Implications of social and material deprivation for changes in health of older people

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Abstract

Objectives

We use the panel structure of the SHARE data for 14 countries to examine the implications of material and social deprivation for health deterioration in the old age and mortality.

Methods

To minimize the potential endogeneity bias we examine the relationship between deprivation and changes in health rather than levels of health. We include a substantial set of fixed "initial conditions", and extend the controls with health measures, as observed at the initial period.

Results

The results of the probit regression suggest strong and statistically significant relationship between measures of material and social deprivation and changes in physical and mental health. Mortality is only affected by the social dimension of deprivation.

Discussion

Treating material and social deprivation separately rather than as a single social exclusion indicator allows for more specific identification of the role of the two dimensions, which might be important for policy decisions.

Keywords:

health in later life, mortality, material and social deprivation, social exclusion

Introduction

Limiting the extent of poverty and social exclusion has been one of the key objectives at the national and European level for over two decades and reducing the number of people at risk of poverty and social exclusion by 20 million became one of the targets of the Europe 2020 strategy of the European Commission. At the same time despite the intuitive nature of the concept there has been an ongoing debate in the literature on how social exclusion should be defined and measured (see e.g. (Walsh, Scharf, Cullinan, & Finn, 2012; Walsh, Scharf, & Keating, 2016)). Given the importance of the social context in the understanding of the concepts of deprivation and exclusion, they are by definition ever changing and thus it is impossible to expect a final verdict on the approach to who is and who is not materially or socially deprived, and who can be classified as socially excluded. This however should not stop researchers from trying to identify convincing broad measures of wellbeing with a focus on deprivation or exclusion. One related concept was proposed in (Myck, Najsztub & Oczkowska, 2015) where risk of social exclusion among people aged 50+ was measured with respect to the relative position of older individuals in the distribution of material and social deprivation indices. These indices were constructed using data from wave 5 of the Survey of Health, Ageing and Retirement in Europe (SHARE) conducted in year 2013 and were developed with the use of questionnaire items specifically designed to identify aspects of wellbeing particularly relevant to individuals aged 50+, such as material conditions, quality of neighbourhood and accessibility to services. Binary indicators signalling individual deprivation with respect to these items were employed with hedonic weights to compute material and social deprivation indices. We then constructed an indicator of severe deprivation by taking individuals allocated above the 75th percentile of the total distribution of each dimension of deprivation. This last measure sheds light on the population at risk of social exclusion. Further in the paper, with the

availability of data from wave 6 of the SHARE survey collected in year 2015, all three measures of deprivation are used in order to analyse the implications of old age material and social deprivation for changes in health.

While measuring deprivation and social exclusion in a cross-sectional setting gives us important knowledge about the material and social state of the examined population, using this information for contemporaneous correlations is unlikely to be very informative of the role they play in determining other outcomes. From this perspective there is a number of advantages in using the SHARE data. First of all, using the panel structure of SHARE gives us the possibility to look into how changes observed between two waves of the survey relate to the values of deprivation and the risk of social exclusion as identified in the initial wave. Secondly, the SHARE data contains a substantial set of information related to life history of respondents which can be considered as correlates of the so-called "initial conditions". This in turn to some extent allows us to further address the issue of endogeneity bias in our estimates resulting from unobservable factors.

In this paper we focus specifically on one of the key determinants of individuals' wellbeing, namely health. Thus the aim of the paper can be presented as twofold. First, using complex measures of deprivation designed specifically for older individuals, we validate the hypothesis that deprivation, both material or social, contributes to deterioration of health at older ages. Secondly, by examining the relation between the two, we are able to demonstrate that among older individuals the combination of material and social deprivation – our measure of social exclusion – is detrimental to physical and mental health.

Given the complex nature of the relationship between health and material and social wellbeing (see e.g. Cambois, Solé-Auró, & Robine, 2016; Deaton, 2008; Ettner, 1996; Haan & Myck, 2009; Marmot, 2002; Teerawichitchainan & Knodel, 2015; Testi & Ivaldi, 2009; Tubeuf & Jusot, 2011; Winkleby, Jatulis, Frank, & Fortmann, 1992) the approach we take is still unlikely to uncover a

clear causal relationship between deprivation, social exclusion and health outcomes. As we explain in a formal presentation of the model we estimate, there may still be unobservable factors which correlate both with the level of deprivation and exclusion and with changes in health, thus causing some bias in the estimates. However, in our approach we examine the relationship between health and material and social wellbeing under very strict assumptions and – as our results show – we still find strong and statistically significant relationship between changes in health and our key variables of interest.

Additionally, even if the analysed relationship cannot be given a clear causal interpretation, relating the information on the levels of material and social wellbeing with changes in health can be informative in at least two important and policy relevant aspects. First, the extent of future health developments among the currently deprived or excluded population can serve as indicators with regard to the expected developments in the level of health of the population and consequently as signals concerning future health care needs. Secondly, by examining the role of material and social deprivation separately we can specify the relative role of each of these domains for developments in health at later stage in people's lives. This can be instrumental in designing specifically targeted policy interventions.

2. The relationship between health and deprivation

2.1 Literature review

Since at least 1970s significant effort has been made to identify the determinants of different aspects of well-being (Gaertner, 1993; Nussbaum, 2001; Sen, 2000; Townsend, 1979) and it has become widely accepted that quality of life should not be perceived solely with reference to income

and income poverty. Bhalla & Lapeyre (1997) noted that one possible way to go beyond the income and commodity notion of evaluating quality of life was through the concept of social exclusion. The concept itself is far from straightforward and its definition has been approached from many different directions, reflecting in particular its relative nature (Atkinson & Hills, 1998; Levitas et al., 2007; Sen, 2000). Another commonly accepted characteristic of social exclusion is multidimensionality. The number of dimensions in social exclusion as well as the range of life domains they might cover have been widely discussed in the literature, resulting in almost as many classifications as studies with reference to economic, social and institutional dimension (Pirani, 2013); financial difficulties, basic necessities, housing conditions, durables, health, social contact and dissatisfaction (Chakravarty & D'Ambrosio, 2006); or material deprivation, social rights, social participation, social integration (Jehoel-Gijsbers & Vrooman, 2008), to name just a few. Regardless of classification, the factors common to all are deprivation in material and deprivation in social aspects of life. Among many others, a broad but straightforward definition of these dimensions of deprivation was proposed in (Jehoel-Gijsbers & Vrooman, 2008) which served as foundation in (Myck et al., 2015) and which we followed throughout this manuscript. Material deprivation may be defined as deficiency in basic material needs and social deprivation corresponds to social isolation and lack of social support.

It has been well established in the literature that lack of command over material resources can have significant adverse effects on health, leading to poor health outcomes as defined with both broader and more precise measures of health. Using simple self-assessment of health, which is both easy to understand and to implement in a social survey, Doebler & Glasgow (2017) analyse the relationship between health and material deprivation among people aged above 64 years. While Adena & Myck (2014) start off with similar self-reported declaration of health status, they extend their examination of health-related poverty implications with indicators of having difficulties with

activities of daily life and being troubled by specific ill-health symptoms, like breathlessness. Benach, Yasui, Borrell, Sáez, & Pasarin (2001) show strong detrimental associations of material deprivation and civilization diseases such as diabetes, heart diseases or lung cancer, providing some further evidence that broadly defined material conditions are correlated not only with future health outcomes, but also mortality, which has been also reported in other studies (e.g. Carstairs & Morris, 1989). Rohde, Tang, Osberg, & Rao (2017) show that even the prospects of economic losses could lead to worsened health.

The diversity of definitions of material hardship cited above suggests that the way we measure material wellbeing has important implications for the identified relationship with health. A number of studies have shown for example that changes in health are generally less responsive to income-based measures of poverty compared to more general concepts such as measures of (relative) deprivation or self-assessed material conditions (Adena & Myck, 2014; Gero, Kondo, Kondo, Shirai, & Kawachi, 2017; Gunasekara, Carter, Crampton, & Blakely, 2013). This has been explained by the fact that broader definitions of material hardship are closer in the chain of events leading to bad health than income. Moreover, in particular with regard to older people, income-based measures may be poor indicators of overall material conditions, as they do not account for the level of available assets and they are insensitive to varying needs of individuals conditional on such characteristics as health or disability (Detollenaere, Desmarest, Boeckxstaens, & Willems, 2018).

Similar conclusions with respect to adverse consequences for health are drawn with regard to social aspects of people's lives, in particular to social isolation which has been shown to affect both mental and physical health (Miyawaki, 2015). A socially inclusive approach towards older people is related to lower suicide mortality (Yur`yev et al., 2010), while (Myck et al., 2015) provide some evidence that social deprivation, broadly conceptualised as deprivation from valuable social

interaction is correlated with life satisfaction. Other studies document that social isolation is related to increased risk of cardiovascular diseases (Barth, Schneider, & von Känel, 2010), infections (Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997), elevated blood pressure and deterioration of cognitive abilities (Bassuk, Glass, & Berkman, 1999). Lack of social interactions not only leads to worse health, but also, in consequence, to increased mortality rate (Shor & Roelfs, 2015). A meta-analysis of 148 studies relating social relationships and mortality revealed that overall stronger social relationships lead to a 50% increase in survival likelihood (Holt-Lunstad, Smith, & Layton, 2010).

2.2 Obtaining unbiased estimates of impact of deprivation on health

In our analysis we attempt to identify the relationship between health and social and material deprivation. This could be summarised in the following equation:

$$h_{i,t} = \beta_1' X_{i,t} + \gamma' d_{i,t} + \varepsilon_{i,t} \qquad\qquad (1)$$

where $h_{i,t}$ is health of individual i at time t, $X_{i,t}$ are his or her characteristics, $d_{i,t}$ is the individual level indicator (or a vector of indicators) of deprivation, i.e. our key variable of interest, and $\varepsilon_{i,t}$ is an individual, t-specific residual. Because under this specification there may be factors in $\varepsilon_{i,t}$ which are correlated with both $d_{i,t}$ and health, the estimated coefficient on deprivation is likely to be biased. An example of such an omitted variable is "ability", which can clearly affect both deprivation and health and for which we are unlikely to control fully through $X_{i,t}$. To reduce such bias we propose to estimate the following equation, where deprivation as well as other characteristics are regressed not on levels but rather on changes in health:

$$\Delta h_{i,t} = \beta_1' X_{i,t-1} + \gamma' d_{i,t-1} + \epsilon_{i,t} \qquad\qquad (2)$$

with $\Delta h_{i,t}$ defined as ($h_{i,t}$ - $h_{i,t-1}$) and the change being conditional on characteristics observed at time *t-1*. While this approach does not completely do away with the potential for the omitted variable bias (e.g. ability can affect both deprivation and the rate of health deterioration), it is generally the case that the degree of such bias is going to be reduced compared to equation (1). The remaining bias may still relate to both fixed and variables factors which are presented in equation (3) as components of $\epsilon_{i,t}$:

$$\epsilon_{i,t} = \mu_i + v_{i,t}. \tag{3}$$

Ability could be treated as such a fixed effect, but μ_i can include other characteristics. To account for such possibility in our approach – given the richness of the SHARE data – we control for a set of such fixed characteristics by including important information on family socio-economic situation of the respondent at the age of 10 and his or her health status during childhood. Detailed description of childhood variables included in the analysis may be found in Appendix C. Thus the second specification we estimate takes the following form:

$$\Delta h_{i,t} = \beta_1' X_{i,t-1} + \beta_2' Z_i + \gamma' d_{i,t-1} + \mu_i + v_{i,t}. \tag{4}$$

Additionally, to further control for the potential correlation between health and material and social conditions at time *t-1* we extend this specification to include a vector of health measures (other than $h_{i,t}$) as observed at *t-1*, $K_{i, t-1}$:

$$\Delta h_{i,t} = \beta_1' X_{i,t-1} + \beta_2' Z_i + \gamma' d_{i,t-1} + \beta_3' K_{i,t-1} + \mu_i + v_{i,t}. \tag{5}$$

As we shall see in our results, this extension in many instances proves very important in reducing the magnitude of the γ coefficients, thus confirming the strong relationship between health and social and material conditions at any given point.

Through the extensive set of controls and because we estimate the specification in changes of health and not in levels, we argue that we minimise the potential bias on the γ coefficient (or vector of

coefficients) of interest, putting the relationship between health and material and social conditions to a very demanding test.

In the final model we examine the probability of changing the health status from good to bad using the probit regression approach (conditional on good health status in *t-1*) for five health outcomes described further in Section 3. The estimated model – in the full specification – thus takes the following form:

$$P(H_{i,t} = 1 | H_{i,t-1} = 0) = \beta'_1 X_{i,t-1} + \beta'_2 Z_i + \beta'_3 K_{i,t-1} + \gamma' d_{i,t-1} + \mu_i + v_{i,t} \tag{5}$$

where $H_{i,t}$ is a binary health indicator taking value 1 in the case of bad health.

Under the specifications outlined in equations 2, 4 and 5 we relate changes from good to bad health status ($H_{i,t}$) between waves 5 and 6 of SHARE to general individual or household characteristics as observed in wave 5, $X_{i,t-1}$, and a vector of measures of deprivation as recorded in wave 5, $d_{i,t-1}$ (specification 1). The $X_{i,t-1}$ characteristics include: gender, age polynomial, level of education, living with a partner as well as country dummies and controls for the time between interview in the two waves in case of all outcomes but death. This set of conditioning variables is then extended to include childhood fixed effects, Z_i (specification 2) and health status, $K_{i,t-1}$, using variables other than $H_{i,t}$ (specification 3). The full list of childhood (Z_i) and health controls ($K_{i,t-1}$) is available in Appendix C. Standard errors are clustered at the country level. We estimate and report results as marginal effects.

3. Data and methodology

3.1. Measuring material and social deprivation in SHARE

The Survey of Health, Ageing and Retirement in Europe (SHARE) is a multidimensional study conducted in European countries and Israel that concentrates on living conditions of individuals aged 50+, including health, employment status, material situation and social relations. Since 2004 seven waves of data collection covering almost 300,000 interviews have been conducted. In this paper we focus on information on current aspects of life drawn from waves 5 and 6 of SHARE study, which were administered in years 2013 and 2015 respectively. This information is supplemented with additional variables on childhood conditions recovered from the retrospective wave 3 of SHARE conducted in 2009. For individuals who had not participated in SHARE at this time, information on childhood conditions was collected in wave 5.

Importantly from the point of this analysis, wave 5 of SHARE contained an extended list of variables specifically gathered to capture broad aspects of wellbeing in later life and covering material conditions, quality of neighbourhood and accessibility to services. These items were used to construct social and material deprivation indices for all SHARE respondents in wave 5 (for more details see Table 1 and also (Adena, Myck, & Oczkowska, 2015; Bertoni, Cavapozzi, Celidoni, & Trevisan, 2015; Myck et al., 2015; Stoeckel & Litwin, 2015)). The indices aggregate binary indicators on whether a person is deprived of a specific item using the so-called hedonic weights from a multiple regression of all items on a single life-satisfaction measure (for more details on hedonic weighting scheme see e.g. (Bertoni et al., 2015)). The final deprivation indices take values from 0 to 1, with higher values implying higher levels of deprivation. On top of the measures of deprivation in material and social dimension, an index of severe deprivation was introduced to serve as indicator of risk of social exclusion (Myck et al., 2015). Individuals are identified as socially excluded if they are allocated above the 75th percentile of the total distribution of each dimension of deprivation (see also Figures A1 and A2 in Appendix B). For the purpose of common reference and cross-country comparison the threshold is universal for all SHARE countries.

Table 1. Items used to build material and social deprivation indices in SHARE wave 5

Material deprivation index	Social deprivation index
Affordability of:	Less than 1 room per household member
meat/fish/chicken	Poor reading or writing skills
fruits/vegetables	Poor computer skills
an unexpected expense	Not feeling part of the local area
a week-long vacation once a year	Vandalism is a problem in the local area
regular grocery shopping	Local area is not clean
Keeping living costs down by:	No helpful people in the local area
reducing heating	Having difficulties to access:
wearing worn-out shoes	bank
wearing worn-out clothes	grocery shop
not replacing glasses	pharmacy
postponing dentist	GP
postponing doctor	Waiting too long to see a doctor
Having payment arrears	Not attending any course or club
Lack of money prevents oneself from doing things that she would like to do	Not taking part in any organisation
	Not trusting people
	Feeling left out of things

Source:(Bertoni et al., 2015; Myck et al., 2015).

While the entire distribution of the material and social indices for each country participating in wave 5 of SHARE may be found in Figures A1-A2 in the Appendix B, in Figure 1 below we show the country specific average levels of deprivation in each domain with relatively high variation across countries and domains. The lowest average level of both material and social deprivation may be seen among the Danish population (0.05 and 0.10 respectively). Estonia clearly stands out as a country with the highest level of material deprivation (0.32), though at the same time the social dimension of deprivation in Estonia is not much different from countries like Israel or Spain. Italy has the highest level of social deprivation (0.25) with second highest level in the material dimension (0.23). Interestingly, with the exceptions of Estonia, Slovenia and Spain, the average country level of social deprivation is higher than the material one and in some cases these differences are substantial. Figure 2 presents percentage of population at risk of social exclusion as defined for the

purpose of this analysis. In line with the results captured for the separate indices of deprivation, while as many as 28% of Estonians, 25% of Italians and 21% of Israelis are at risk of social exclusion, only 2% of the Danish population are identified as being at risk.

Fig. 1 Average levels of material (MD) and social deprivation indices (SD) in SHARE wave 5 by country

[insert Fig. 1.]

Source: Authors' calculations using SHARE wave 5 data, release 6.1.1.

Notes: weighted using individual weights.

Fig. 2 Proportion of population at risk of social exclusion in SHARE wave 5 by country

[insert Fig. 2.]

Source and notes: see Figure 1.

3.2. Health changes between wave 5 and wave 6 of SHARE

Data in wave 5 of SHARE was collected in 2013 in 15 countries, of which all but one also took part in the following wave of the survey two years later. In Table 2 we present the key descriptive sample statistics for individuals who participated in wave 5, conditional on the status of their participation in wave 6. Out of slightly over 65,000 individuals who participated in SHARE in 2013, 72% completed the survey in wave 6, while additionally there is information on 3% of individuals who died between wave 5 and 6. This information was collected in the form of the so-called end-of-life interviews conducted with close relatives of deceased respondents.

In our main analysis we use the subsample of wave 5 participants who completed the interview in wave 6 or for whom we have information from the end-of-life interview conducted in wave 6,

which is used to identify mortality. We use a large set of variables and thus the final analytical sample is limited to individuals for whom all necessary information is available. From 36,644 such individuals, 35,629 completed the interview in wave 6 and for further 1015 we have information from the end-of-life interview (see Tables 3 and 4).

Table 2. Sample statistics of participants of SHARE wave 5

	Participated in wave 6	Deceased	Did not participate in wave 6
Number of obs.	46 744	1 944	16 352
% female	56.2%	45.1%	54.2%
Average age in wave 5 (years)	66.5	77.9	65.9
Number of obs. by country:			
Austria	3 045	88	1 159
Germany	4 204	93	1 287
Sweden	3 512	93	910
Netherlands	0	0	4 118
Spain	5 063	360	1 156
Italy	3 596	144	920
France	3 117	82	1 225
Denmark	3 295	116	645
Switzerland	2 546	55	388
Belgium	4 273	149	1 110
Israel	1 768	118	675
Czech Republic	4 337	249	951
Luxembourg	1 089	18	484
Slovenia	2 366	92	456
Estonia	4 533	287	868

Source: SHARE wave 5 and 6 data, release 6.1.1.

Our principal focus in this paper is the relationship between the level of material and social deprivation and changes in health status between the two waves. For this purpose we select a number of key health measures from those available in the SHARE survey and complement the analysis with mortality information from end-of-life interviews. The following measures of health are used in the analysis:

limitations with activities of daily living (ADL),

difficulties in mobility (MOBILITY),

self-reported overall health status (SAH),

depression symptoms as measured by the EURO-D scale (EURO-D),

mortality.

While the indicator of limitations with activities of daily living (ADL) captures problems reported by the respondent with six basic everyday life activities (like dressing or bathing), mobility impairments such as walking 100 meter or climbing one flight of stairs are reflected in the MOBILITY scale (full list of limitations with ADL and MOBILITY can be found in Appendix A). For the purpose of further analysis we assume that an individual is in bad health when at least one of the respective limitations is reported (Chan, Kasper, Brandt, & Pezzin, 2012; Fernandes, Meijer, & Zamarro, 2008). In SHARE individuals assess their overall health status (SAH) on a five-point scale from excellent through very good, good, fair to poor. Here, poor self-assessed health is taken to reflect bad health. Depression symptoms are measured using the EURO-D scale of 12 items capturing for instance whether a person had any hopes for the future or had trouble sleeping recently (full list of symptoms in Appendix A). The usual cut-off point used in the literature indicating the risk of depression is set at 4 symptoms (Castro-Costa et al., 2007; Prince et al., 1999). Descriptive statistics of health outcomes are presented in Table 3 for the sample of respondents who participated both in wave 5 and 6 of SHARE and in Table 4 for the sample of wave 5 participants for whom end-of-life interviews were conducted in wave 6. For participants of both wave 5 and 6 we observe a natural deterioration in physical health during the two years period, but in terms of mental health we observe a slight improvement.

The measures of health status in our data are strongly differentiated by country, both in terms of the level of health in a specific wave and in terms of changes between waves. This is reflected in

Figures 3a-d where we show proportions of respondents in bad health among those who were interviewed in both waves.

Table 3. Descriptive statistics: participants of both wave 5 & 6 of SHARE

| | Wave 5 | |
	Mean	St. dev.
% female	0.534	0.499
Age (years)	65.012	10.033
Education:		
primary or none	0.237	0.425
secondary	0.541	0.498
tertiary	0.222	0.416
Partner in household	0.675	0.467
Deprivation and exclusion:		
material deprivation	0.144	0.195
social deprivation	0.174	0.136
social exclusion	0.118	0.323
Number of obs.	35,629	

| | Wave 5 | | Wave 6 | |
	Mean	St. dev.	Mean	St. dev.
Proportion in bad health:				
1+ ADL	0.086	0.280	0.098	0.298
1+ MOBILITY	0.447	0.497	0.452	0.498
Poor SAH	0.081	0.272	0.080	0.271
4+ EURO-D	0.261	0.439	0.257	0.437

Source: SHARE wave 5 and 6 data, release 6.1.1.

Notes: weighted using individual weights.

Table 4. Descriptive statistics: participants of wave 5 who had end-of-life interview in wave 6 of SHARE

| | Wave 5 | |
	Mean	St. dev.
% female	0.436	0.496
Age (years)	76.104	10.356
Education:		
primary or none	0.409	0.492
secondary	0.476	0.500

tertiary	0.115	0.319
Partner in household	0.564	0.496
Deprivation and exclusion:		
material deprivation	0.169	0.196
social deprivation	0.273	0.159
social exclusion	0.237	0.425
Proportion in bad health:		
1+ ADL	0.373	0.484
1+ MOBILITY	0.751	0.432
Poor SAH	0.335	0.472
4+ EURO-D	0.480	0.500
Number of obs.	1015	

Source and notes: see Table 3.

Fig. 3 Proportion of respondents in bad health in waves 5 and 6 of SHARE by country

a) Proportion 1+ ADL   b) Proportion 1+ MOBILITY

[insert Fig. 3a.]   [insert Fig. 3b.]

c) Proportion in poor health (SAH)   d) Proportion 4+ EURO-D

[insert Fig. 3c.]   [insert Fig. 3d.]

Source: own calculations using SHARE wave 5 and 6 data, release 1.1.1.

Notes: only respondents who participated in both waves, weighted using individual weights.

4. Results

Tables 5 and 6 we present results of the estimations in the three specifications described in Section 2.2. of the paper for each of the four measures of health from the Section 3.2., while in Table 7 we show results of estimations for the probability of death between waves 5 and 6. In Table 5 we show results when controlling for material and social deprivation indices, whereas in Table 6 the two are combined in a single social exclusion indicator. All results are reported as marginal effects. Given

a high number of conditioning variables used in the analysis only a subset of results is presented in the tables.

In all of the estimated specifications in Table 5 the effects of both deprivation measures are positive and statistically significant implying strong correlation between material and social deprivation and deterioration of health. For all four health measures we find only minimal biasing role of the childhood variables added in Specification 2. The same cannot be said for the comparison with Specification 3, in which the other health measures from wave 5 are added to the set of control variables. In the case of all health changes controlling for other measures of health status in time (t-1) has a strong influence on the value of the estimated effects. For example for 1+ADL adding the (t-1) heath controls in Specification 3 reduces the value of the marginal effect of material deprivation from 0.074 to 0.032, and the value of the effect on social deprivation from 0.108 to 0.041. Slightly smaller (relative) changes are recorded for other health measures. These findings confirm the strong correlation between health level and both material and social deprivation in the baseline period (t-1), and with changes in the analysed health dimension.

As for other results in Table 5 it is worth noting that women have a higher probability of falling into depression. Both education (-) and age (+) have the expected signs with regard to the worsening of physical health, however the effect on mental health is less straightforward.

With regard to the estimation which uses only the indicator of risk of social exclusion (Table 6) it is worth noting that the results reported for the separate indices generally hold and we also observe the pattern of an adverse role of social exclusion towards physical and mental health changes. The only exception is in Specification 3 for 1+ADL where not only we find a substantial bias from excluding the additional health indicators from (t-1), but also – as a result of including these in Specification 3 – find that the social exclusion index has no effect on change in this dimension of health.

Finally, looking at the results in the model for the probability of dying between waves (Table 7) we see a similar pattern with respect to the role of controls for (t-1) health status in Specification 3. What is interesting is the fact that in Specification 3 while material deprivation seems to bear no effect on the probability of dying between the waves, social deprivation continues to play a role, even under the most extended specification. Additionally, we find a familiar result that women are less likely to die than men, and as one could expect the effect is stronger once we condition for health status in Specification 3.

The estimated coefficients on deprivation and exclusion measures presented in Tables 5-7 show the average relationships for all countries in the sample. However, as we show in Tables 9-11 in Appendix D, these average values are very close in magnitude to the effects estimated for four countries for which the samples are the largest (Czech Republic, Germany, Estonia and Spain), which is reassuring given the institutional and cultural heterogeneity of these four countries.

Given the results presented above – independently for material and social deprivation, one general conclusion is that in the analysis of influence of deprivation on health, it seems more informative to include the two separate indices of deprivation, material and social, rather than the combined indicator for social exclusion. Our results suggests that the two dimensions of deprivation might affect people differently with respect to different measures of health and this heterogeneity in effects is lost if we use a combined index of exclusion.

Table 5. Role of material and social deprivation for the probability of changes in health between SHARE wave 5 and wave 6 (marginal effects)

	(1) 1+ADL	(2)	(4)	(5) 1+MOBILITY	(6)	(8)	(9) Poor SAH	(10)	(12)	(13) 4+ EURO-D	(14)	(16)
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Material deprivation	0.077***	0.074***	0.032***	0.100**	0.098**	0.058	0.073***	0.070***	0.043***	0.148***	0.139***	0.104***
	(7.89)	(7.50)	(4.12)	(2.75)	(2.76)	(1.89)	(10.93)	(10.53)	(6.70)	(8.89)	(8.41)	(6.41)
Social deprivation	0.113***	0.108***	0.041***	0.272***	0.270***	0.190***	0.101***	0.098***	0.047***	0.254***	0.244***	0.184***
	(8.65)	(8.47)	(4.38)	(6.34)	(6.14)	(4.92)	(7.94)	(7.99)	(4.55)	(8.02)	(8.08)	(6.49)
Female	-0.002	-0.001	-0.025***	0.070***	0.070***	0.057***	-0.005	-0.005	-0.029***	0.070***	0.071***	0.040***
	(-0.49)	(-0.38)	(-5.39)	(12.44)	(12.31)	(5.05)	(-1.31)	(-1.26)	(-4.36)	(16.37)	(17.78)	(5.67)
Educ. (ref. cat. primary or none):												
secondary	-0.008	-0.005	-0.002	-0.029**	-0.028*	-0.020	-0.012**	-0.009*	-0.009*	-0.013	-0.007	-0.007
	(-1.72)	(-1.15)	(-0.40)	(-2.69)	(-2.42)	(-1.89)	(-2.62)	(-2.23)	(-2.25)	(-1.09)	(-0.58)	(-0.56)
tertiary	-0.025***	-0.020***	-0.012*	-0.067***	-0.066***	-0.053***	-0.021***	-0.017**	-0.014*	-0.018	-0.009	-0.005
	(-4.84)	(-3.57)	(-2.19)	(-4.80)	(-4.30)	(-3.68)	(-3.68)	(-3.27)	(-2.54)	(-1.45)	(-0.66)	(-0.42)
Age	0.003***	0.003***	0.002***	0.009***	0.009***	0.007***	0.002***	0.002***	0.001***	0.002***	0.002***	0.000
	(13.33)	(13.18)	(8.83)	(12.87)	(12.55)	(10.24)	(10.21)	(9.91)	(4.22)	(3.66)	(3.67)	(0.11)
No partner in HH	0.006*	0.006*	0.006*	0.011	0.011	0.009	0.004	0.004	0.004	-0.013*	-0.013*	-0.014*
	(2.32)	(2.19)	(2.14)	(1.22)	(1.21)	(1.05)	(1.41)	(1.39)	(1.26)	(-2.15)	(-2.18)	(-2.30)
Childhood controls		incl.	incl.		incl.	incl.		incl.	incl.		incl.	incl.
(t-1) health controls			incl.			incl.			incl.			incl.
No. of obs.	32690	32690	32690	19611	19611	19611	32925	32925	32925	27181	27181	27181

Notes: t statistics in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001, standard errors clustered at the country level. In specification 1 we include controls for demographic information, childhood fixed effects are added in specification 2 and health controls in time t-1 are included in

Table 6. Role of social exclusion for the probability of changes in health between SHARE wave 5 and wave 6 (marginal effects)

	(1) 1+ADL Spec. 1	(2) Spec. 2	(3) Spec. 3	(4) 1+MOBILITY Spec. 1	(5) Spec. 2	(6) Spec. 3	(7) Poor SAH Spec. 1	(8) Spec. 2	(9) Spec. 3	(10) 4+EURO-D Spec. 1	(11) Spec. 2	(12) Spec. 3
Social exclusion	0.039***	0.037***	0.008	0.094***	0.091***	0.053**	0.040***	0.038***	0.019***	0.096***	0.091***	0.065***
	(8.38)	(7.63)	(1.76)	(4.92)	(4.77)	(3.08)	(8.08)	(7.65)	(4.37)	(14.63)	(13.76)	(8.76)
Female	-0.001	-0.000	-0.027***	0.071***	0.071***	0.054***	-0.004	-0.003	-0.032***	0.070***	0.071***	0.035***
	(-0.23)	(-0.09)	(-5.60)	(11.75)	(11.73)	(4.52)	(-0.98)	(-0.91)	(-4.38)	(15.22)	(16.63)	(4.63)
Educ. (ref. cat. primary or none):												
secondary	-0.014**	-0.010*	-0.003	-0.039***	-0.035**	-0.024*	-0.018***	-0.013**	-0.011**	-0.024	-0.014	-0.011
	(-2.82)	(-2.05)	(-0.85)	(-3.51)	(-3.04)	(-2.32)	(-3.58)	(-3.04)	(-2.75)	(-1.91)	(-1.18)	(-1.00)
tertiary	-0.036***	-0.029***	-0.015**	-0.085***	-0.079***	-0.061***	-0.032***	-0.025***	-0.018**	-0.040**	-0.024	-0.016
	(-6.60)	(-5.02)	(-2.83)	(-6.31)	(-5.36)	(-4.42)	(-5.03)	(-4.51)	(-3.18)	(-3.08)	(-1.86)	(-1.28)
Age	0.003***	0.003***	0.002***	0.009***	0.009***	0.007***	0.002***	0.002***	0.001***	0.002***	0.002***	-0.000
	(14.01)	(13.82)	(8.90)	(12.83)	(12.49)	(10.16)	(10.95)	(10.57)	(3.76)	(4.30)	(4.25)	(-0.01)
No partner in HH	0.011***	0.010***	0.008**	0.016	0.015	0.011	0.008**	0.008**	0.005*	-0.007	-0.007	-0.010
	(4.01)	(3.75)	(2.78)	(1.89)	(1.85)	(1.43)	(2.77)	(2.68)	(2.02)	(-1.12)	(-1.20)	(-1.62)
Childhood controls		incl.	incl.		incl.	incl.		incl.	incl.		incl.	incl.
(t-1) health controls			incl.			incl.			incl.			incl.
No. of obs.	32690	32690	32690	19611	19611	19611	32925	32925	32925	27181	27181	27181

Notes and source: see Table 5. * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 7. Role of social and material deprivation and social exclusion for the probability of death between SHARE wave 5 and wave 6 (marginal effects)

	(1) Spec. 1	(2) Spec. 2	(3) Spec. 3	(4) Spec. 1	(5) Spec. 2	(6) Spec. 3
Material deprivation	0.014***	0.014**	-0.003			
	(3.37)	(3.20)	(-0.70)			
Social deprivation	0.059***	0.059***	0.019**			
	(7.44)	(7.27)	(2.66)			
Social exclusion				0.016***	0.016***	0.003
				(7.60)	(7.08)	(1.24)
Female	-0.019***	-0.019***	-0.035***	-0.019***	-0.019***	-0.035***
	(-10.75)	(-10.50)	(-10.66)	(-10.03)	(-9.71)	(-10.71)
No partner in HH	0.001	0.001	0.002	0.002	0.002	0.002
	(0.56)	(0.52)	(0.92)	(1.02)	(0.95)	(1.00)
Educ. (ref. cat. primary or none):						
secondary	-0.004	-0.004	-0.003	-0.006	-0.005	-0.003
	(-0.97)	(-0.84)	(-0.74)	(-1.36)	(-1.09)	(-0.76)
tertiary	-0.008*	-0.008	-0.007	-0.011**	-0.011*	-0.007
	(-2.07)	(-1.93)	(-1.68)	(-2.99)	(-2.51)	(-1.77)
Age of respondent at the time of interview	0.002***	0.002***	0.002***	0.003***	0.003***	0.002***
	(20.95)	(21.26)	(13.37)	(22.33)	(22.87)	(14.74)
Childhood controls		incl.	incl.		incl.	incl.
(t-1) health controls			incl.			incl.
No. of observations	38019	38019	38019	38019	38019	38019

Notes and source: see Table 5; time between waves is not included as a control. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5. Conclusions

Uncovering the causal components in the relationship between health and material and social conditions seems to be one of the more challenging problems in microeconomic and epidemiological studies. The outcomes are so tightly intertwined and so strongly result from common factors such as innate qualities, childhood conditions and – in fact – the entire life history, that providing a clean causal identification is extremely difficult, if at all possible. This is true for the causal effect of health on material/social conditions as well as for the effect in the other direction. While this paper, in which we address the latter problem, does not provide the definitive answers as to if and to what extent material and/or social conditions influence health, for a number of reasons we believe it makes an important contribution to the literature on the subject.

In our analysis, which is based on the data from waves 5 and 6 of the Survey of Health, Ageing and Retirement in Europe (SHARE), we examine the implications of several factors for health among the 50+ European population with the focus on complex and comprehensive measures of material and social conditions. We take a very careful approach to the examined specifications in order to judge the potential extent of the endogeneity bias and to minimize it in the final approach.

In order to do that, first, instead of taking levels we examine the relationship with respect to changes in a number of dimensions of health status between two points in time. In particular, the analysis refers to three dimensions of physical health, a measure of mental health and the likelihood of dying. In the basic approach, in which we develop the methodology, this covers the changes between waves 5 and 6 of the SHARE survey. Second, in order to control for the factors which may be considered as "initial conditions" jointly determining late life health and socio-economic outcomes, we extend our basic specification to include a long range of variables

relating to childhood conditions of SHARE respondents. Finally, in the last specification, in the examination of changes in each of the five definitions of health we control for the levels in additional health dimensions at time (t-1) to account for the correlation of material and social conditions with health status at the initial point in time.

As we show in our results for all physical measures of health, the last extension of the list of control variables matters most in terms of its influence on the estimated coefficients of interest. Still, even though the magnitude of the coefficients falls by about half in comparison to the basic specification, the estimates suggest a strong and statistically significant relationship between the measures of deprivation and social exclusion and health. Interestingly, in our examination of the probability of dying we find that this is only affected by social and not by material deprivation.

One important limitation of the analysis is its heavy reliance on detailed specific questions with which we identify the degree of deprivation. This battery of questions was specifically designed for the SHARE survey but as a full set the questions were only asked in wave 5 of the survey. The approach is therefore not easily transferable to other policy and cultural contexts. We believe though that this and other analyses which were based on these deprivation indicators stress the importance of collecting such information and continued development of deprivation measures in the material and social dimensions.

As we argued above, our approach to the analysis of the relationship between health and material and social conditions should allow for causal interpretation of the results in our final specification. The paper thus confirms earlier findings that material and social conditions in old age have their causal implications for the development of health status. Our results extend beyond the existing research and provide evidence that the impact on changes in health should not only be regarded separately with respect to the two dimensions of deprivation, but can be considered also when material and social disadvantages are combined. The results seem to be

of potentially high relevance from the policy perspective, and examination of the specific role of material and social deprivation for developments in health at later stage in people's lives can be instrumental in designing specifically targeted policy interventions. Along these lines, understanding of negative health developments among the currently deprived population may serve as an important sign of the future developments in the level of health and healthcare needs, providing them with some expectations for the future needs and the resulting costs.

Acknowledgement

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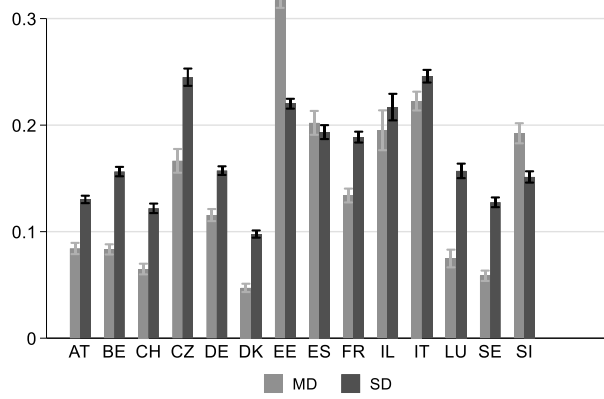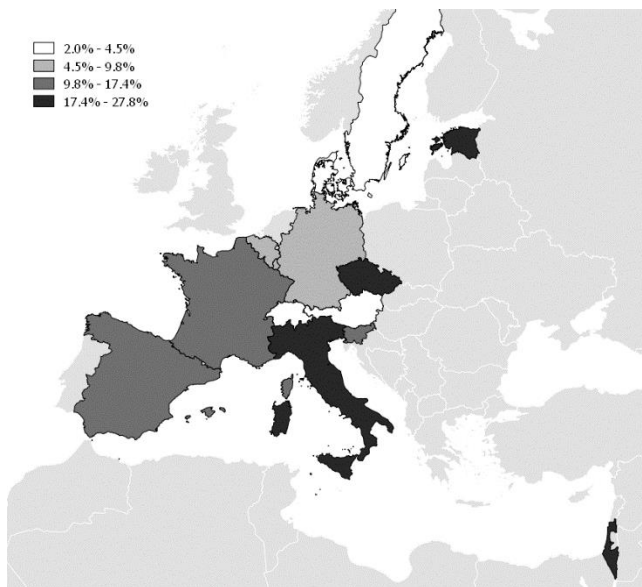   1337–1343. https://doi.org/10.1017/S1041610210001614
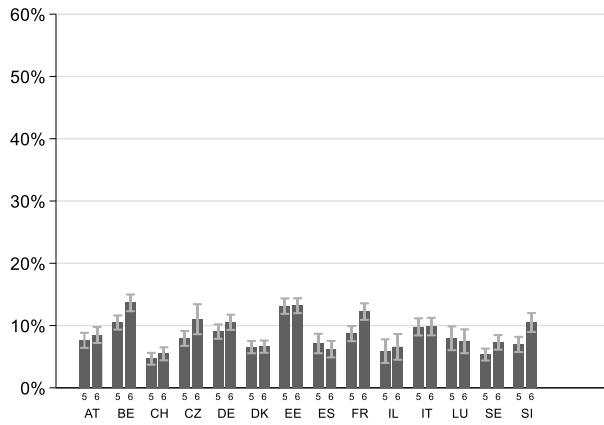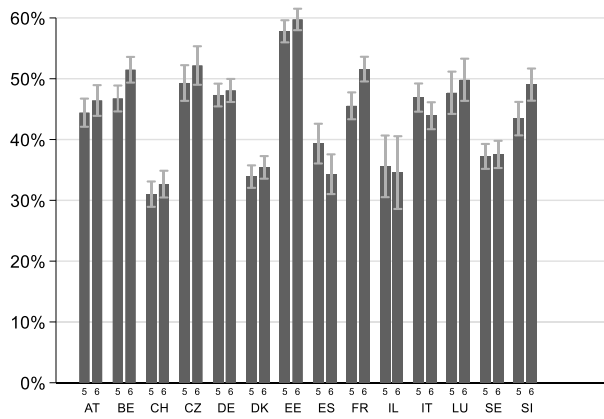
Figures

Fig. 1

Fig. 2

Fig. 3A

Fig. 3B

Fig. 3C
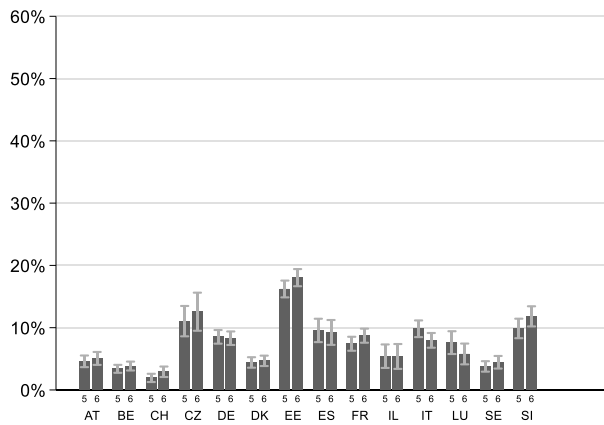
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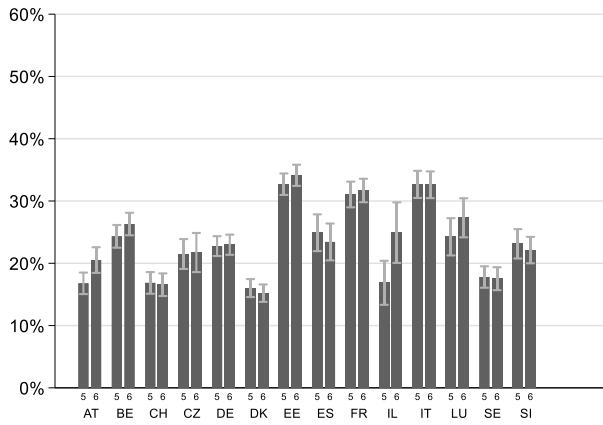
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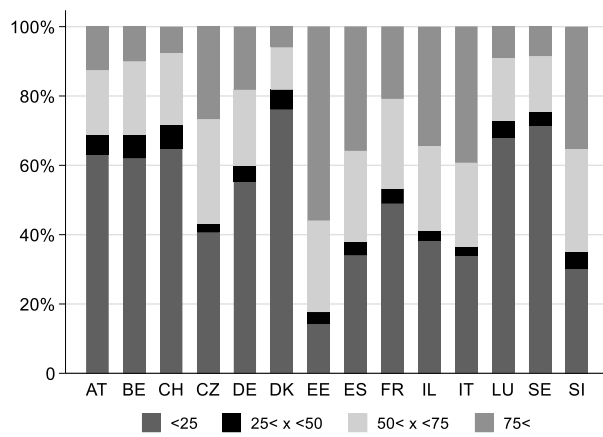
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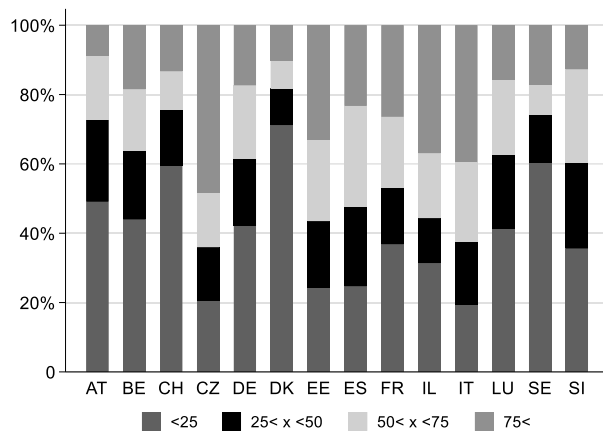
Appendix A

Items from SHARE questionnaire used as health outcomes in the analysis

List of limitations with activities of daily living (ADL):

1. Dressing, including putting on shoes and socks

2. Walking across a room

3. Bathing or showering

4. Eating, such as cutting up your food

5. Getting in or out of bed

6. Using the toilet, including getting up or down

List of limitations with mobility items (MOBILITY):

1. Walking 100 meters

2. Sitting for about two hours

3. Getting up from a chair after sitting for long periods

4. Climbing several flights of stairs without resting

5. Climbing one flight of stairs without resting

6. Stooping, kneeling, or crouching

7. Reaching or extending your arms above shoulder level

8. Pulling or pushing large objects like a living room chair

9. Lifting or carrying weights over 10 pounds/5 kilos, like a heavy bag of groceries

10. Picking up a small coin from a table

Items from SHARE questionnaire used to measure symptoms of depression on the EURO-D scale, where 1 indicates having a selected symptom (for more details see (Prince et al., 1999)):

1) What are your hopes for the future?

0. Any hopes mentioned

1. No hopes mentioned

2) In the last month, have you felt that you would rather be dead?

1. Any mention of suicidal feelings or wishing to be dead

0. No such feelings

3) Do you tend to blame yourself or feel guilty about anything?

1. Obvious excessive guilt or self-blame

0. No such feelings

4) Have you had trouble sleeping recently?

1. Trouble with sleep or recent change in pattern

0. No trouble sleeping

5) In the last month, what is your interest in things?

1. Less interest than usual mentioned

0. No mention of loss of interest

6) Have you been irritable recently?

1. Yes

0. No

7) What has your appetite been like?

1. Diminution in desire for food

0. No diminution

8) In the last month, have you had too little energy to do the things you wanted to do?

1. Yes

0. No

9) How is your concentration? For example, can you concentrate on a television programme,

film or radio programme?

1. Difficulty in concentrating on entertainment

0. No such difficulty

10) Can you concentrate on something you read?

1. Difficulty in concentrating on reading

0. No such difficulty

11) What have you enjoyed doing recently?

1. Fails to mention any enjoyable activity

0. Mentions ANY enjoyment from activity

12) In the last month, have you cried at all?

1. Yes

0. No

Appendix B

Fig. 4 Distribution of material and social deprivation indices by country in wave 5 of SHARE

a) Material deprivation index	b) Social deprivation index
[insert Fig.4a.]	[insert Fig.4b.]

Source: own calculations based on SHARE wave 5 data, release 6.0.0.

Notes: weighted using individual weights.

Appendix C Descriptive statistics of controls included in analysis in Section 4

Table 8 Descriptive statistics of controls included in analysis in Section 4

	Respondents who participated in wave 6		Respondents with end-of-life interview in wave 6	
	Mean	St. dev.	Mean	St. dev.
Childhood characteristics:				
less than 1 room per HH member at age 10	0.712	0.453	0.752	0.432
one shelf of books or less at home at age 10	0.643	0.479	0.779	0.415
not enrolled in school education at age 10	0.016	0.125	0.061	0.239
worse performance as compared to classmates at age 10:				
in math	0.145	0.352	0.137	0.344
in country language	0.140	0.347	0.149	0.357
poor self-reported health at age 10	0.021	0.144	0.026	0.159
no vaccinations during childhood	0.032	0.175	0.101	0.302
missed school for 1 month or more during childhood due to a health condition	0.128	0.334	0.078	0.268
(t-1) health controls†:				
2+ chronic diseases††	0.464	0.499	0.716	0.451
not able to perform grip strength test	0.028	0.165	0.145	0.352
max. grip strength	34.180	11.923	27.259	10.673
weight	75.481	15.133	72.625	16.372
height	167.73	9.346	166.260	9.158

Notes: weighted using individual weights; † (t-1) means at the time of wave 5, 1+ ADL, 1+ MOBILITY, poor SAH, 4+ EURO-D were included as additional (t-1) health controls when different than dependent variable. ††list of diseases: heart attack, high blood pressure, high blood cholesterol, stroke, diabetes, chronic lung disease, cancer, ulcer, Parkinson disease, cataracts, hip fracture, other fractures, Alzheimer's disease, other affective disorders, Rheumatoid Arthritis, osteoarthritis.

Source: SHARE wave 3, 5 and 6 data, release 6.1.1.

Appendix D Comparison of regression results for selected countries

Table 9. Role of material and social deprivation for the probability of changes in health between SHARE wave 5 and wave 6 in selected countries (marginal effects)

		(1) 1+ADL	(2)	(4)	(5) 1+MOBILITY	(6)	(8)	(9) Poor SAH	(10)	(12)	(13) 4+ EURO-D	(14)	(16)
Country		Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
CZ	Material deprivation	0.146***	0.143***	0.073**	0.140	0.140	0.108	0.103***	0.099***	0.060*	0.151***	0.148***	0.105*
		(5.15)	(5.05)	(2.61)	(1.82)	(1.79)	(1.37)	(3.72)	(3.56)	(2.16)	(3.47)	(3.38)	(2.40)
	Social deprivation	0.084*	0.085*	0.036	0.203*	0.188*	0.152	0.098**	0.095**	0.052	0.145**	0.137**	0.083
		(2.27)	(2.29)	(1.01)	(2.33)	(2.15)	(1.74)	(2.75)	(2.66)	(1.46)	(2.74)	(2.61)	(1.58)
	No. of obs.	2581	2581	2581	1405	1405	1405	2539	2539	2539	2217	2217	2217
DE	Material deprivation	0.087***	0.076**	0.039	0.271***	0.259***	0.219**	0.082***	0.080***	0.059**	0.096*	0.087	0.065
		(3.53)	(3.07)	(1.58)	(3.97)	(3.78)	(3.24)	(3.96)	(3.82)	(2.93)	(2.15)	(1.95)	(1.43)
	Social deprivation	0.082*	0.071	0.001	0.312**	0.307**	0.232*	0.159***	0.157***	0.103***	0.273***	0.259***	0.223**
		(2.18)	(1.88)	(0.04)	(3.09)	(2.99)	(2.28)	(5.08)	(4.96)	(3.31)	(4.08)	(3.83)	(3.27)
	No. of obs.	3201	3201	3201	1907	1907	1907	3203	3203	3203	2702	2702	2702
EE	Material deprivation	0.105***	0.107***	0.051*	0.043	0.050	0.037	0.157***	0.151***	0.095***	0.178***	0.173***	0.128**
		(4.15)	(4.20)	(2.03)	(0.68)	(0.79)	(0.60)	(5.74)	(5.51)	(3.50)	(4.25)	(4.09)	(3.00)
	Social deprivation	0.196***	0.191***	0.092*	0.535***	0.532***	0.322**	0.209***	0.199***	0.101*	0.420***	0.410***	0.335***
		(5.35)	(5.20)	(2.53)	(5.22)	(5.18)	(3.10)	(5.20)	(4.92)	(2.53)	(6.20)	(6.02)	(4.78)
	No. of obs.	3017	3017	3017	1406	1406	1406	2906	2906	2906	2349	2349	2349
ES	Material deprivation	0.018	0.011	-0.010	-0.030	-0.028	-0.034	0.087***	0.085***	0.068**	0.125**	0.121**	0.109**
		(0.87)	(0.54)	(-0.49)	(-0.57)	(-0.53)	(-0.64)	(3.94)	(3.77)	(3.02)	(3.09)	(2.94)	(2.65)
	Social deprivation	0.139***	0.131***	0.058	0.314**	0.329***	0.222*	0.065	0.069	0.005	0.307***	0.305***	0.235**
		(4.44)	(4.14)	(1.79)	(3.25)	(3.39)	(2.24)	(1.79)	(1.88)	(0.12)	(4.15)	(4.08)	(3.11)
	No. of obs.	3086	3086	3086	1934	1934	1934	3001	3001	3001	2466	2466	2466

Notes and source: see Table 5. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 10. Role of social exclusion for the probability of changes in health between SHARE wave 5 and wave 6 in selected countries (marginal effects)

Country		(1) 1+ADL Spec. 1	(2) Spec. 2	(3) Spec. 3	(4) 1+MOBILITY Spec. 1	(5) Spec. 2	(6) Spec. 3	(7) Poor SAH Spec. 1	(8) Spec. 2	(9) Spec. 3	(10) 4+EURO-D Spec. 1	(11) Spec. 2	(12) Spec. 3
CZ	Social exclusion	0.046***	0.044***	0.013	0.102**	0.092*	0.067	0.034**	0.033*	0.015	0.080***	0.079***	0.057**
		(3.51)	(3.39)	(1.04)	(2.65)	(2.35)	(1.70)	(2.72)	(2.56)	(1.15)	(3.99)	(3.91)	(2.84)
	No. of obs.	2581	2581	2581	1405	1405	1405	2539	2539	2539	2217	2217	2217
DE	Social exclusion	0.036*	0.029*	-0.001	0.170***	0.165***	0.125**	0.071***	0.068***	0.048***	0.115***	0.108***	0.096***
		(2.52)	(2.03)	(-0.05)	(3.88)	(3.75)	(2.85)	(6.27)	(5.98)	(4.38)	(4.11)	(3.86)	(3.40)
	No. of obs.	3201	3201	3201	1907	1907	1907	3203	3203	3203	2702	2702	2702
EE	Social exclusion	0.063***	0.062***	0.024*	0.132***	0.129***	0.067*	0.085***	0.081***	0.044***	0.124***	0.118***	0.086***
		(5.76)	(5.62)	(2.20)	(3.97)	(3.88)	(2.01)	(7.21)	(6.81)	(3.74)	(6.00)	(5.67)	(4.04)
	No. of obs.	3017	3017	3017	1406	1406	1406	2906	2906	2906	2349	2349	2349
ES	Social exclusion	0.028*	0.022*	-0.002	0.066	0.069	0.050	0.040**	0.038**	0.024	0.122***	0.115***	0.096***
		(2.54)	(1.98)	(-0.18)	(1.85)	(1.91)	(1.37)	(3.25)	(3.08)	(1.92)	(4.78)	(4.45)	(3.69)
	No. of obs.	3086	3086	3086	1934	1934	1934	3001	3001	3001	2466	2466	2466

Notes and source: see Table 5. * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 11. Role of social and material deprivation and social exclusion for the probability

of death between SHARE wave 5 and wave 6 in selected countries (marginal effects)

Country		(1) Spec. 1	(2) Spec. 2	(3) Spec. 3	(4) Spec. 1	(5) Spec. 2	(6) Spec. 3
CZ	Material deprivation	0.016	0.020	-0.014			
		(0.78)	(0.97)	(-0.68)			
	Social deprivation	0.077**	0.075**	0.022			
		(2.98)	(2.91)	(0.87)			
	Social exclusion				0.017*	0.018*	0.002
					(1.98)	(1.99)	(0.21)
	No. of observations	3036	3036	3036	3036	3036	3036
DE	Material deprivation	-0.012	-0.010	-0.017			
		(-0.89)	(-0.74)	(-1.29)			
	Social deprivation	0.094***	0.090***	0.051**			
		(5.06)	(4.87)	(2.87)			
	Social exclusion				0.022***	0.021**	0.007
					(3.40)	(3.24)	(1.04)
	No. of observations	3543	3543	3543	3543	3543	3543
EE	Material deprivation	0.024	0.023	-0.000			
		(1.47)	(1.38)	(-0.03)			
	Social deprivation	0.067**	0.066**	0.014			
		(2.99)	(2.93)	(0.62)			
	Social exclusion				0.019**	0.018**	0.001
					(2.82)	(2.71)	(0.08)
	No. of observations	3842	3842	3842	3842	3842	3842
ES	Material deprivation	0.011	0.007	-0.003			
		(0.64)	(0.39)	(-0.18)			
	Social deprivation	0.066**	0.056*	0.007			
		(2.78)	(2.34)	(0.27)			
	Social exclusion				0.014	0.008	-0.003
					(1.62)	(0.95)	(-0.31)
	No. of observations	3751	3751	3751	3751	3751	3751

Notes and source: see Table 7; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.