemployment rate, unemployment rate in the previous period and the unemployment growth between periods) and the indicator variable *y2008* instead. Table 5 summarizes the results of the estimates for the models that have medications and cigarettes as dependent variables.

To simplify and summarise the presentation of our results, we organise them in main effects. Columns (1) to (5) in Table 3 show the coefficients estimated using IV two-stage least-square linear regression.² Columns (6) to (11) show the results of estimating IV probit models using a maximum likelihood estimator.

² This is the most efficient estimator given that our error terms are assumed to be independent and homoscedastic. We do not report the first-stage estimates of income.

We first look into the effects due to changes in the deprivation level as shown in Table 3. Given that the omitted category of deprivation (IMD1) is that associated to the least deprivation and that deprivation increases the higher the category is, from our results in Table 3 we can establish that deprivation has a decreasing effect on vegetables' consumption. Being in the second lightest level of deprivation (IMD2) has a significant positive effect (+0.0670) but being in the highest level (IMD5) has a negative and significant effect (-0.0570). The higher the deprivation level the lower the consumption of vegetables, probably because vegetables include a very heterogeneous group of foods, i.e. from greens to potatoes and pulses. There is a clearly negative significant effect on the consumption of fruits as individuals in the two most deprived categories have negative coefficients (-0.0914 for IMD4 to -0.182 for IMD5).

A positive effect on the BMI variables exists as individuals in deprivation categories IMD2, IMD3, IMD4 and IMD5 with respect to the omitted least deprived category (IMD1) have positive significant coefficients, and this effect is larger the higher the level of deprivation is. Thus, the effect for individuals in IMD2 is 0.244 whereas the effect is 0.705 for those in category IMD5. Consumption of cigarettes has a negative significant effect on the consumption of cigarettes for individuals in the least deprivation categories whereas there is a positive and significant effect on smoking for those individuals in the two highest deprivation levels. This is therefore indicative that in lowest levels of deprivation cigarette consumption has decreased whereas for higher deprived areas consumption has actually increased. There is a negative effect on the likelihood of drinking only significant if individuals are in the most deprived category (-0.0661).

When looking at the intake of medicines, results suggest that being in the top deprivation categories IMD4 and IMD5 has a positive significant effect on consumption of medicines. In line with these results, we find that those in the two top deprivation categories have a higher likelihood of having a long-standing illness – as indicated by the positive and significant coefficients of the IMD4 and IMD5 dummies (+0.0623 and +0.0933, respectively). As per the other morbidity measures, there is an increasing positive effect on the likelihood of having a blood disease (i.e. diabetes) and heart disorders. However, the effect is only significant for the heart variable. The positive effect on having a heart problem increases with the level of deprivation (being in categories IMD3, IMD4 and IMD5 means individuals have a 7.9%, 11.8% and 13.9% higher likelihood of having a heart problem, respectively).

There is a negative significant effect (-0.0660) on having a mental illness. Those in the second least deprived category have a likelihood of having a mental disorder 6.6% less than those in the least deprived category. The variable on digestive problems, although having a

negative effect for the two least deprived dummies and a positive effect for the two highest deprived categories, does not show any significant effect.

From Table 3 we can also see the effect of the 2008 indicator variable. From these results we observe that the indicator variable for the start of the crisis has a significant negative effect on the consumption of fruits (-0.111); drinking (-0.144); and the likelihood of having a longstanding illness (-0.151). This variable has a surprising small positive effect on the consumption of vegetables (+0.0807); but a large positive effect on the BMI (+0.448), on medicines consumption (+0.331) and on the likelihood of having a mental disorder. Its effect on cigarettes, blood diseases, heart and digestive conditions is insignificant.

If we look at the coefficients estimated for the control variables we see that most covariates have an effect with the expected signs. Looking at the coefficients associated to the instrumented income variable we observe that all signs are as expected and significant with the exception of its effect on the likelihood of having a heart condition. Thus, income affects positively the consumption of vegetables, fruits and alcohol; and, negatively the BMI of the individual; the number of cigarettes and medicines; and the likelihood of having a longstanding illness, a mental illness and digestive problems. The variable age has a positive effect on the consumption of vegetables, fruit, BMI, medicine intake, and the likelihoods of having a longstanding illness, or a blood, heart or digestive condition. Increased education results in increased consumption of vegetables and fruits, and a decreased BMI, drinking and number of cigarettes. Married individuals consume more vegetables, have higher BMI and drink less than their counterparts. Females tend to consume more vegetables and fruits, have a lower BMI, smoke less cigarettes and drink less, consume fewer medications and have lower likelihood of having a longstanding illness or a heart condition. Being unemployed as opposed to employed only has a significant negative effect on the number medicines taken and a significant positive effect on the likelihood of drinking, having a longstanding illness and having a mental disorder.

Table 4 contains three panels presenting the estimates of the coefficients of interest when using the unemployment variables instead of deprivation indices to capture the most obvious effects of the macroeconomic downturn. All three specifications include the recession indicator variable 2008. The first panel shows the effect of the coetaneous regional unemployment level; the second panel uses the lagged regional unemployment variable instead; and the last panel shows the estimates when the rate of change in the regional unemployment rate is used instead of the other two options. These three specifications have controlled for all other covariates as in Table 3.

The effect of the coetaneous unemployment appears to have a positive significant effect on fruit consumption and the likelihood of drinking. The only two other significant coefficients show that there is a negative effect of unemployment on cigarette consumption and the likelihood of having a longstanding illness. The recession indicator variable *y2008* in this specification has a significant effect on almost all health related outcome variables. The effect is positive on BMI, cigarette consumption, medicines' intake and the likelihood of having a mental problem. Surprisingly, it has a small (not significant) positive effect on vegetables' consumption. It has a negative effect on the consumption of fruit, the likelihood of drinking, having a longstanding illness, and a heart problem.

In order to capture the market dynamics we use the lagged unemployment rate. This variable has similar effects that the coetaneous unemployment rate, with the exception of the coefficient for drinking which becomes negative but it is not significant. For this specification, we find that the recession indicator dummy *y2008*, has also a qualitatively similar effect to that in the previous panel with some significance variations. If the unemployment growth rate is used we see there is a statistically significant and negative effect on vegetables consumption and a positive effect on heaving a heart condition. The effect of *y2008* in this specification is similar to that in the previous two.

Finally, we present in Table 5, Tobit estimates of the effects of deprivation and the set of unemployment variables on consumption of cigarettes and medicines. The variable consumption is a corner solution outcome for which some individuals have a level equal to zero, i.e consumption of cigarettes or medicines can be zero as well as any other positive number. We therefore use the standard censored Tobit model to estimate the coefficients of the cigarettes and medicines consumption. The estimates are obtained assuming endogeneity of the income variables. The results are qualitatively similar to those obtained in Table 3 for the IMD dummies wbut now the IMD4 and IMD5 coefficients seem to have a bigger impact on consumption of cigarettes and medicines. We conclude that coetaneous unemployment affects negatively both variables. Lagged unemployment and unemployment growth rate do not have any statistically significant effect. The recession indicator variable *y2008* does have a significant positive effect on medicines taken when controlling for deprivation level, and all three measures regional unemployment level. The effect on cigarettes is insignificant except for the specification that uses the contemporaneous unemployment rate.

Table 3. Marginal Effects of IMD

VARIABLES	(1) Vegetables	(2) Fruit	(3) BMI	(4) Cigarettes	(5) Medicines	(6) Drinking	(7) Longill	(8) Blood	(9) Mental	(10) Heart	(11) Digestive
IMD2	0.0670***	-0.0143	0.244***	-0.202**	-0.0257	0.0101	-0.0134	0.0356	-0.0660*	0.0243	-0.0408
IMD3	0.000868	-0.0255	0.422***	-0.188*	0.0285	-0.00827	0.0263	0.0738	-0.0292	0.0767***	-0.00148
IMD4	0.0170	-0.0914**	0.690***	0.279**	0.108**	-0.0214	0.0623***	0.0646	-0.0223	0.118***	0.00833
IMD5	-0.0570*	-0.182***	0.705***	0.765***	0.134**	-0.0661*	0.0933***	0.124	-0.0369	0.139***	0.0139
y2008	0.0807***	-0.111***	0.448***	-0.206	0.331***	-0.144***	-0.151***	0.142	0.150***	-0.0538	-0.0518
Loginc	0.158***	0.367***	-0.268*	-3.616***	-0.639***	0.533***	-0.189***	-0.0578	-0.389***	-0.0713	-0.114**
Sex	0.0829***	0.300***	-0.433***	-1.001***	-0.0578**	-0.275***	-0.0296**	0.283***	0.0148	-0.180***	0.0519**
Age	0.00270***	0.0205***	0.0434***	-0.0516***	0.0499***	-0.00358***	0.0206***	0.00627***	-0.00547***	0.0312***	0.00669***
Hhsize	-0.000678	0.0120	0.0327	-0.536***	-0.156***	0.0195*	-0.0740***	0.00556	-0.136***	-0.0550***	-0.0493***
Married	0.0582**	0.0300	0.942***	0.0679	-0.0163	-0.0700**	0.00727	-0.0738	-0.0957**	0.179***	0.0120
Sep_div	0.0329	-0.0429	0.604***	1.354***	-0.136***	-0.0234	0.0631***	0.0344	0.110***	0.0718**	0.0262
Widowed	-0.00393	-0.0876*	0.480***	-0.267	0.193**	-0.182***	-0.0630*	-0.0391	-0.250***	0.0556	-0.0413
Mixed	0.0596	0.265***	0.0930	-1.044***	-0.0439	-0.323***	0.00140	0.119	-0.0656	0.0613	0.0277
Black_blackbrit	0.414***	0.468***	-0.662***	-3.602***	-0.0883	-1.280***	-0.182***	0.235**	-0.478***	0.0676	-0.197***
Asian_asianbrit	0.108**	0.452***	1.089***	-3.905***	-0.275***	-0.768***	-0.238***	0.0831	-0.512***	0.188***	-0.301***
Other	0.575***	0.373***	-1.714***	-2.719***	-0.498***	-0.919***	-0.313***	0.0256	-0.598***	-0.0650	-0.191
Degree	0.385***	0.597***	-0.693***	-0.636***	-0.132**	0.183***	0.0674**	0.108	0.177***	-0.0400	0.0781*
Alevel	0.235***	0.359***	-0.253**	-0.761***	-0.102**	0.192***	0.0314	0.131*	0.0984**	-0.0375	0.00656
GCSE	0.0833***	0.179***	-0.165**	-0.306***	-0.261***	0.218***	0.0175	0.0701	0.103***	-0.0279	0.0461
Foreign	-0.00954	0.189***	-0.412**	-0.771***	-0.339***	0.108**	-0.0591	-0.148	0.0240	-0.0509	0.111
FTStudent	0.283***	0.655***	-1.507***	-3.210***	-0.259***	0.238***	-0.206***	0.00305	-0.516***	-0.238***	-0.135*
Unemployed	0.00964	-0.0866	-0.257	-0.166	-0.206***	0.164***	0.0754*	-0.0269	0.285***	0.0903	0.0463
Retired	0.0133	0.157***	-0.774***	-2.527***	0.736***	0.00817	0.132***	0.152*	-0.00608	0.123***	0.0843**
Inactive	0.0736***	0.0221	0.158	-0.145	0.870***	-0.168***	0.463***	0.222***	0.752***	0.363***	0.257***
Observations	48,328	48,328	48,328	48,328	34,391	48,328	48,328	48,328	48,328	48,328	48,328
R ² /LogLikelihood	0.042	0.067	0.047	0.027	0.272	-63943	-75840	-48121	-53022	-61329	-55275
p-value	0.1016	0	0.3297	0	0	0	0.00235	0.615	7.86e-06	0.213	0.113

Note: Time and regional dummies included. Reference Categories: Single, White, No qualifications, Employed, IMD1 (least deprived). P-value corresponds to the test of exogeneity of income variable- H_0 : exogenous. Robust standard errors. Estimation clustered by household. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4. Marginal Effects of Macro Conditions

VARIABLES	(1) Vegetables	(2) Fruit	(3) BMI	(4) Cigarettes	(5) Medicines	(6) Drinking	(7) Longill	(8) Blood	(9) Mental	(10) Heart	(11) Digestive
Unemployment y2008	-0.296 0.0857	4.259* -0.267***	-2.213 0.564**	-27.41*** 0.777**	-4.090 0.474***	3.888* -0.282***	-3.303** -0.0302	-4.519 0.302	-3.318 0.267**	0.220 -0.0516	-3.264 0.0648
Observations	48,328	48,328	48,328	48,328	34,391	48,328	48,328	48,328	48,328	48,328	48,328
R ² /LogLikelihood	0.040	0.061	0.043	0.004	0.266	-64541	-76431	-48691	-53592	-61917	-55845
p-value	0.0096	0	0.0028	0	0	0	5.16e-06	0.445	1.63e-07	0.00913	0.0360
Unemployment (t-1) y2008	-1.365 0.0437	2.016 -0.311***	-7.136 0.514**	-9.249 0.0859	-1.921 0.318***	-0.183 -0.0906	-3.156* 0.00747	-7.124 0.349**	-1.239 0.0397	1.547 -0.131*	-6.448** 0.172**
Observations	43,684	43,684	43,684	43,684	34,047	43,684	43,684	43,684	43,684	43,684	43,684
R ² /LogLikelihood	0.042	0.060	0.045	0.002	0.266	-58640	-69299	-44323	-48769	-56234	-50656
p-value	0.0467	0	0.0185	0	0	0	1.76e-05	0.488	3.86e-06	0.00711	0.0188
Unemployment Growth y2008	-2.256*** 0.0757**	0.210 -0.121***	-2.233 0.483***	1.730 -0.167	-0.738 0.339***	0.186 -0.147***	-0.356 -0.145***	0.576 0.146*	-1.589 0.150***	1.961* -0.0454	-1.944 -0.0498
Observations	48,319	48,319	48,319	48,319	34,391	48,319	48,319	48,319	48,319	48,319	48,319
R ² /LogLikelihood	0.040	0.061	0.043	0.003	0.265	-64543	-76427	-48694	-53594	-61917	-55847
p-value	0.0097	0	0.0028	0	0	0	4.79e-06	0.445	1.53e-07	0.00896	0.0350

Note: Time and regional dummies included. P-value corresponds to the test of exogeneity of income variable- H₀: exogenous. Robust standard errors. Estimation clustered by household. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Tobit estimates for Cigarette and Medicines' consumption – Marginal Effects

VARIABLES	(1) Cigarettes	(2) Medicines	(3) Cigarettes	(4) Medicines	(5) Cigarettes	(6) Medicines	(7) Cigarettes	(8) Medicines
IMD2	-0.0775	-0.0837						
IMD 3	0.357	0.0575						
IMD 4	1.861***	0.205**						
IMD 5	2.496***	0.233**						
Unemployment			-91.79**	-6.757				
Unemployment (t-1)					-16.83	-1.929		
Unemployment Growth y2008	-0.435	0.454**	2.892**	0.686**	-0.280	0.464**	4.066	0.0751
							-0.324	0.560***

Note: Robust standard errors. Time and regional dummies included. *** p<0.01, ** p<0.05, * p<0.1

5. Conclusions and future research

In this paper, we study the effects of the economic recession that started in 2008 on intermediate health outcomes (such as the likelihood of having a heart, blood, mental, digestive or a longstanding illness); on the intake of medicines; and on health behaviours such as fruit and vegetables intake, cigarettes' consumption and the likelihood of drinking. We do so by exploiting eight waves of the Health Survey for England, which contains information on these health-related variables of interest, other individual characteristics such individual income and local measures of deprivation. We complement this dataset by using regional unemployment rates and analyse the combined effect of regional unemployment with the unobserved changes occurred since 2008 on the intermediate health outcomes and health behaviours of individuals. We do the same using indices of deprivation instead.

Our preliminary results indicate that there has been a downward trend in the consumption of vegetables since 2008 even after controlling for individual factors such as income, and employment status, and also local deprivation indicators and regional unemployment rates. Fruit consumption however is positively associated with unemployment. We also observe a surprising increase in the likelihood of drinking, although we need to interpret this result with careful consideration as the variable definition

accounted for current drinking or not and it is therefore not reflective of the intensity of drinking. Overall, fruit and drinking are countercyclical. As per the morbidity variables our preliminary estimates show there is a negative association between unemployment and longstanding illness, blood, mental and digestive disorders. The exception is the heart disorder variable. This suggests the presence of a procyclical effect of economic conditions on morbidity and it is in line with some of the findings in the literature. The 2008 dummy variable captures an effect that goes beyond the effect of adverse macro-conditions. Taken as a whole, the dummy variable reflecting the post-recession period shows that after the recession starts those effects are exacerbated.

The limitations of our preliminary version are numerous. First of all, the period analysed is limited and thus we are currently working on extending the number of waves included back to the first HES waves collected. With a longer time period we will be able to capture better fluctuations in the behaviour of the health variables used. Secondly, we have not studied if the effect of the recession changes by deprivation category or by regional unemployment rate, thus, we want to see the interacted effect of the recession indicator variable with regional unemployment and indices of deprivation.

Additional limitations arise with the definition of some of the variables used. For instance, morbidity variables are very broadly defined and do not allow to distinguish between levels of severity. Under heart conditions one may find heart attacks and strokes as well as other health conditions. Similarly, under mental disorders one can find depressions mixed with schizophrenia but only the former is likely to be by some means influenced by economic fluctuations. Finally, we use a dummy that separates the pre- and the post-recession period but it may well be that the effects of a recession kick in later periods. Therefore, we need to further explore the timing effect of adverse economic conditions.

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