

Denny, Kevin; Franken, Patricia

**Working Paper**

## Self-reported health in good times and in bad: Ireland in the 21st century

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**Self-reported health in good times and in bad:  
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Kevin Denny and Patricia Franken, University College Dublin

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**UCD SCHOOL OF ECONOMICS  
UNIVERSITY COLLEGE DUBLIN  
BELFIELD DUBLIN 4**

# **Self-reported health in good times and in bad: Ireland in the 21<sup>st</sup> century\***

**Kevin Denny**  
**School of Economics & Geary Institute for Public Policy,**  
**University College Dublin**

**Patricia Franken**  
**University College Dublin**

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## **Abstract**

The Great Recession has renewed interest in whether and how health responds to macroeconomic changes. Ireland provides a convenient natural experiment to examine this since a period of sustained high growth and low unemployment – the so-called Celtic Tiger period- gave way to a deep recession following the economic crisis in 2008. We use data from the Statistics on Income and Living Conditions survey (SILC), to explore what happened to self-reported health over the period 2002-2014. While some sub-populations experienced pro-cyclical effects on self-rated health, in general we find no evidence that the proportion of the population in poor health was higher after the onset of the economic crisis. However a multivariate model implies that there was some effect at the top of the health distribution with a higher unemployment rate switching individuals from being in “very good health” to “good health”. Effect sizes are much larger for females than males.

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\* Email: [kevin.denny@ucd.ie](mailto:kevin.denny@ucd.ie) , [Patricia.Franken@gmx.net](mailto:Patricia.Franken@gmx.net). The authors thank the Irish Social Science Data Archive ([www.ucd.ie/issda](http://www.ucd.ie/issda) ) for supplying the EU-SILC data, David Madden for very helpful suggestions and participants at the UCD Geary Institute Well-being Symposium (November 2015) for comments.

## 1. Introduction

The Great Recession, starting in 2008, affected many countries. Ireland's downturn was particularly severe since prior to the onset of the recession it had been growing rapidly, the so-called "Celtic Tiger". Before the onset of the recession, the Irish GDP growth rates were 5.5% in 2006 and 4.9% in 2007 for example. The recession saw annual GDP growth rates of -2.6% in 2008 and -6.4% in 2009. There has been a significant recovery in recent years. For example, the GDP growth rate was 4.8% in 2014<sup>1</sup>. The Celtic Tiger was also characterized by a strong demand for labour with the unemployment rate falling to 4.5% in 2006. It rose sharply from 4.6% in 2007 to 13.7% in 2012. By 2015 the recovery was well advanced with a fall in unemployment to 8.7%. Largely because the collapse of the construction sector was such an important feature of the recession the increase in the unemployment rate was more dramatic for males. For males, unemployment rose from 5.2% in 2007 to 16.6% in 2012 whereas for females it rose, over the same period from 3.9% to 10.3%<sup>2</sup>.

The recent experience of Ireland therefore provides a good natural experiment to investigate how health varies with macroeconomic fluctuations.

The relationship between health and the macro-economy has been widely studied by economists and epidemiologists. A feature of most of this research is a focus on mortality as an outcome. While the earliest work suggested that mortality was counter-cyclical (for example Brenner 1979) subsequent research, for example Ruhm (2000), showed the opposite. This, perhaps counter-intuitive finding, arose largely because road deaths tend to be lower when economic activity is low. Deaths by suicide on the other hand, which has been the focus of much research, tend to be counter-cyclical as one would expect. More recent research for the US suggests that there is no clear relationship between overall mortality and the state of the economy (Ruhm 2013). Analysis of recent European data also finds an increase in suicide and a decrease in road deaths e.g. Stuckler et al. (2011). It is worth noting that while in this literature there is a heavy focus on

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<sup>1</sup> See <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?page=1> The reported increase in real GDP for 2015 is an astronomical 26.3%. However this is clearly a statistical artefact reflecting the accounting practices of a small number of large multinational corporations and the particular way that Eurostat treats certain transactions.

<sup>2</sup> See O' Connell (2016), Table 1.

unemployment (and sometimes GDP) as the independent variable of interest, other aggregate variables can play a role: Cotti, Dunn & Tefft (2015) show that large falls in the Dow Jones stock market index are associated with worsening self-reported health as well as increased levels of risky behaviour.

There has been relatively little research on morbidity and the macroeconomy. Tekin, McClellan and Minyard (2013) analyse US data over the period between 2005 and 2011 and find that, as with recent mortality studies, the relationship between economic activity and health and health behaviours has weakened. The focus on mortality may partly reflect the availability of data. It can be argued that the comparative neglect of morbidity in this literature may miss out on a significant part of the picture: focusing on mortality sets a high bar in terms of detecting changes in health and, on welfare grounds, health is an important component of quality of life.

Separate to research on macroeconomic determinants of health, there is a large amount of related research, principally in social epidemiology and economics, on the relationship between individual's labour market status and health outcomes.<sup>3</sup> Draydakakis (2015) and Tøge & Blekesaune (2015) are recent studies of the relationship between individual unemployment and health at the time of the economic crisis using longitudinal European data.

A challenge with using individual labour market status is that there is a strong possibility of reverse causality (also known as "health selection"): it is likely that being unwell changes the probability of being in the workforce and/or being employed. Moreover unobserved characteristics, such as time preferences, may be correlated with both health and labour market status. So identifying causal relationships is not straightforward. The use of longitudinal data, by controlling for unobserved fixed effects, does not circumvent the former problem although it can address the latter. Ideally one needs some exogenous variation in the independent variable of interest (via "instrumental variables") to identify a causal relationship.

There is little recent research on Ireland that we are aware of. Corcoran et al. (2015) consider changes in the suicide rate over the period 1980-2012, while Walsh & Walsh (2011) examine

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<sup>3</sup> For example Kawachi & Wamala (2006).

suicide trends between 1968 and 2009. Walsh (2012) models changes in different measures of wellbeing, including life satisfaction and mental health, from the early 1970s to 2011. He concludes that the impact of the current recession on well-being is surprisingly modest.

A characteristic of most studies in this literature is that they only analyse immediate effects of macroeconomic fluctuations on health and well-being. The static nature of these models typically assumes that these effects do not persist. However, it is conceivable that a dynamic process exists with delayed and persistent effects over life cycle. Daly and Delaney (2013) find that unemployment in early adulthood has a scarring effect on individuals with effects on psychological distress occurring in subsequent decades - as late as 50 years of age.

The purpose of this paper therefore is to document trends in morbidity broken down by several criteria using different data sources. We also test whether health levels are associated with whether the economy is in recession or otherwise. The primary aim of this paper is not to model trends in self-reported health but to answer a simpler, but nonetheless important question: did health worsen after the onset of the economic crisis?

The outcome of interest is self-rated health - also known as subjective general health. Individuals are asked to rate their health with five possible answers: Very Good, Good, Fair, Bad and Very Bad. Since the last category, Very Bad, accounts for a very small percentage of responses (less than 1-2% typically) it is combined here with the Bad category: in this paper (as elsewhere) this is labelled "Poor health". Self-rated measures of health have been found to be generally predictive of health, use of physician services as well as mortality amongst the elderly and middle-aged population (Mossey and Shapiro 1982, Miilunpalo et al. 1997, Idler, Benyamini 1997, Singh-Mantoux et al. 2006). There is evidence that physical health is more strongly associated with self-rated health than mental health and social functioning (Maviddat et al. 2011). While there are several measures of self-rated health used in epidemiology, the evidence is that differences between them are marginal (Eriksson, Undén, Elofsson 2001).

There are methodological questions about whether subjective data such as this can be used to make comparisons across groups. For example Jürges (2006) shows that different reporting styles (i.e. how individuals' "true health" is translated into their self-reported health) can explain some

of the differences in self-reported health across countries. If a similar issue arises across time, so that reporting style differs with the state of the economy, then it will be difficult or impossible to infer anything about how health varies with the state of the economy. A similar problem has been raised with the use of self-reported happiness scales by Bond and Lang (2014) who show that strong auxiliary assumptions are necessary to rank groups by average happiness using survey data with a small number of potential responses. Their arguments apply, *pari passu*, to self-reported health.

## **2. Data**

We use the Irish data from the Statistics on Income and Living Conditions survey (SILC) which provides the largest and longest running source of data on self-reported health in Ireland.

SILC is a household survey that collects data on income, poverty, health and living conditions and is a project launched by the European Union in 2003 in six member states (Belgium, Denmark, Greece, Ireland, Luxembourg and Austria and Norway) and in 2004 for the EU-15 member states (except Germany, the Netherlands, the United Kingdom, Estonia, Norway and Iceland). SILC has a cross-sectional and longitudinal part and is used to monitor the level of poverty and social inclusion. The cross-sectional data is collected annually and the longitudinal data is collected periodically over a four year period. In Ireland SILC is conducted by the Central Statistics Office since 2003. The average annual sample size for Ireland over the period 2003-2013 is 12,690. All the analysis in the paper utilizes the sampling weights and is conducted with *Stata 12*.

There are other potential sources of data on self-reported health including the Quarterly National Household Study (QNHS), the Survey on Lifestyle and Attitudes to Nutrition (SLÁN) and the European Social Survey (ESS). Given the years in which they were collected and sample sizes it would be difficult to say much, if anything, about changes over the recent period economic crisis.

## **3. Data analysis**

In this section we compare the change in self-reported health over time for different groups. Since there are five categories, to facilitate comparisons we choose the percentage in bad and

very bad health combined as an outcome (labelled “poor health” here). Table 1 shows the marginal distributions of self-rated health across all years.

Figure 1 shows the proportion in poor health for men and women separately over the period 2003-2013. For men, there is no simple economic pattern: it rose then fell during the boom years of 2003-2007. Since 2008 health has worsened. This includes the worst of the recession but also the beginning of the recovery. For women, there is arguably even less of a cyclical pattern: the proportion in poor health has trended down aside from an upward blip in 2010 which is measured imprecisely and an increase at the end. From a labour market perspective, the recession affected men more than women since the rise in unemployment was particularly severe in the construction and related sectors. Below the figure we report Pearson  $\chi^2$  tests for independence and for both men and women we can comfortably reject the hypotheses of the independence of the outcome and time. This says nothing about the direction of the relationship (if any) of course. We discuss more specific tests later in this section.

In Table 2 we present several tests of whether the proportion with poor health differs before and after the onset of the recession. The period 2003 to 2007 is defined to be before the recession. We use two alternative definitions for after the onset of the recession 2009 to 2013 and 2009-2011. The latter is used as arguably the economy had started to recover by 2012. Note that 2008 is omitted since it is unclear which period it belongs to and thus excluding it should provide a cleaner comparison.

The table shows that, by either definition and for either sex, the incidence of poor health actually *fell* by a fraction of one percentage point. This decrease is slightly smaller when we include the period of the recovery. Since, from Table 1, only about 3-4% are in poor health, the proportionate change is relatively large. For example, the -.3% in the top left corner of the table represents a fall from 3.9% to 3.6%. In all four cases the difference is not statistically different at the 5% level. The latter tests are two-tailed tests. However for females, a one-tailed test (that poor health fell against the null of no change) cannot be rejected at  $p=.05$ . In short, we can reject the hypothesis that subjective general health deteriorated with the onset of the economic crisis.



These tests are not very specific and as an alternative we consider the bivariate relationship with unemployment. Table 3 reports the correlation between the proportions with poor health for each sex with the corresponding unemployment rate. In each case, consistent with Table 2, the correlation is negative but small meaning that higher unemployment is actually associated with less poor health (i.e. with better health) although the correlation is not statistically significant.

Figure 2 considers variation in poor health by highest level of education attained. Comparing the panels one sees a clear socio-economic gradient with a much higher degree of poor health amongst those with only primary education. This may be partly a cohort effect giving the rising level of education. For the primary education group, there is evidence that their health improved slightly prior to the crisis and worsened steadily thereafter. As the test results reported below the figure indicate, one can clearly reject the hypothesis that poor health is independent of time ( $p \approx 0$ ). However for the other education groups there is no noticeable pattern over time. Because of the common scaling, the changes in the lower two panels appear very small. We have included these two charts separately in the Appendix, Figures A2 and A3 respectively.

Figure 3 show the changes in poor health by principal economic status. Given the small numbers involved we have combined several groups (students, retired, ill/disabled, other and economically inactive) into one category. The first chart in Figure 3 is also shown separately in the Appendix, Figure A3. From Figure 3 one can see a tendency for poor health amongst the unemployed (and also “others”) to become less frequent prior to the crash and more common thereafter. In terms of what this might mean for overall health one has to remember that the unemployed clearly have worse health than the employed in general and that there was a big increase in the numbers unemployed after 2008.

Finally we break down the sample by age group as there is a widely held view that the effects of the crisis varied across cohorts. For the four age categories one can see no obvious time pattern in the frequency of poor health and in all cases one cannot reject independence of the outcome with respect to time. This contrasts somewhat with the finding that young people (particularly males) were most exposed to the economic crisis with an ensuing higher rate of suicide. This

provides further tentative evidence that the effects of recessions and booms on physical and mental health can be quite different.

Finally, while this paper focuses on the Irish case, it is useful to make a brief international comparison. Figure 5 shows the trends in the same outcome, poor health, for the European Union and two other countries which experienced severe recessions, also using SILC<sup>4</sup>. Unlike Ireland, Spain experienced a significant *fall* in the proportion in poor health in 2008 and this health improvement has yet to be reversed. For Greece, there was little noticeable change over the period except for a slight upward trend over the period. This suggests that health responses to recessions can vary significantly across countries and that one cannot presume that poor health is counter-cyclical.

#### 4. Multivariate analysis

The analysis in the previous section addressed the question of whether self-reported health was, on average higher or lower during a recession or boom. In this section, we complement that with a multivariate analysis of the data. This is not intended to be a definitive analysis but it illustrates the extent to which our previous conclusions about aggregate effects might be qualified by controlling for a small number of key individual characteristics.

To do this we estimate a series of logistic regression model with subjective health as the dependent variable and controls for age group, rural location, sex and education level. As the explanatory variable of interest we include sex-specific unemployment rates<sup>5</sup>. Column 1 of Table 4 is a binary logit with poor health as dependent variable. Consistent with the results in the previous section, we are clearly unable to reject the null of a zero coefficient on the unemployment rate ( $p=.275$ ).

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<sup>4</sup>The data is taken from [http://ec.europa.eu/eurostat/data/database?node\\_code=hlth\\_silc\\_10](http://ec.europa.eu/eurostat/data/database?node_code=hlth_silc_10) and <http://ec.europa.eu/eurostat/documents/3433488/5280869/KS-SF-09-024-EN.PDF/f4f4f956-eafb-49f6-a52a-4a22d602433c>

<sup>5</sup> These were downloaded (March 17<sup>th</sup> 2016) from the US Federal Reserve Bank of St Louis (FRED: <https://research.stlouisfed.org/fred2>), series LRUNTTFEIEA156N and LRUNTTMAIEA156S for females and males respectively.

In looking at poor vs. non-poor health it is possible that one is looking in the wrong place i.e. that unemployment has an effect at a different margin. Column 2 investigates this by estimating an ordered probit model using all five categories. This leads to a different, perhaps more intuitive conclusion, that higher unemployment is associated with inferior health outcomes. It is straightforward to reconcile these apparently conflicting results by calculating the marginal effects for this latter model (panel 1 in Table 5). What one can see is that the effect of unemployment is to reduce the probability of being in very good health. The probability of the other four outcomes, but particularly “good” and “fair”, rises. In short, unemployment has little effect on the level of poor health (consistent with the aggregate picture in the previous section) but re-allocates individuals between the top two categories. Note that the size of the effect is very small: a one percentage point increase in unemployment reduces the probability of being in very good health by a fraction of one percent.

Columns 3 and 4 of Table 4 explore this further by estimating the ordered choice model for women and men separately. The coefficient on the unemployment rate for females is about twice that of males. A better way to compare the effects is to consider the corresponding marginal effects which are reported in Table 5. This confirms what one would expect: the marginal effect of an increase in the unemployment rate for females is around double that of males. It is not clear why women’s health is particularly sensitive to cyclical effects. Note that this is the marginal effect not the average. With the onset of the crisis, the unemployment rate for males rose more than females - reflecting the huge negative shock to the construction sector. This will obviously offset the lower marginal effect for males.

To get an idea of the magnitude of the effects, the evidence for the pooled model (column 2 Table 4 & panel 1 in Table 5) implies that a one percentage point increase in the unemployment rate is associated with about one third of a percentage point lower probability of being in very good health. At its post-crash peak the unemployment rate was about ten percentage points higher than the pre-crash level of around 4%. So this increase in the unemployment rate would account for a 3% lower probability of being in very good health. Since, on average, this probability is around 50% (Table 1) the effect is not very large proportionately.

## 5. Conclusions

This paper investigates how health in Ireland changed over the early part of the 21<sup>st</sup> century, a period which included an economic boom and a dramatic fall in economic activity following the onset of the economic crisis in 2008. Ireland's boom and crash was one of the most noticeable in Europe and hence provides a good laboratory for understanding the effects of the macroeconomic on health. While almost all of the relevant research literature considers mortality as an outcome, this paper considers morbidity, specifically self-reported health.

Using a population-representative survey and looking at the aggregate picture we find no evidence that the level of self-reported poor health was worse after 2008 and some evidence that it was slightly higher. While this may be counter-intuitive it is important to remember that recent analyses of mortality tend to find little effect of recessions with the exception of deaths by suicide. Self-reported health is unlikely to reflect the extent of mental health problems.

Turning to an individual level analysis sheds further light on the result. While we again show that higher unemployment rates do not predict a higher probability of poor health, there is a small but statistically significant negative effect on the probability of being in very good health - largely due to a higher probability of being in good/fair health. This suggests that in analysing categorical data on health care needs to be taken to measure the effect of the economy across the whole distribution of health since the effect of the economic crisis was to re-allocate individuals between the higher categories of subjective health leaving the lower tail largely unchanged.

Why the recession's effect varied over the distribution of health in this way is unknown. One could speculate that health services are most effective at preventing or mitigating ill-health. In other words, services are focused on those with the worst health and less so those on those who are very healthy to begin with. Overall, there is little evidence to suggest that one of the most dramatic economic boom and bust cycles in recent European history has had more than a modest effect on self-reported health.

ooOoo

**Table 1: Marginal distributions of self-reported health**

	<b>Men</b>	<b>Women</b>
<b>Very good</b>	.523	.489
<b>Good</b>	.326	.326
<b>Fair</b>	.123	.145
<b>Bad</b>	.022	.030
<b>Very bad</b>	.007	.010
	1	1

**Table 2: Hypothesis tests for a change in proportion with poor health before and after the recession**

	<b>Men</b>	<b>Women</b>
<b>Before: 2003-2007</b>		
<b>After: 2009-2011</b>	-.3% (.122)	-.4% (.055)
<b>After: 2009-2013</b>	-.2% (.190)	-.3% (.053)

The table reports the percentage change with p values in parentheses for two-sided tests.

**Table 3: Correlations between proportion with poor health and sex-specific unemployment rates**

	<b>Men</b>	<b>Women</b>
<b>Pearson correlation</b>	-.139 (0.684)	-.177 (.602)

P-values in parentheses. Unemployment rates from OECD online database.

**Table 4: Multivariate analysis of subjective general health**

	(1) Binary Pooled	(2) Pooled	(3) Ordered logits Females	(4) Males
Unemployment rate	0.0104 (1.09)	0.0154*** (4.95)	0.0242*** (4.56)	0.0127*** (5.35)
Female	0.0158 (0.25)	0.110*** (5.09)		
Rural	-0.289*** (7.00)	-0.0538* (2.44)	-0.0559* (2.36)	-0.0527* (2.28)
Lower secondary education	-0.611*** (10.61)	-0.558*** (25.43)	-0.559*** (13.26)	-0.552*** (30.57)
Upper secondary education	-1.136*** (19.79)	-0.930*** (44.55)	-0.962*** (30.02)	-0.892*** (31.72)
Higher education	-1.209*** (20.77)	-1.137*** (64.93)	-1.148*** (45.19)	-1.132*** (42.91)
Age 25-49	-2.018*** (21.42)	-1.806*** (55.13)	-1.740*** (40.49)	-1.880*** (45.29)
Age 50-64	-0.894*** (16.78)	-1.107*** (34.59)	-1.075*** (25.96)	-1.146*** (37.99)
Age 65+	-0.154** (3.24)	-0.403*** (10.56)	-0.395*** (11.07)	-0.414*** (8.82)
N	88,307	88,307	46,367	41,940

Absolute *t* statistics in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Column 1 is a binary logit model. Columns 2-4 are ordered logits.

**Table 5: Marginal effects of the unemployment rate**

	<b>1</b>		<b>2</b>		<b>3</b>	
	<b>Pooled</b>		<b>Females</b>		<b>Males</b>	
	<b>Marginal effect</b>	<b>t ratio</b>	<b>Marginal effect</b>	<b>t ratio</b>	<b>Marginal effect</b>	<b>t ratio</b>
<b>Very good</b>	-.0032	4.98	-.0050	4.59	-.0026	5.36
<b>Good</b>	.0010	5.21	.0015	4.86	.0008	5.37
<b>Fair</b>	.0016	4.96	.0027	4.52	.0013	5.44
<b>Bad</b>	.0004	4.67	.0006	4.36	.0003	5.03
<b>Very bad</b>	.0001	4.09	.0002	3.80	.0001	4.38
	0		0		0	

The marginal effect is the change in the probability of each health outcome from a one percentage point change in the unemployment rate. Estimates are based on columns 2, 3 and 4 in Table 4

## Figures

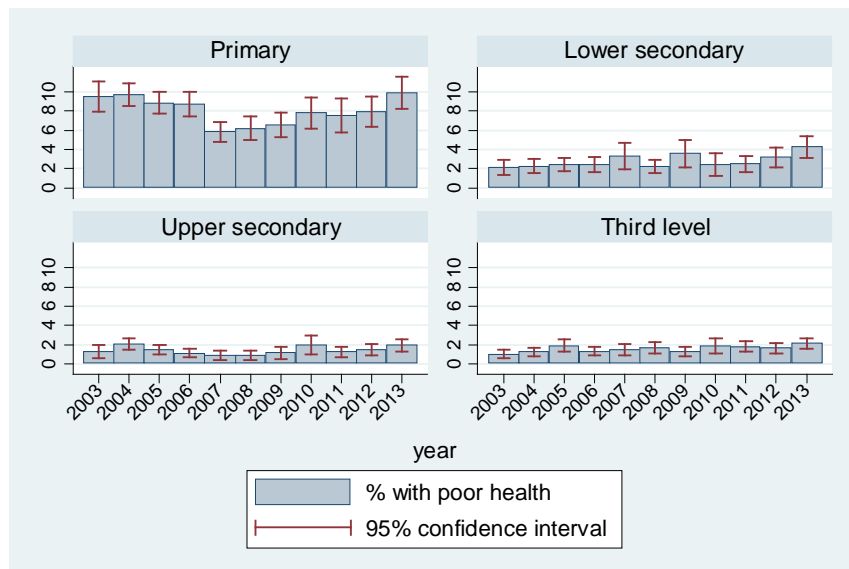
**Figure 1: Percentage with poor health, by sex**



Pearson test for independence p-values:

Males=.0085. Females=.0094.

**Figure 2: Percentage with poor health, by education level**

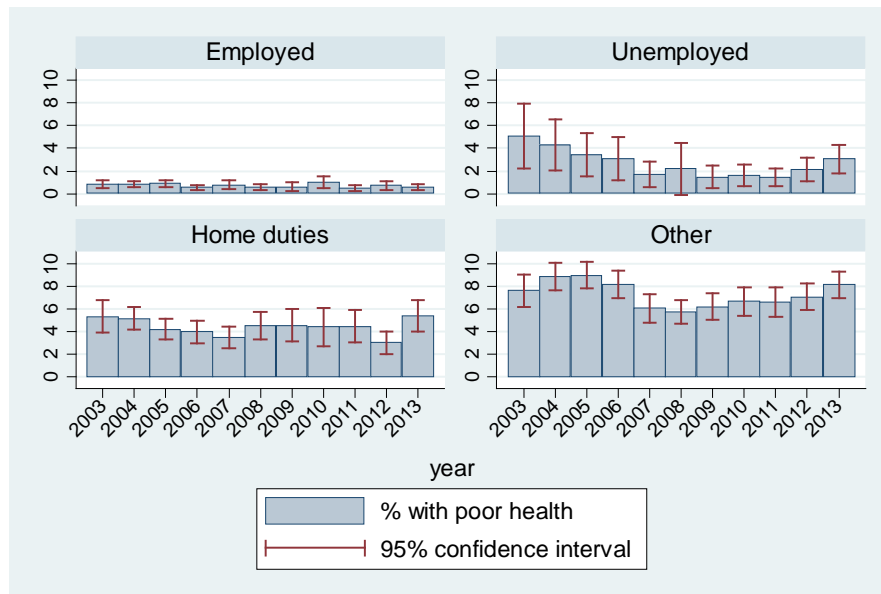


Pearson test for independence p-values:

Primary=.0000.Lower secondary=.0671. Upper secondary=.0740. Third level=.2068.



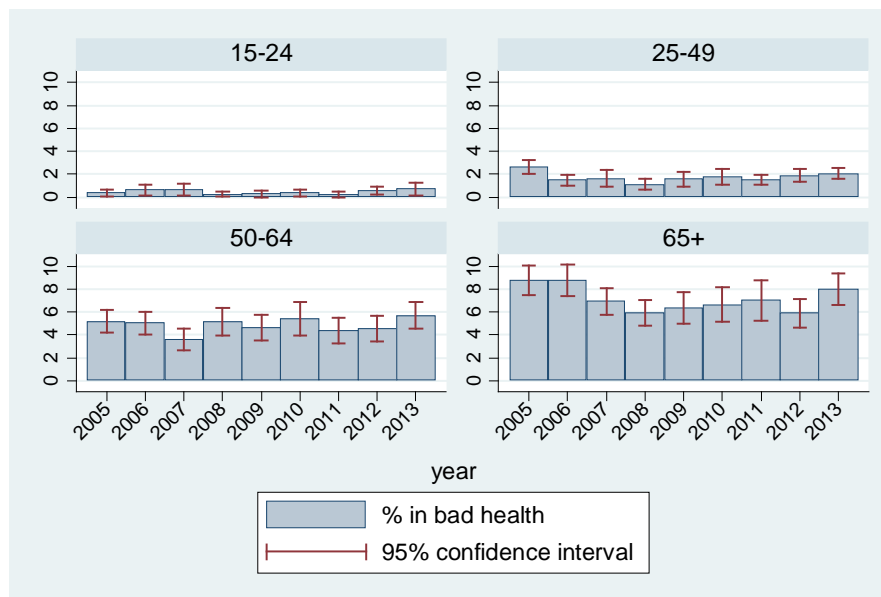
**Figure 3: Percentage with poor health, by principal economic status**



Pearson test for independence p-values:

Employed=.4828. Unemployed=.0273. Home duties=.2383. Other=.0005

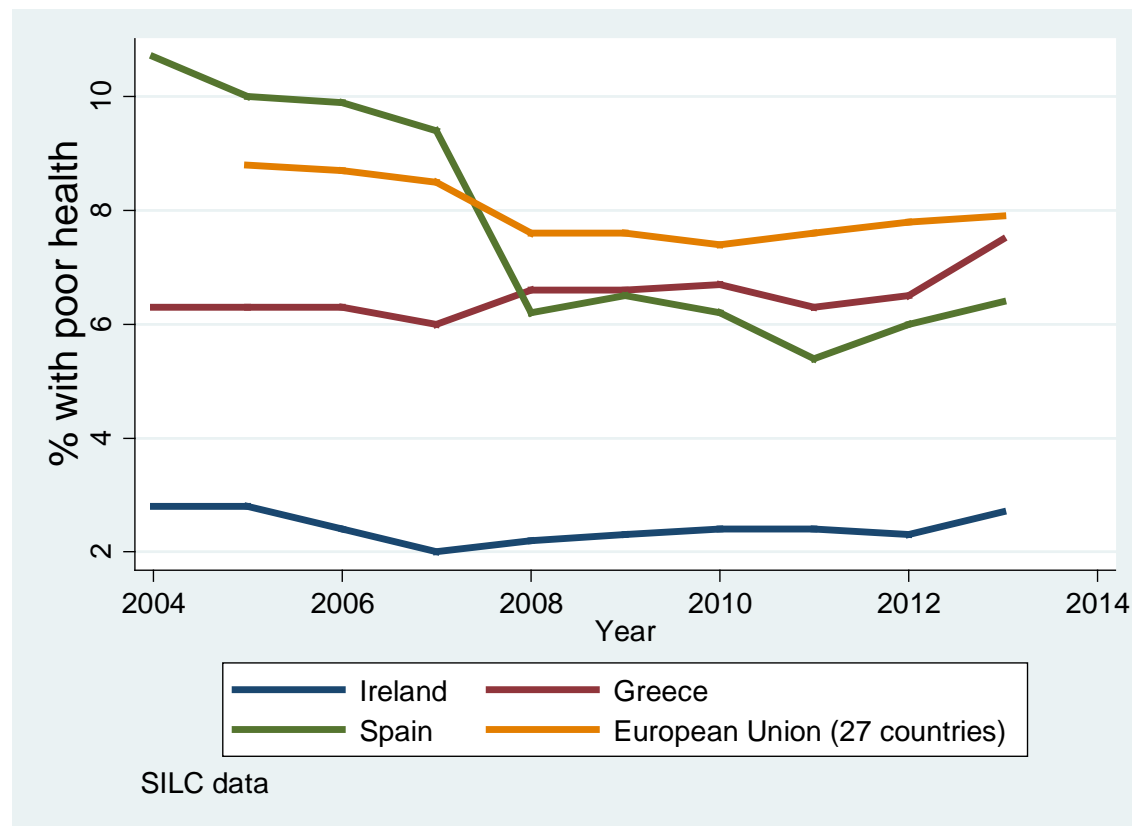
**Figure 4: Percentage with poor health by age group**



Pearson test for independence p-values:

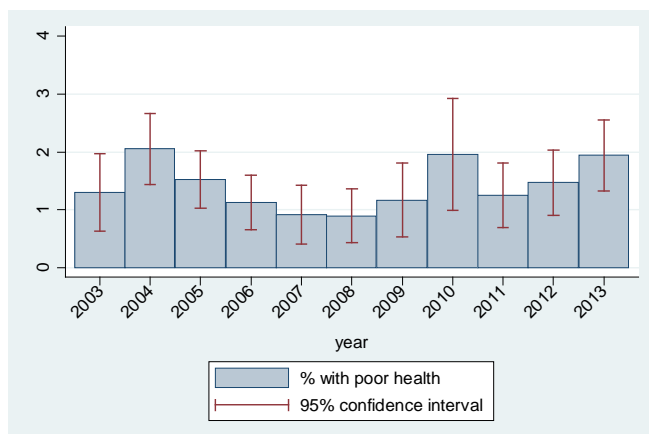
15-24=.4715. 25-49=.0470. 50-64=.3103. 65+=.0165.

**Figure 5: Trends in poor health 2004-2013 in selected countries**

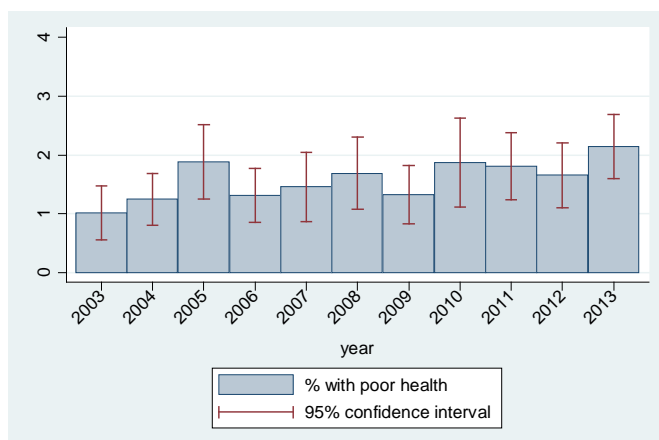


## Appendix: enlarged versions of selected figures.

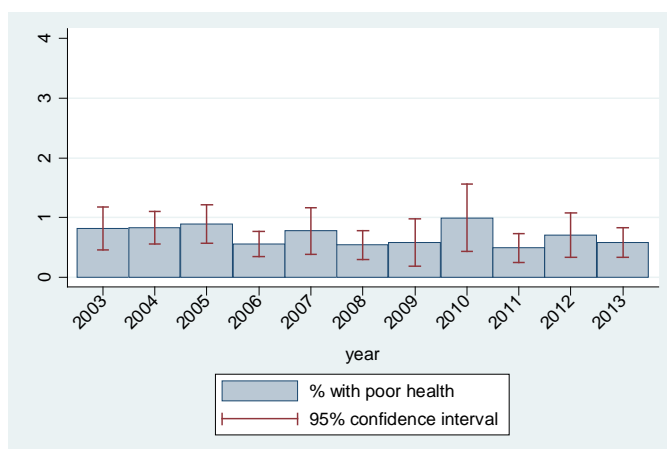
**Figure A1: Poor health for individuals with upper secondary education (see Figure 2)**



**Figure A2: Poor health for individual with third level education (see Figure 2)**



**Figure A3: Poor health for employed individuals (see Figure 3)**



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