

# First Results from the Survey of Health, Ageing and Retirement in Europe (2004-2007)

## Starting the Longitudinal Dimension

November 2008

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**Contents**

<b>1</b>	<b>Introduction</b> .....	<b>10</b>
	<i>Editor: Axel Börsch-Supan</i>	
1.1	The Fascination of the Ageing Process.....	11
1.2	Why Do We Need More Interdisciplinary Data to Understand Ageing?.....	11
1.3	Why Do We Need More International Data to Understand Ageing?.....	12
1.4	Why Do We Need More Longitudinal Data to Understand Ageing?.....	13
1.5	SHARE as an Infrastructure.....	14
1.6	Our Main Results.....	15
1.7	Where Do We Go From Here?.....	19
1.8	Acknowledgements.....	20
<b>2</b>	<b>Comparison Between SHARE, ELSA, and HRS</b> .....	<b>23</b>
	<i>Editor: Arie Kapteyn</i>	
2.1	Overview of Available Aging Data Sets.....	24
	<i>Erik Meijer, Gema Zamarro, Meenakshi Fernandes</i>	
2.2	Health Comparisons.....	30
	<i>Meenakshi Fernandes, Gema Zamarro, Erik Meijer</i>	
2.3	Mental Health and Cognitive Ability.....	40
	<i>Gema Zamarro, Erik Meijer, Meenakshi Fernandes</i>	
2.4	Labor Force Participation and Retirement.....	48
	<i>Gema Zamarro, Erik Meijer, Meenakshi Fernandes</i>	
2.5	Income and Replacement Rates.....	56
	<i>Erik Meijer, Gema Zamarro, Meenakshi Fernandes</i>	
<b>3</b>	<b>The SHARE Respondents</b> .....	<b>65</b>
	<i>Editor Axel Börsch-Supan</i>	
3.1	What Has Happened to the Oldest Old SHARE Participants After Two Years?.....	66
	<i>Karen Andersen-Ranberg, Jean-Marie Robine, Mikael Thinggaard, Kaare Christensen</i>	
3.2	Health, Bequests, and Social Support in the Last Year of Life: First Results from the SHARE End-of-Life Interviews.....	74
	<i>Hendrik Jürges</i>	
3.3	Czech Republic and Poland – the 50+ on Labour Markets in Transition.....	84
	<i>Radim Bobacek, Michal Myck</i>	
3.4	Israel: Diversity Among Population Groups.....	93
	<i>Howard Litwin, Eliyahu V. Sapir</i>	
3.5	Home, Houses and Residential Mobility.....	99
	<i>Viola Angelini, Anne Laferrère</i>	

3.6	Staying or Moving? Housing and Residential Mobility	108		6.2	Job Quality and Retirement Decisions	215
	<i>Martin Kobli, Harald Künemund, Claudia Vogel</i>				<i>Mario Schnalzenberger, Nicole Schneeweis, Rudolf Winter-Ebmer, Martina Zweimüller</i>	
<b>4</b>	<b>Health and Health Care</b>	<b>117</b>		6.3	Public, Occupational and Individual Pension Coverage	222
	<i>Editor: Johan Mackenbach</i>				<i>Lisa Callegaro, Christina Benita Wilke</i>	
4.1	Changes in Physical Health Among Older Europeans	118		6.4	Changes in Health Status and Work Disability	230
	<i>Mauricio Avendano, Johan Mackenbach</i>				<i>Axel Börsch-Supan</i>	
4.2	The Association Between Socioeconomic Status and Changes in Health in Europe	125		6.5	Dynamics of Volunteering	239
	<i>Renske Kok, Mauricio Avendano, Johan Mackenbach</i>				<i>Karsten Hank, Marcel Erlinghagen</i>	
4.3	Changes in Health-Behaviour Related Determinants	131		6.6	Retirement and Mental Health	247
	<i>Farizah Mohd Hairi, Mauricio Avendano, Johan Mackenbach</i>				<i>Agar Brugiavini, Enrica Croda, Michael Dewey</i>	
4.4	The Effects of Ill Health on Displacement from the Labour Market and Potential Impact of Prevention	137		6.7	Quality of Work and Well-being: The European Dimension	255
	<i>Alex Burdorf, Tilja van den Berg, Mauricio Avendano, Anton Kunst, Johan Mackenbach</i>				<i>Johannes Siegrist, Morten Wahrendorf</i>	
4.5	Do New Countries Joining SHARE Experience a Different Level of Health Services Utilization?	143		6.8	Caring for Parents and Employment of European Middle-Aged Women	263
	<i>Jacques Spagnoli, Sarah Cornaz, Brigitte Santos-Eggimann</i>				<i>Laura Crespo, Pedro Mira</i>	
4.6	Life Events and Change in Economic Resources as Predictors of Change in Health Services Utilization	149		<b>7</b>	<b>Socio-Economic Status</b>	<b>271</b>
	<i>Sarah Cornaz, Jacques Spagnoli, Brigitte Santos-Eggimann</i>				<i>Editor: Guglielmo Weber</i>	
4.7	Changes in Health Out-of-Pocket Payments and Health Care Utilization in the Early Post-Retirement Period	156		7.1	Income and Income Changes	272
	<i>Alberto Holly, Karine Lamiraud, Karine Moschetti, Tarik Yalcin</i>				<i>Danilo Cavapozzi, Omar Paccagnella, Guglielmo Weber</i>	
<b>5</b>	<b>Social and Family Context</b>	<b>165</b>		7.2	Poverty and Persistent Poverty: Adding Dynamics to Familiar Findings	278
	<i>Editor Johannes Siegrist</i>				<i>Antigone Lyberaki, Platon Timios</i>	
5.1	Shrinking Families? Marital Status, Childlessness, and Intergenerational Relationships	166		7.3	Real and Financial Assets in SHARE Wave 2	285
	<i>Martin Kobli, Harald Künemund, Claudia Vogel</i>				<i>Dimitris Christelis, Tullio Jappelli, Mario Padula</i>	
5.2	Evolution of Social Support	174		7.4	Consumption	291
	<i>Claudine Attias-Donfut, Jim Ogg, Francois-Charles Wolff</i>				<i>Viola Angelini, Agar Brugiavini, Guglielmo Weber</i>	
5.3	Changes in Financial Transfers: Do Family Events Matter?	182		7.5	Inequality, Life-Course Transitions, and Income Positions	297
	<i>Claudine Attias-Donfut, Jim Ogg, Francois-Charles Wolff</i>				<i>Steven Gorré, Karel Van den Bosch</i>	
5.4	Social Productivity and Quality of Life – First Prospective Findings	190		7.6	Expectations and Attitudes	306
	<i>Morten Wahrendorf, Olaf von dem Knesebeck, Johannes Siegrist</i>				<i>Joachim Winter</i>	
5.5	Informal Care and Labour Force Participation: The Economics of Family Networks	197		<b>8</b>	<b>Development</b>	<b>313</b>
	<i>Lisa Callegaro, Giacomo Pasini</i>				<i>Editor: Hendrik Jürges</i>	
<b>6</b>	<b>Work and Retirement</b>	<b>205</b>		8.1	The Development Process: Going Longitudinal and Including New Countries	314
	<i>Editor: Agar Brugiavini</i>				<i>Axel Börsch-Supan, Hendrik Jürges</i>	
6.1	Exits from the Labour Force	206		8.2	Survey Instruments in SHARE Wave 2	316
	<i>Agar Brugiavini, Giacomo Pasini, Franco Peracchi</i>				<i>Maarten Brouwer, Marcel Das, Maurice Martens</i>	
				8.3	Training for SHARE Wave 2	322
					<i>Kirsten H. Alcser, Grant D. Benson, Heidi M. Guyer</i>	
				8.4	Attrition	327
					<i>Mathis Schröder</i>	

<b>8.5 Sampling Design and Weighting Strategies in the Second Wave of SHARE</b> .....	<b>333</b>
<i>Giuseppe De Luca, Claudio Rossetti</i>	
<b>8.6 Fieldwork and Survey Management in SHARE</b> .....	<b>339</b>
<i>Barbara Schaaf</i>	
<b>8.7 Item Non-Response</b> .....	<b>345</b>
<i>Dimitris Christelis</i>	
<b>8.8 Enhancing International Comparability Using Anchoring Vignettes</b> .....	<b>353</b>
<i>Arthur van Soest</i>	
<b>List of Contributors</b> .....	<b>358</b>

## Conclusions

This article provided a brief overview of how survey continuation in Wave 2 in SHARE is related to various variables in Wave 1 such as survey design, respondent demographics and interviewer-respondent interactions and how these differ across the participating countries. Contrary to the general notion that long survey time in Wave 1 negatively influences participation in Wave 2 we do not find such a relationship. There are no clear cut results for the demographic variables, but it seems likely that considering a more elaborate model with multiple influencing variables, this will change. As for the interactions of interviewers and respondents, we find several interesting results, which sometimes vary considerably over the countries. It seems reassuring that the interviewers' perception of the willingness to answer transfers directly into the participation in the next wave, as this can help when addressing potentially reluctant respondents in the future.

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## 8.5 Sampling Design and Weighting Strategies in the Second wave of SHARE

Giuseppe De Luca, Claudio Rossetti

Sample surveys are usually affected by two types of errors: sampling and nonsampling errors. Sampling errors derive from the choice of studying a probability sample instead of the whole population. Nonsampling errors encompass all other sources of errors like coverage errors of the sampling frame and nonresponse errors. In this chapter, we provide a description of sampling design procedures and nonresponse weighting strategies adopted in the second wave of SHARE to deal with both types of errors.

First, we will define the target population of the second wave. Then we discuss sampling design procedures and computation of sampling design weights, with focus on the main sampling design differences between the first and the second wave. Detailed information on the sampling design adopted in each SHARE country will be provided in a separate technical report. We continue by focusing on the problem of unit nonresponse in the second wave and describing the computation of calibrated cross-sectional weights. The last section focuses on the problem of sample attrition between the first and the second wave and describes computation of calibrated longitudinal weights.

### Target Population

The target population of the second wave of SHARE can be defined in terms of both individuals and households. The target population of individuals consists of all people born in 1956 or earlier, speaking the official language of the country, not living abroad or in an institution such as a prison during the entire fieldwork period, plus their spouses/partners independent of age. The target population of households is implicitly defined as all households with at least one member in the target population of individuals.

### Sampling Design Weights

The second wave of the SHARE was carried out in fifteen European countries. Of these, eleven countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden and Switzerland) also participated in the first wave conducted in 2004, while four countries (Czech Republic, Ireland, Israel, Poland) only participated in the second wave conducted in 2006. (Israel 2005)

As already pointed out by Klevmarken et al. (2005), institutional conditions and regulations regarding sampling are so different across countries involved in this project that using a common sampling frame and sampling design for all countries was infeasible. In most of them, suitable sampling frames for the target population investigated by SHARE either did not exist, or could not be used. Thus, national sampling frames were selected depending on what was already available in each country. All national samples were drawn through probability sampling, but sampling procedures are not standardized across countries. In particular, they vary from simple random sampling to rather complicated multi-stage designs. The most common sampling design is two-stage sampling, with geographical areas (usually municipalities) as primary sampling units, and households or individuals as secondary sampling units. Simple random sampling was used in Denmark, Poland, and Sweden, whereas three-stage sampling was used in Austria, Czech Republic, Greece and Italy (In Austria, Czech Republic and Greece the third stage consists of screening of telephone numbers to assess age-eligibility of sampled units). The main sampling design differences with respect to the first wave occurred in Belgium and Denmark. In Belgium, the sampling

design changed from three-stage sampling of telephone numbers in Wave 1 to two-stage sampling of households in Wave 2. In Denmark, the sampling design changed from simple random sampling of households in Wave 1 to simple random sampling of individuals in Wave 2.

For most countries which participated in both waves of the panel, the sample for the second wave consists of two parts, a longitudinal sample and a refreshment sample. The former includes the subset of individuals and households already interviewed in the first wave, while the latter includes a new sample drawn to compensate for the loss of observations due to sample attrition. The only countries with no refreshment sample are Austria and the Dutch part of Belgium. Oversampling of individuals born in 1955 or 1956 was carried out in the refreshment sample. The aim of oversampling is to maintain an adequate representation of these cohorts because the longitudinal sample includes only individuals born in 1954 or earlier. In addition to the main sample, a sample with anchoring vignette questions in the drop-off questionnaire was drawn in most countries (the so called vignette sample). The only countries where no vignette samples were drawn, neither in Wave 1 nor in Wave 2, are Austria and Switzerland.

After taking into account the peculiar features of the sampling design adopted in each country, the probability of being selected in the sample of the second wave was generally computed as the joint probability of being selected in four sub-samples: main longitudinal, main refreshment, vignette longitudinal and vignette refreshment. (Since the first wave, the data also include a supplementary sample that was drawn in Sweden to increase the low number of achieved interview. This sample can be usually considered as a part of the main longitudinal sample). Sampling design weights were then computed as the inverse of the selection probability for the main sample alone, the vignette sample alone, and the two samples combined. Notice that, these weights only account for sampling errors by compensating for unequal selection probabilities of individuals and households. Furthermore, by the design of SHARE, the probability of including any eligible household member is the same as the probability of including the household. Thus, the selection probability and the design weight is the same for the household as for any eligible household member. A list of the sampling design weights included in the release 0 of the SHARE data is provided in the first panel of Table 1.

Variable	Description
wgtADH	Design weight, household & individual, overall sample
wgtMDH	Design weight, household & individual, main sample
wgtVDH	Design weight, household & individual, vignette sample
wgtACH	Calibrated cross-sectional household weight, overall sample
wgtMCH	Calibrated cross-sectional household weight, main sample
wgtVCH	Calibrated cross-sectional household weight, vignette sample
wgtACI	Calibrated cross-sectional individual weight, overall sample
wgtMCI	Calibrated cross-sectional individual weight, main sample
wgtVCI	Calibrated cross-sectional individual weight, vignette sample
lwgtACH	Calibrated longitudinal household weight, overall sample
lwgtMCH	Calibrated longitudinal household weight, main sample
lwgtVCH	Calibrated longitudinal household weight, vignette sample
lwgtACI	Calibrated longitudinal individual weight, overall sample
lwgtMCI	Calibrated longitudinal individual weight, main sample
lwgtVCI	Calibrated longitudinal individual weight, vignette sample

Table 1 Weighting variables in the second wave of SHARE

### Calibrated Cross-Sectional Weights

As discussed in the previous section, sampling design weights allow obtaining unbiased estimators of the population parameters under the ideal situation of complete response. Unfortunately, survey data are usually affected by problems of nonresponse. Hence, estimators constructed on the basis of sampling design weights may lead to biased estimators of the population parameters of interest.

In this section, we focus on problems of unit nonresponse in the second wave of SHARE and describe the construction of calibrated cross-sectional weights. Under certain conditions, these weights may help reduce the potential selectivity bias generated by this source of nonsampling error. (Notice that, the set of calibrated weights provided in the public release of the SHARE database are designed to compensate for problems of unit nonresponse in the CAPI interview by ignoring for problems of unit nonresponse in the drop-off questionnaire). As for the first wave, nonresponse corrected weights in Wave 2 were constructed through the calibration procedure provided by Deville and Särndal (1992). This is a statistical reweighting procedure that assigns weights to sample respondents in order to match known population totals obtained from external sources. As discussed at length in the survey literature, effectiveness of this reweighting procedure relies crucially on the assumption that the missing data mechanism underlying unit nonresponse is missing at random (MAR). This means that, after conditioning on a set of variables, there is no relation between the probability of unit nonresponse and other key survey variables excluded from the conditioning set. In principle, the MAR assumption could be relaxed by considering alternative approaches where the process for the outcome of interest and the nonresponse process are estimated jointly. An empirical application of this approach can be found in De Luca and Peracchi (2007). In practice, however, the specification of this type of sample selection models tends to be specific to the analysis of interest. Furthermore, they usually require some background information on both responding and nonresponding units

which is not available for all SHARE countries. Depending on the purpose of the analysis, users should decide if the set of calibrated weights provided by SHARE is enough for unit nonresponse compensation.

Consider a finite population  $U=\{1,\dots,k,\dots,N\}$  from which a probability sample  $S\subseteq U$  is drawn according to a given sampling design. Let  $w_k$  be the original sampling design weight of the  $k$ th unit, and assume that only a sub-sample of respondents  $R\subseteq S$  agree to participate to the survey. Following Deville and Särndal (1992), the calibrated weight  $w_k^*$  can be obtained by minimizing the chi-square distance function

$$\sum_{k\in R} (w_k^* - w_k)^2 / w_k$$

subject to a set of  $J$  calibration equations

$$t_x = \sum_{k\in R} w_k^* x_k$$

where  $x_k=(x_{k1},\dots,x_{kj})$  and  $t_x=(t_1,\dots,t_j)$  are  $J$ -vectors of calibration variables and known population totals respectively. Note that the use of the chi-square distance function is a convenient choice because it guarantees the existence of a closed form solution. (Alternative distance functions which require iterative solution methods have been investigated by Deville and Särndal (1992).) The solution of the minimization problem gives calibrated weights of the following form

$$w_k^* = w_k \left[ 1 + \left( t_x - \sum_{k\in R} w_k x_k \right)' \left( \sum_{k\in R} w_k x_k x_k' \right)^{-1} x_k \right]$$

Thus, given the chosen distance measure, calibrated weights are as close as possible to the original sampling design weights, while also respecting a set of constraints which reflect the size of the target population across one or more dimensions. Notice that, even if calibrated weights are primarily designed to obtain unbiased estimates of population totals, population means can be easily estimated after rescaling the sum of the weights to one.

Calibrated cross-sectional weights of Wave 2 were separately computed by country using at least 8 calibration margins to control for the size of the target population across gender and age groups (50-59, 60-69, 70-79 and 80+). For most of the SHARE countries, information about the calibration margins comes from sources other than the sampling frame, such as national population census. (As pointed out by Klevmarken et al. (2005), this may be worrisome because census data may not exactly cover the same target population investigated by SHARE.) For those countries involved in oversampling of individuals born between 1955 and 1956, we have calibrated against 10 population totals by splitting the age class 50-59 into the age classes 50-52 and 53-59. Additional calibration margins were only used in France, Italy and Denmark. In France, we added one calibration margin to control for home ownership, while in Italy and Denmark we added 14 and 15 calibration margins respectively to control for the size of the target population across geographical areas.

Overall, the release 0 of the data includes six types of calibrated cross-sectional weights which are listed in the second panel of Table 1. We can distinguish between cross-sectional weights at the individual and the household level, and cross-sectional weights for three variants of the SHARE sample (main, vignette and overall sample). For the individual level weights, each 50+ respondent receives a calibrated weight which depends on the household design weight and the respondent's calibration variables. For the household level weights, each interviewed household member receives a common calibrated weight which depends on the household design weight and the calibration variables of all 50+ household respondents. These weights are therefore designed for inference on the target population of individuals and households respectively. For each type of weight, we also provide a flag variable which is equal to 1 when the corresponding calibrated weight is missing. In particular, weights at the individual level are missing for respondents younger than 50 and respondents with missing information on either gender or year of birth. Weights at the household level are instead missing whenever sampling design weights can not be computed because of incomplete sampling frame information.

### Calibrated Longitudinal Weights

In addition to calibrated cross-sectional weights, SHARE also provides calibrated weights for the longitudinal part of sample. These weights aim of compensating for potential selectivity effects generated by sample attrition between the first and the second wave.

In this preliminary release of the data, calibrated longitudinal weights were constructed by using the same procedure adopted for calibrated cross-sectional weights. There are only two major differences. First, they are only defined for the subset of respondents who agree to participate to both waves of the panel. Second, we have calibrated against 8 population totals to match the size of the target population of Wave 1 by gender and age class (50-59, 60-69, 70-79 and 80+). As for cross-sectional weights, calibrated longitudinal weights were computed at the individual and the household level, and for three variants of the sample (main longitudinal, vignette longitudinal, and overall longitudinal sample). This leads to six types of calibrated longitudinal weights which are listed in the third panel of Table 1. Validity of these weights relies again on the assumption that the missing data mechanism underlying sample attrition is MAR.

A more refined version of longitudinal weights is planned to be provided in the final release of the Wave 2 data. The aim of this revision is twofold. First, we will account for mortality in the target population of Wave 1 by using estimates of mortality rates obtained from life tables. Unlike other sources of attrition, mortality is indeed a phenomenon that affects both the sample and the population. For this reason, the most appropriate population for longitudinal weights should be the target population of Wave 1 that survives across waves. Second, the construction of calibrated longitudinal weights will be based on a larger set of conditioning variables by using the additional information collected in the Wave 1 interview. In principle, this may help reduce the selectivity bias generated by sample attrition and improve the plausibility of the MAR assumption. In practice, however, one cannot ignore the undesirable increase in the variability of the weights arising from a larger conditioning set. To avoid unnecessary delay in the release of the data, these issues will be addressed in future research.

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## 8.6 Fieldwork and Survey Management in SHARE

Barbara Schaun

SHARE is designed to be a genuine cross-national survey. In order to ensure high quality data and a strict cross-national comparability, certain design tools have been applied of which the common interview mode, questionnaire design, effort devoted to the translation of the questionnaire, and finally the standardisation of the fieldwork procedures across countries (including a common electronic sample management system) were the most important ones.

This chapter describes the main fieldwork procedures and survey design characteristics adopted by SHARE, which have been designed and implemented in close cooperation between the Mannheim Research Institute for the Economics of Ageing (MEA) and CentERdata at the University of Tilburg, with help of the Survey Research Center (SRC) at the University of Michigan in Ann Arbor. Professional survey agencies have been selected in all participating countries in order to achieve high data quality. Agencies were subject to a common set of requirements designed by the SHARE co-ordinating team in order to minimise the occurrence of nonsampling errors, and to minimize attrition rates. Examples of the common protocols are the use of advance and follow-up letters, brochures which informed the respondents about the results from Wave 1, and the set-up of general rules for the management of the fieldwork. Basic fieldwork procedures were then administrated by the survey agencies according to their own established protocols.

### The Fieldwork Period

During its second wave, SHARE was conducted in thirteen European countries. Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden and Switzerland already participated in the first wave of SHARE, whereas two new countries, the Czech Republic and Poland, debuted to SHARE. In between the waves 1 and 2 Israel joined the SHARE survey with its first wave, and data are currently being collected in Ireland.

In several countries, the sample consisted of two parts: the “core sample” and the “vignette sample”. In the vignette samples, a section with anchoring vignettes replaced a part of the self-completion questionnaire. A vignette sample was added in eleven countries (Belgium, Czech Republic, Denmark, France, Germany, Greece, Italy, the Netherlands, Poland, Spain, and Sweden).

The main fieldwork period of SHARE lasted about twelve months, from October 2006 until September 2007. In some countries the fieldwork period of the second wave was prolonged to November 2007, as the specific sample requirements of SHARE – to follow respondents who moved house, to interview people living in old-age institutions, and to conduct end-of-life interviews – requested more time-consuming (administrative) efforts by survey agencies and their interviewers than originally expected.

For all countries participating for the second time (except for Austria) a refresher sample was drawn. The refresher sample served to boost the overall sample size. In almost all countries with a refresher sample, the newly drawn sample consisted of households belonging to the core as well as of households belonging to the vignette sample. The only exceptions were France and Switzerland where the refresher sample was a core sample only.