The Survey of Health, Ageing and Retirement in Europe (SHARE) is a multidisciplinary and cross-national panel database of micro data on health, socio-economic status and social and family networks of more than 85,000 individuals (approximately 150,000 interviews) from 19 European countries (+Israel) aged 50 or over.

This book has two parts: "Innovations" and "Methodology". The first six chapters of this book are devoted to the innovations in SHARE Wave 4, starting with an account of the experiences of the new countries in joining SHARE in wave four. Furthermore a detailed account of the most important new content in wave 4 is given, namely the social networks module. In the following chapter the experiences with taking and analysing dried blood spots in Germany is described. Furthermore, another chapter focuses on the linking of respondents' retirement accounts at the German pension system with SHARE interview data. The third sub-project within the German SHARE test studies concerns response behaviour where the process and the first results of an experiment of the effects of unconditional respondent cash incentives on response rates are laid out. The section on innovations is completed by an introduction to the improvements made to key software tools such as the sample distributor and the online translation tool.

The section "Methodology" starts with a detailed outline of the sampling process and outcomes that were used to enhance the panel samples of SHARE with refreshment samples. An overview of managing a multinational survey infrastructure from an operational point of view, focusing on fieldwork monitoring and quality control in times of profound organizational changes is given as well. The book finishes with a summary of key indicators of survey response, such as contact and cooperation rates, response rates of the refreshment samples and retention rates of the panel samples.

SHARE Survey of Health, Ageing and Retirement in Europe

SHARE Wave 4: Innovations & Methodology

Edited by
Frederic Malter
Axel Börsch-Supan

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ISBN 978-3-00-040802-1

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January 2013

The SHARE data collection has been primarily funded by the European Commission through the 5th Framework Programme (project QLK6-CT-2001-00360 in the thematic programme Quality of Life), through the 6th Framework Programme (projects SHARE-I3, RII-CT-2006-062193, COMPARE, CIT5- CT-2005-028857, and SHARELIFE, CIT4-CT-2006-028812) and through the 7th Framework Programme (SHARE-PREP, N° 211909, SHARE-LEAP, N° 227822 and SHARE M4, N° 261982). Additional funding from the U.S. National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, R21 AG025169, Y1-AG-4553-01, IAG BSR06-11 and OGHA 04-064) and the German Ministry of Education and Research as well as from various national sources is gratefully acknowledged (see www.share-project.org for a full list of funding institutions).

Published by
Munich Center for the Economics of Aging (MEA)
Amalienstrasse 33
80799 München
Tel: +49-89-38602-0
Fax: +49-89-38602-390
www.mea.mpisoc.mpg.de

Cover Design by
Markus Berger

Printed by
CS Werbezentrum
Goethestr. 28
80336 München

Suggested Citation:
Malter, F., Börsch-Supan, A. (Eds.) (2013). SHARE Wave 4: Innovations & Methodology. Munich: MEA, Max Planck Institute for Social Law and Social Policy.

ISBN 978-3-00-040802-1

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8 Sample Design in SHARE Wave Four

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8.1 Introduction

This chapter outlines the design of the samples that are included in SHARE wave four. We begin by defining the population that SHARE aims to represent and explaining why this definition was adopted. We then set out the objectives of the sample design and summarise the approach that was taken to meet these objectives, thus placing the samples selected at wave four in the context of the samples selected at previous waves. We include a description of the process by which sample designs were developed and agreed and we describe the nature of the sample designs implemented, including discussion of the role played by sampling frames, stratification, sample clustering and variation in selection probabilities. The chapter ends with a description of the process of developing the weights that have been provided for use by data analysts. The weights adjust both for variation in selection probabilities by design and for variation in participation probabilities caused by non-response and analysts are strongly encouraged to use them.

8.2 What population does SHARE represent?

The target population for inference from SHARE is the European population aged 50 and older. However, the study design must also take into account practical considerations relating to the ability to sample and collect data from respondents. Two restrictions are introduced as a consequence. The first is that the study population is restricted to those people who are resident in a private household at the time of sampling and at the time of fieldwork. Residents of institutions are excluded, with the exception of countries using as a sampling frame a population register in which residents of residential and nursing homes are included. In such cases, those residents were included. The second restriction is imposed by the practicalities of interviewing in different languages. The study is restricted to people who speak (one of) the national language(s). Also, as the household context is important the spouses/partners of sample members are included, regardless of their own age. Thus, the definition of the study population for SHARE wave four is:

Persons born in 1960 or earlier, and persons who are a spouse/partner of a person born in 1960 or earlier, who speak the official language(s) of the country and who are residents within private households, regardless of nationality and citizenship.

To achieve representation of this population, SHARE employs a sample design which involves baseline samples of the household population aged 50 and older at a particular point in time in each country, supplemented by regular refreshment samples of the sub-population of people who have turned 50 since the original baseline sample was selected. The design and implementation of these baseline and refreshment samples are described in the next section.

8.3 The basic sample design

The sampling rationale for baseline and refreshment samples was the same that all sophisticated cross-national survey programs apply at present. Kish (1994, p.173) provides the underlying idea: "Sample designs may be chosen flexibly and there is no need for similarity of sample designs. Flexibility of choice is particularly advisable for multinational comparisons, because the sampling resources differ greatly between countries. All this flexibility assumes probability selection methods: known probabilities of selection for all population elements." This encapsulates the idea that to facilitate inference to the population of interest, it is necessary that the survey is based upon probability samples with full population coverage. SHARE therefore insists on the use of probability sampling, with known selection probabilities for each individual. The extent to which full population coverage is strictly possible depends on the quality of sampling frames available in each country (see next section), but in all cases close to full coverage was achieved. The details of the sample design varies between countries, as discussed later in this chapter, but the basic principles of probability-based selection and maximal population coverage underpin all the designs used.

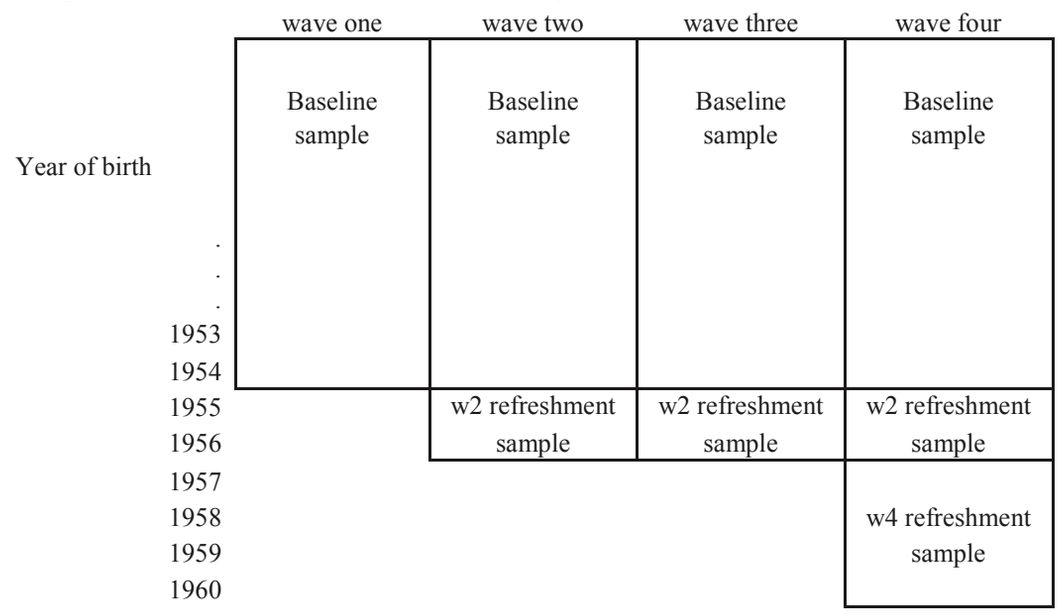
Probability sampling and the absence of under-coverage ensure that a sample can provide unbiased estimates. But in addition to the avoidance of bias, it is necessary that samples provide sufficient precision to enable meaningful estimation. This requires adequate sample sizes, minimal clustering and minimal variation in selection probabilities. Precision can also be aided by the use of sample stratification, so this is encouraged where possible. For this reason the procedures adopted by SHARE address each of these components of the design: sample size, clustering, variation in selection probabilities and stratification. Regarding sample size the target for each country is to conduct 6,000 interviews overall at each wave, baseline and refreshment samples combined. Regarding the other elements of sample design, advice is provided to participating countries by means of the "SHARE Sampling Guide" and through bilateral discussion with a member of the SHARE Sampling Panel. The results and the implications are outlined in a later section of this chapter.

Even with a well-designed sample selection process, the sample of respondents can become unrepresentative of the target population due to non-response. A final important ingredient in order to achieve the inferential aims of the study is therefore to achieve high response rates. The extent to which this was achieved can be found in chapter 10.

Four new countries entered SHARE for the first time in the fourth wave. These countries - Estonia, Hungary, Portugal and Slovenia – therefore had to construct baseline samples that will ultimately form their "first wave" panel cases. Other countries had to select refreshment samples of people born between 1957 and 1960 to add to their existing sample of people born in 1956 or earlier. (Wave 1 baseline samples consisted of people born in 1954 or earlier; Wave two refreshment samples contained people born in 1955 and 1956; No refreshment samples were added at wave 3.) For some countries – where no refreshment sample had been added at wave two – the wave four refreshment sample included people born between 1955 and 1960. Additionally, many of the countries which had participated in any of the previous three waves conducted so far were faced with a sample size problem. Due to panel mortality, the

number of cases in the initial sample has decreased from wave to wave. Consequently, many countries deemed it necessary to implement a refreshment sample across the full age range of people born in 1960 or earlier, in order to have a large enough sample size for subgroup analyses such as by age groups. Where possible, these full-range refreshment samples included an over-sampling of persons born in 1957 to 1960 (or 1955 to 1960 if the country had no wave two refreshment sample), to maintain the statistical efficiency of the overall sample. Figure 8.1 illustrates examples of the different kinds of sample combinations that can be found in the SHARE data.

Example A: Countries which had a refreshment sample at wave two



Example B: Countries which had no refreshment sample at wave two

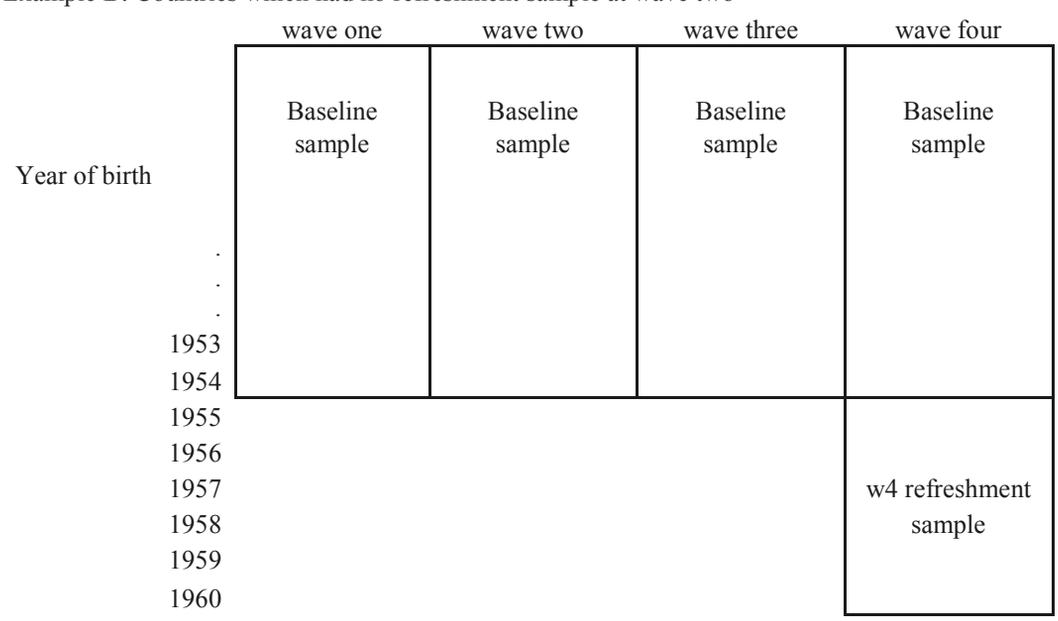


Figure 8.1A Relationship between samples and waves

Example C: Countries which had a refreshment sample at wave two and full age range refreshment at wave four

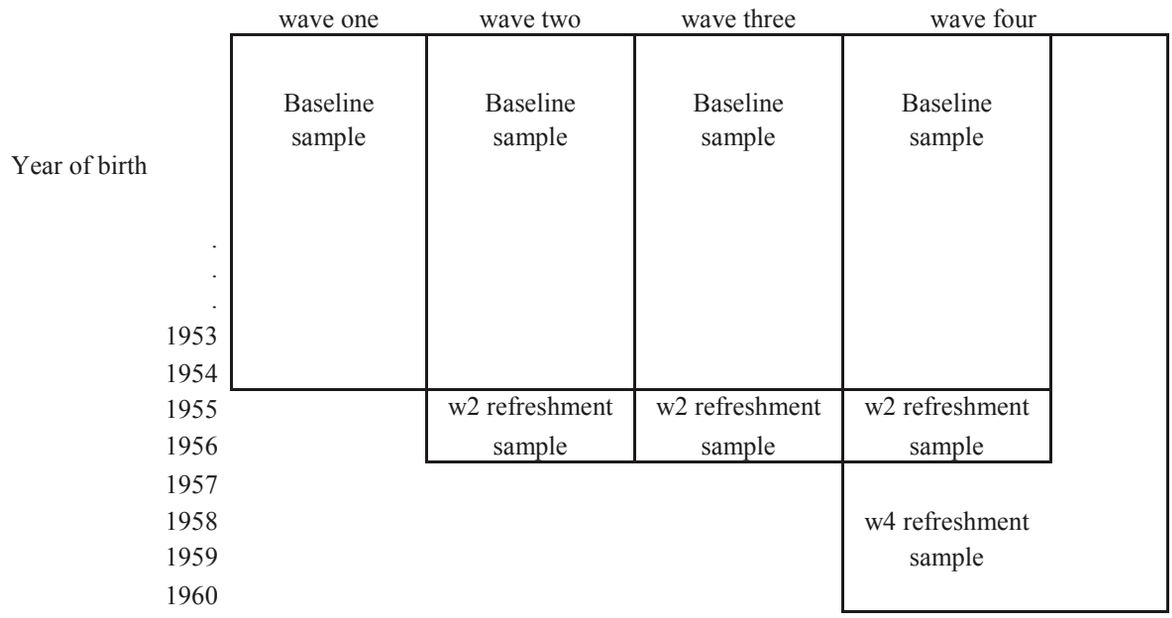


Figure 8.1B Relationship between samples and waves

8.4 How was the sample design controlled?

The sample design requirements for SHARE are set out in the "SHARE Sampling Guide" and were widely disseminated and discussed with the country teams. For wave 4, SHARE created for the first time a "Sampling Panel", consisting of four international experts on survey sampling (the authors of this chapter), all with experience of cross-national comparative surveys. The role of the panel was to discuss the proposed sample designs for both baseline and refreshment samples with each country team, to suggest improvements, and ultimately to assess the acceptability of the design. One panel member was assigned to each country to provide technical assistance during the entire sampling process. This approach gave country teams access to expert assistance in developing efficient and appropriate designs and also increased the likelihood of consistent decisions being made across countries. The process was generally deemed to have been a success, though of course a limitation is that it was not possible to influence the design of samples that had already been selected at earlier waves.

8.5 National variations in design

In developing national sampling designs, the first task was to find the most suitable sampling frame in each country. The sampling experts and the national country teams were looking for frames with minimum under-coverage and minimum over-coverage, i.e. the most often updated frames from the most trustworthy sources. An important characteristic any candidate frame had to fulfil was the availability of reliable information on age for the frame population since the target population comprised only those persons born in the year 1960 or earlier. If this information was not available from a given frame, a screening procedure had to be applied. The table below shows a summary of sampling frames. More details on sample frames and screening procedures can be found in Appendix 2.

Table 8.1 Description of sampling frames in countries with baseline/refreshment samples in wave four

Country	Description of frame	Units
Austria	List of all dwellings with corresponding p.o. boxes	A
Belgium	National population register	I
Czech Republic	Electoral register	A
Denmark	National population register	I
Estonia	National population register	I
France	The rolling population census	I
Germany	Local population registries	I
Hungary	Population registry of Hungary	I
Netherlands	Refreshment Sample from 26 municipalities	I
Portugal	National Health System register	H
Slovenia	Central register of population	I
Spain	Population register based on census and municipal registers	I
Sweden	Population register NAVET of the Swedish tax authority	I
Switzerland	Population register	I

A-Addresses, H-Households, I-Individuals

Due to privacy or legal restrictions it was not always possible to use the best existing frame in a given country. For example, Austria has a modern, computer-based population register. But this register was and still is (as of late 2012) unfortunately not accessible for survey sampling. On the other hand, SHARE was the first survey that was allowed to use the Swiss population register which is known to be of excellent quality. As a rule the sampling experts did not insist on taking the same frame as in the previous SHARE wave but instead countries were allowed to find the best one. In general, finding suitable sampling frames for sample selection is a very difficult, challenging and time consuming step in cross-national survey sampling. SHARE is no exception to this rule.

The next step was the design of the samples given the frames in each country. Usually the sampling experts recommended a regional stratification scheme to ensure a good representation of different geographical areas of the country. If further relevant characteristics were available on the sampling frame – such as age in the case of population registers – countries were advised to also use them for stratification. As in other survey programs, such as the European Social Survey (ESS) or the Programme for the International Assessment of Adult Competencies (PIAAC), a guiding principle is to design sampling plans which yield minimum variation in inclusion probabilities and a minimum amount of clustering. This is because these two design characteristics directly influence the precision of estimates based on the underlying samples. Finding a sampling frame which allows for such a design is, however, not always possible.

Such a scenario applies, for example, if a country team only has access to a list of households and an eligible person has to be selected from all eligible target persons of a sampled household. In this case, variation in inclusion probabilities cannot be avoided. This procedure introduces a so called “design effect due to unequal inclusion probabilities” ($Deff_p$). Other studies (e.g. ESS) have shown that $Deff_p$ usually ranges between 1.20 and 1.25 for designs that involve the random selection of one adult per household, depending on the variation of household sizes in a country. This variation in

inclusion probabilities has to be taken into account by a design weight which is just the inverse of the inclusion probability. For SHARE, $Deff_p$ should tend to be smaller than this, as it depends on the distribution of the number of age-eligible units per household, rather than the total number of adults per household, where an age-eligible unit is defined as either a single person aged 50 or over or a couple containing at least one person aged 50 or over. In most countries, few households contain more than one age-eligible unit and very few have more than two.

Fortunately, many countries had access to population registers, e.g. Denmark, Slovenia, Switzerland and Germany. In these countries sample designs could be implemented which yielded equal inclusion probabilities for all elements. In Germany, however, SHARE had to use a two-stage clustered sample design as the population registers are locally administered by the municipalities. Therefore, a number of municipalities had to be selected at the first stage and age eligible persons at the second stage. In such a case, an additional component of the design effect emerges. It is the design effect due to clustering ($Deff_c$). Usually, $Deff_c$ is larger than 1 since both the mean cluster size of the primary sampling units (municipalities, in the case of Germany) and the intraclass correlation determine its magnitude. Therefore, by design, the mean cluster size had to be chosen as small as possible and as many primary sampling units as possible had to be selected. This is at odds with the interests of the survey agencies for which an increase in the number of primary sampling units is associated with increased costs.

The refreshment sample of France shall serve as an example of how design weights in part determined the design effect. The following figure shows the distribution of design weights in the French refreshment sample by region (region was a one of two stratification variables in the French sample design). Although the sample design was chosen such that the overall variation in inclusion probabilities would be as small as possible, the household selection still caused variation in inclusion probabilities as Figure 8.2 clearly shows. This lead to a design effect due to unequal inclusion probabilities of 1.33 in France.

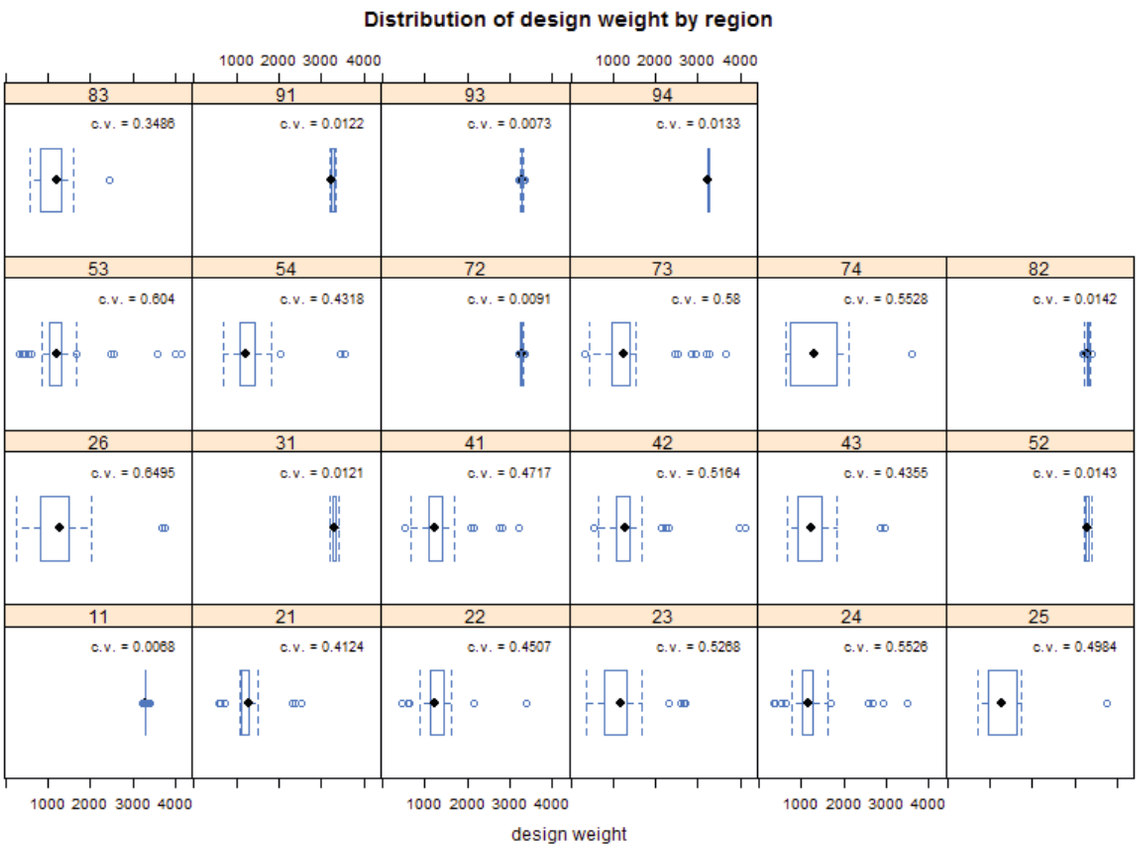


Figure 8.2 Distribution of design weights in the French refreshment sample.

8.6 Sample size and response rates

In contrast to many cross-sectional survey programs SHARE did not define a minimum net sample size (like for example PIAAC does) or a minimum effective sample size (like in the ESS) because the size of the refreshment sample should be determined by the size of the surviving initial panel sample, i.e. the smaller the sample size of the surviving initial panel sample, the larger the size of the refreshment sample should be. The ultimate guideline is to conduct 6000 individual interviews overall, if panel respondents and refreshment respondents are combined at the end of fieldwork. For baseline samples, SHARE has the rule that the net sample size should be as large as possible, given the cost restrictions in the country.

The resulting net sample size was difficult to estimate in advance, mainly due to these reasons:

- In countries where no age information from the frame was available, a screening procedure had to be conducted, i.e. a contact person in the household had to be interviewed how many people belonging to the target population lived in the household. The response rate of these contact persons was difficult to anticipate. An example would be Austria.
- The response rate of the selected persons within the household was difficult to estimate in advance.

- Within a selected household, one age-eligible member plus his/her partner/spouse had to be interviewed in addition. Whether there was a partner/spouse to be interviewed was not known from the frames. Thus, this percentage had to be estimated and evidence from previous waves indicated that it differs between countries. Furthermore, the response rate of the partners/spouses was also difficult to estimate in advance.
- The ineligibility rate, i.e. deficiencies of the frame had to be assessed in advance. If the estimated eligibility rate was too small this reduced – given a fixed gross sample - the resulting net sample size.

Some of these problems are clearly illustrated in the example of the baseline sample size calculation for Slovenia. The following is an extract from the Slovenian sampling design form (see Appendix 2 for details):

"The gross sample size will be n_{gross} = 4.200 (21 primary respondents in 200 PSUs). With a response rate of about 60% and an eligibility rate of 90%, assuming 60% of primary respondents have partners, and assuming 50% response rate of partners, this leads to a net sample size n_{net}=2948 (2268 primary respondents + 680 partners). This net sample means about 15 interviews completed per PSU. To summarize, that means that we start with a gross sample of 4200 individuals from the register, to reach estimated 2948 completed interviews, which include the partners. "

Thus, estimation in advance of the study of the net sample size that would result from any given gross sample size was subject to substantial uncertainty (especially in countries without a frame of individuals) as it relied on several more or less weak assumptions. Details about response rates and retention rates can be found in chapter 10.

8.7 Analysis weights

Sampling design weights, defined as the inverse of the probability of being included in the sample of any specific wave, compensate for unequal selection probabilities of the various sample units. Without such weights it is not possible to obtain unbiased estimators of population parameters of interest. However, even with such weights, estimators are unbiased only under the ideal situation of complete response. Unfortunately, survey data are always affected by unit nonresponse (i.e., eligible sample units fail to participate in the survey because of either noncontact or explicit refusal to cooperate). Such nonresponse occurs at each wave, resulting in panel attrition (i.e., responding units in a given wave of the panel drop out in a subsequent wave). Therefore, estimators constructed using sample design weights alone, and ignoring unit nonresponse and attrition, may be biased (Lessler and Kalsbeek 1992). Although sample design weights are included in the public release of the SHARE data, we strongly discourage users to rely on these weights unless they are used for the implementation of specific statistical methods which account for nonresponse errors in other ways, or for other specific purposes.

The strategy used by SHARE to cope with the potential selection bias generated by unit nonresponse and panel attrition relies on the ex-post calibration procedure of Deville and Särndal (1992). As discussed in Appendix 1, this statistical re-weighting procedure gives calibrated weights which are as close as possible, according to a given

distance measure, to the original design weights while also respecting a set of known population totals (the calibration margins). Under certain assumptions about the missing data process, calibrated weights may help reduce the potential selectivity bias generated by unit nonresponse and panel attrition. The key assumption is that, after conditioning on a set of variables (the calibration variables), there is no relation between the response probability and the other key survey variables excluded from the conditioning set. Using the terminology introduced by Rubin (1987) this corresponds to assuming that the process generating missing observations is missing-at-random (MAR). This assumption could be relaxed by considering more sophisticated approaches where the process for the outcome of interest and the response process are estimated jointly (see, for example, De Luca and Peracchi 2012). However, these approaches are generally specific to the research questions under investigation and they require auxiliary information on all eligible sample units. Thus, depending on the purpose of the analysis to be performed, users should decide whether calibrated weights provided in the public release of the SHARE data are enough to compensate for the potential selectivity bias associated with unit nonresponse and panel attrition.

As in the previous waves, the public release of the wave four SHARE data includes calibrated cross-sectional weights to be used in the context of cross-sectional analyses and calibrated longitudinal weights to be used for longitudinal analyses. Since the basic units of analysis can be either individuals or households, both types of weights are computed at the individual level for inference to the target population of individuals and at the household level for inference to the target population of households.

Calibrated cross-sectional weights are defined for the sample of 50+ respondents (either individuals or households) in wave four by ignoring the distinction between longitudinal and refreshment samples. At the individual level, each 50+ respondent receives a calibrated weight that depends on the household design weight and the respondent's set of calibration variables. At the household level, each interviewed household member receives a common calibrated weight that depends on the household design weight and the calibration variables of all 50+ respondents in the same household. Calibrated weights are always computed separately by country in order to match the size of national populations of individuals born in 1960 or earlier. Within each country, we used a set of calibration margins for the size of the target population across 8 gender-age groups (i.e. males and females with year of birth in the classes (-1930], [1931-40], [1941-50], [1951-60]) and across NUTS1 regional areas. For each type of calibrated weight, we also provide a flag variable which is equal to 1 whenever the corresponding calibrated weight is missing. This occurs for respondents younger than 50 years (i.e. age-ineligible partners of an age-eligible respondent), those with missing information on the set of calibration variables (i.e. year of birth, gender and NUTS1 code), and those with missing sampling design weights (i.e., respondents with missing sampling frame information).

Calibrated longitudinal weights differ from calibrated cross-sectional weights in three important respects. First, these weights are only defined for the balanced sample of eligible units who participated in two or more waves of the panel. Second, calibrated longitudinal weights take into account mortality of the original target population across waves. Mortality affects both the sample and the population. Thus, the target population for longitudinal analyses is the original population at the beginning of the time reference

period that survives up to the end of period. Third, since the SHARE panel consists of four waves, one can compute thirty different types of calibrated longitudinal weights depending on the selected combination of the waves (i.e., 1-2, 1-3,…,3-4, 1-2-3,…,2-3-4, 1-2-3-4) and the basic unit of analysis (either individuals or households). To simplify the structure of the public release of the data, SHARE provides calibrated longitudinal weights only for the fully balanced panel sample (i.e. the sample of 50+ respondents participating to all waves). These calibrated weights are computed separately by country in order to match the size of the national populations of individuals born in 1954 or earlier that survive up to 2011. We used a set of calibration margins for the size of the target population across eight gender-age groups (i.e. males and females with year of birth in the classes (-1924], [1925-34], [1935-44], [1945-54]) and across NUTS1 regional areas. Mortality is accounted for by subtracting from each population margin the estimated number of deaths between 2004 and 2011. Calibrated longitudinal weights are available at the individual and the household level. Notice that, for the weights at the household level, we only require that there is at least one eligible respondent in each wave. Thus, households with one partner participating in the first wave and the other partner participating in the other waves belong to the balanced sample of households, even if neither partner belongs to the balanced panel of individuals.

For longitudinal analyses based on other possible combinations of waves, users can compute their own calibrated longitudinal weights. To support users in this methodological task, SHARE provides a Stata command called cweight.ado which implements the calibration procedure by Deville and Särndal (1992), a Stata do-file weighting.do which illustrates step-by-step how to compute calibrated longitudinal weights at the individual and the household level, and tables of country specific information needed to compute the population calibration margins.

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Appendix 1 The calibration procedure

This appendix provides a formal description of the new theoretical framework used since the third wave of SHARE to compute calibrated weights. Calibrated weights of the first two waves have being also updated through the public release 2.4.0. Additional methodological details on the calibration procedure can be found in Devile and Särndal (1992).

Consider a finite population P={1, …, k, …, N} from which a probability sample $S \subset P$ is drawn according to a given sampling design. Let w_k be the original sampling design weight of the kth sample unit, and assume that only a sub-sample of respondents $R \subseteq S$ agree to participate to the survey. Following Devile and Särndal (1992), calibrated weights w_k^* can be obtained minimizing the sum of the distances

$$\sum_{k \in R} G(w_k^*, w_k)$$

subject to a set of J calibration equations

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

where $x_k = (x_{k1}, \ldots, x_{kJ})$ and $t_x = (t_1, \ldots, x_{kJ})$ are J-dimensional vectors of calibration variables and known population totals, respectively. Before release 2.4.0, the distance function between the original sampling design weight w_k and the calibrated weight w_k^* was arbitrarily taken as a chi-square distance function of the form,

$$G(w_k^*, w_k) = (w_k^* - w_k)^2 / w_k ,$$

On the one hand, this was a convenient choice since this distance function guarantees that calibrated weights exist with probability 1 and they have the following closed form expression

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

On the other hand, however, it was recognized that this distance function is unbounded and hence it is likely to give problems with the range of feasible values that calibrated weights can take. Depending on the chosen calibration margins, calibrated weights can be indeed negative or extremely large. Negative weights are inadmissible, while extremely large weights may lead to unrealistic estimates of various population domains.

To overcome these theoretical problems of the chi-square distance function, the new version of the calibration procedure is based on a bounded distance function of the following form (case 6 in Devile and Särndal 1992)

$$G(q_k) = (q_k - L) \log\left[(1 - L)^{-1} (q_k - L) \right] + (U - q_k) \log\left[(U - 1)^{-1} (U - q_k) \right],$$

where $q_k = w_k^* / w_k$, and L and U are constant coefficients such that $L < 1 < U$. If $G'(\cdot)$ is the first partial derivative of $G(\cdot)$ with respect to w_k^* and $F(\cdot)$ is the inverse of $G'(\cdot)$, then one can show that

$$F(v) = \frac{L(U-1) + U(1-L)\exp(Av)}{(U-1) + (1-L)\exp(Av)},$$

with $A = (U-L)/[(1-L)(U-1)]$. As shown by Devile and Särndal (1992), calibrated weights can be then computed in two steps. In the first step, one determines the vector of the Lagrange multiplies $\lambda = (\lambda_1, \ldots, \lambda_J)$ solving the system of first order conditions,

$$\sum_{k \in R} w_k \left[F(x_k^T \lambda) - 1\right] x_k = t_x - \sum_{k \in R} w_k x_k .$$

In the second step, one computes the calibrated weights using the following expression

$$w_k^* = w_k F(x_k^T \lambda).$$

Unlike the chi-square distance function, this distance function guarantees by construction that calibrated weights are bounded between Lw_k and Uw_k. The main drawback is that a solution to the optimization problem may not exist and in any case it depends on the choice of the distance function through the coefficients L and U. To handle this problem we use more than 400 distance function by choosing a grid alternative combinations of L and U. Among the distance function which lead to a solution to the above optimization problem, we then selected the pair (L,U) that gives calibrated weights w_k^* with minimum standard deviation.

Appendix 2 – National Sampling Design Forms[1]

Austria

Refreshment or baseline sample: Refreshment
Survey Institute: IFES GmbH
Country sampling contact: Andreas Bugnar
SHARE sampling expert: Sabine Häder
Reference survey: Finanzielle Lage österreichischer privater Haushalte (OeNB)
Date: 11 January 2011

Target population, Population coverage	All German speaking residents born 1960 or earlier and their spouses / partners at the time of interview independent of the spouse's/partner's age. The target population does not include those living in institutions.
Screening frame (if applicable)	Not applicable
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	Not applicable
Sampling frame	Stage 1: list of all Austrian Zählbezirke (Enumeration Areas) Stage 2: list of all dwellings with corresponding p.o boxes
Sampling frame problems	In Austria there are no addresses with data regarding persons aged 50+ available, therefore a screening inside the randomly drawn households and oversampling in general is necessary (because persons 50+ do not exist in every household). Due to legal reasons there is no access to the central household register (Zentrales Melderegister).
Sampling design	Stratified two stage probability sample: **First stage:** Random draws without replacement (inside Strata) from 8.745 Zählbezirke (Enumeration Areas). *Zählbezirk: smallest territorial unit of a collection of dwellings, a Zählbezirk contains on average around 450 dwellings* Zählbezirke are stratified according to NUTS 3 regions X sizes of settlement in Bundesland (chart below). Vienna is one NUTS 3 Region and is therefore divided in 23 districts. Sum is 193 Strata. Allocation of sample points is done proportional to population. **Second Stage:** Random draws without replacement (inside Zählbezirke) from dwellings (p.o. box code), source for p.o. box code is the Austrian Address Information System (Address register, including the numbers of all p.o. boxes), Identification of household corresponding to p.o. box code via companies databases or name bought from adress providers. Inside households with more persons aged 50+ we will choose the youngest within this group to compensate the panel-effect. According to data from Statistik Austria in about one of two households there is a person aged 50+. The regional distribution of the Panel-Households will be taken into consideration within the refreshment-sampling.

[1] Some forms displayed here may have been appended by national teams after they were gathered for publication.

<table>
<tr><td>Remarks</td><td>Overview NUTS 3 Regions in Austria:
<table>
<tr><th></th><th></th><th colspan="9">Population Size of Municipality</th></tr>
<tr><th>Province</th><th>NUTS3 Regions (districts for Vienna)</th><th>-2,000</th><th>-3,000</th><th>-5,000</th><th>-10,000</th><th>-20,000</th><th>-50,000</th><th>- 1 Mio</th><th>+ 1 Mio</th><th>Total</th></tr>
<tr><td>Vienna</td><td>23</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>23</td><td>23</td></tr>
<tr><td>Lower Austria</td><td>7</td><td>7</td><td>7</td><td>7</td><td>7</td><td>6</td><td>6</td><td></td><td></td><td>40</td></tr>
<tr><td>Burgenland</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>12</td></tr>
<tr><td>Styria</td><td>6</td><td>6</td><td>6</td><td>5</td><td>6</td><td>3</td><td>1</td><td>1</td><td></td><td>28</td></tr>
<tr><td>Carinthia</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td>1</td><td></td><td>16</td></tr>
<tr><td>Upper Austria</td><td>5</td><td>5</td><td>5</td><td>5</td><td>5</td><td>3</td><td>2</td><td>1</td><td></td><td>26</td></tr>
<tr><td>Salzburg</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td></td><td>1</td><td></td><td>15</td></tr>
<tr><td>Tyrol</td><td>5</td><td>5</td><td>5</td><td>4</td><td>4</td><td>3</td><td></td><td>1</td><td></td><td>22</td></tr>
<tr><td>Vorarlberg</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td></td><td></td><td>11</td></tr>
<tr><td>Total</td><td>57</td><td>34</td><td>34</td><td>32</td><td>32</td><td>22</td><td>10</td><td>6</td><td>23</td><td>193</td></tr>
</table></td></tr>
<tr><td>Auxiliary frame data that can be used by SHARE</td><td>Not applicable</td></tr>
<tr><td>Selection probabilities</td><td>to be determined later</td></tr>
<tr><td>Design weights</td><td>to be determined later</td></tr>
<tr><td>Expected individual response rate (for sampling purposes)</td><td>Vienna 50%, rest of Austria 65%

Based on the assumption of delivery of net 4.000 interviews are net ca. 2.500 households (factor for calculation of number of households is based on experience from last SHARE survey) and expected individual response rate (Vienna 50%, rest of Austria 65%).</td></tr>
<tr><td>Target sample sizes</td><td>Gross sample without oversampling: 4.113 households in 395 sample points (8 adresses in Vienna per sample point, 12 adresses rest of Austria per sample point).

Gross sample including oversampling: 8.226 households in 790 sample points (8 adresses in Vienna per sample point, 12 adresses rest of Austria per sample point).</td></tr>
</table>

Belgium
Refreshment or baseline: refreshment
Survey Institute: CELLO, University of Antwerp
Country sampling contact: Karel Van den Bosch
SHARE sampling expert: Peter Lynn
Reference survey:
Date: 27 October 2010

Target population, Population coverage	All residents speaking French or Dutch born 1962 or earlier, and their spouses/partners at the time of interview, living in the Belgian regions Brussels, Wallonia or Flanders. The target population does not include individuals living in the German-speaking communities in the east of Belgium (0.6% of the population). The target population does include individuals living in 'collective households', i.e. homes for the elderly.
Screening frame (if applicable)	No screening is necessary in Belgium
Screening frame problems (if applicable)	
Screening design (if applicable)	
Remarks	
Sampling frame	Stage 1: List of all municipalities in Wallonia, Flanders and Brussels (excluding the German-speaking municipalities); Stage 2: National Register of all persons resident in Wallonia, Flanders and Brussels.
Sampling frame problems	Persons do not always actually live at the registered address. Register information might be outdated since there is a time-lag between moving house and registering the new address.
Sampling design	**Two stage sampling of Refreshment sample born in 1960 or earlier.** ***Stage 1: Selection of municipalities.*** Data on the number of persons born in 1960 or earlier by municipality are used. These data are provided by Statistics Belgium. Municipalities are distributed across 11 strata, according to region and size, as follows: Brussels (capital region): one stratum. Flanders: five strata. The big cities Antwerp and Gent each form one stratum, the other municipalities are distributed across three strata, such that these strata have equal size in terms of the target population (born 1960 or earlier). The criterion for assigning municipalities to one of the three strata was its size in terms of the target population. Wallonia: five strata. The big cities Liège and Charleroi each form one stratum, the other municipalities are distributed across three strata, such that these strata have equal size in terms of the target population (born 1960 or earlier). The criterion for assigning municipalities to one of the three strata was its size in terms of the target population. The target sample sizes are distributed across the strata in proportion to the size of the strata in terms of the target population (born 1960 or earlier). This gives the target sample size n_s within each stratum s. The number of municipalities to be selected within each stratum m_s (except the four one-city strata) is determined by the formula: m_s = ROUND(n_s / 25), where 25 is the target cluster size. Within each of the strata (except in the four one-city strata) municipalities were selected proportional to size in terms of the target population, and

	without replacement. ***Stage 2: Selection of individuals / couples / households within each municipality.*** The sampling frame (national register) has information on the age, sex and 'relation to the reference person' of all individuals within each household. The program to select persons must be written and executed by the programmers of the National Register, which charges the costs of this programming to us. Given, therefore: - the need for a simple sampling procedure (to reduce costs and errors) - the information available - and the goal of an EPSEM sample (Equal Probability of Selection Probability) we devised the following method: - within each municipality, persons within the target population are sampled by simple random sampling (without replacement) - the spouse / partner of each selected person is identified, and his/her age is determined - if the spouse/partner belongs to the target population, the (original) person is marked as 'target-couple', otherwise she/he is marked as 'target-single'. - from the group marked as 'target-couple', half are deleted from the sample by simple random sampling - the selected persons, as well as their spouse/partners, if they belong to the target population, are retained as the final sample. It would have been more efficient (from a statistical point of view) to divide in advance the whole population within each municipality into two strata, 'target-couples' and 'target-singles', but this appeared not to be feasible. Two stage sampling of Refreshment sample: - born in 1957 - 1960 living in Wallonia or Brussels. n = 200. - born in 1955 - 1960 living in Flanders. n = 450. These individuals are selected within the municipalities selected for the original (2004) sample. The target sample numbers will be distributed across municipalities proportional to the size of the municipalities in terms of the target population (born in indicated age bracket). Selection of individuals will proceed in the same way as for the general refreshment sample.
Remarks	Given the limited budget for the survey, we minimize travel costs by using clusters of at least 25 individuals.
Auxiliary frame data that can be used by SHARE	Information on the structure of the population can be found at the website of the national statistical institute. These numbers can be useful when calculating calibrated weights since one can then take into account not only the population size, but also the age, sex and marital status distribution in the total population.
Selection probabilities (sampling plus screening, if applicable)	
Design weights	
Target response rate (for sampling purposes)	The minimum response rate is estimated to be 40% (based on refreshment sample response rates of previous waves).
Target sample size	The gross sample size equals 4422 individuals. Out of these 4422 individuals

	1654 persons are to be interviewed in the Dutch-speaking part of Belgium (Flanders), 2768 in the French-speaking part of Belgium (Wallonia and Brussels). The target net sample size is 2800 refreshment interviews in Belgium as a whole.

Switzerland
Refreshment or baseline sample: Refreshment sample
Survey Institute: Link Institute
Country sampling contact: Bryce Weaver
SHARE sampling expert: Sabine Haeder
Reference survey:
Date: 11 February 2011

Target population, Population coverage	Persons living in private homes will be considered. The main refreshment sample will be randomly selected from individuals born in 1960 or earlier. The supplementary or corrective sample will be selected amongst those born in the years 1957 - 1960, to compensate for their ineligibility in the previous refreshment sample.
Screening frame (if applicable)	Not applicable
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	
Sampling frame	The sampling frame is the Stichprobenrahmen für Personen- und Haushaltserhebungen (SRPH) managed by the 'Bundesamt für Statistik' (BFS). Due to concerns for the protection of data, the BFS will do the actual selection of the samples. The SRPH is a registry of all residents in Switzerland compiled from communal registries. As birth year is available in this registry, the samples will be randomly selected (in general without replacement) directly from the eligible population. This alleviates the need for screening, the saved resources will be applied toward increasing the effective numbers. For all individuals, the address is known in the registry. The selected individuals will be cross-referenced with telephone registries by the BFS. The addresses of all individuals will be delivered and, when legal by Swiss law to do so, the cross-referenced telephone numbers will be as well. The field work will be done by the Link Institute (LINK) in Switzerland.
Sampling frame problems	The biggest weakness with the SRPH is that it is new and currently untested. This is making it hard to predict response rates for SHARE. Other problems with the SRPH's relative youth is that certain, otherwise useful variables, are not yet reliable within some communities. This eliminates some alternative sampling options that would reduce the variance in selection probabilities. The main intrinsic weakness is that family relations are not known, and (in our context) that the variable for marital status is the legal one and not the co-residence indicator we use to define the partner. Given the uncertainties of this sampling frame there are several unknowns that are difficult to estimate reliably. This uncertainty is taken into account when developing the sampling plan. The main strategy is to include packets that can be released if certain response rates are not achieved.
Sampling design	Main refreshment sample: stratified one-stage random sample
Remarks	Because of the uncertainties about the frame, the two refreshment samples are divided into a certain number of packets. The first packet will be relatively larger than the subsequent reserve packets. A reserve packet is released when the response rate of the selected individual in the first packet falls below the threshold given in the tables (column “primary RR” in tables 8.2 and 8.1 in the document attached). The first threshold is set above what is believed to be attainable (as the first packet is automatically and is not considered a reserve packet).
Auxiliary frame data that can be used by SHARE	Not applicable

Selection probabilities (sampling plus screening, if applicable)	Not applicable
Design weights	to be determined later

Target response rate (for sampling purposes)	66.2% - 34.3%
Target sample size	Corrective sample: We wish to select a number of respondents, n_{corr} , that will give us the same order of magnitude for the weights between the original sample and this one. To do this, we estimate the number of individuals that are 54+ versus the number that are 50 - 53 by using compiled 2009 data from the official 'Statistique de l'état annuel de la population' (ESPOP). The respective numbers (needed only for a ratio) are 2220493 individuals 54+ and 439666 individuals 50-53. Using the number of projected respondents from the original sample, we seek that ncorr satisfies $n_{corr}/1100 = 439666/2220493$. $n_{corr}= 218$, which we round to the nearest 10 giving $n_{corr}=220$ Main sample: $n_{main}= 2300 - n_{corr} = 2080$
Remarks	The total number of interviews that can be conducted, given budget constraints, in both of the refreshment samples, is n=2300. The rate at which a responding individual will have a responding partner, is 0.33, the eligibility rate is 0.95.

Czech Republic
Refreshment or baseline sample: Baseline and Refreshment
Survey Institute: SC&C Ltd.
Country sampling contact: Pavlina Varutti, Michal Svoboda
SHARE sampling expert: Giuseppe De Luca
Reference survey:
Date: 07 December 2010

Target population, Population coverage	All households with at least one Czech speaking member born 1960 or earlier. All Czech speaking residents born 1960 or earlier and their spouses/partners at the time of the interview independent of the spouse's/ partner's age.
Screening frame (if applicable)	The sampling frame provides only information on the address of residence. A preliminary screening phase in the field is then needed to assess age-eligibility of the sampled units.
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	Individuals living in institutions for the elderly are excluded from the target population.
Sampling frame	The sampling frame is a list of all electoral districts in Czech Republic (Czech Statistical Office, 2009) plus a list of households/addresses in the selected electoral districts.
Sampling frame problems	The electoral register does not cover people living in institutions (homes for elderly, prisons or similar institutions), nationals who have lost their voting rights and non-citizens.
Sampling design	Czech republic is one of the countries who jointed SHARE in the 2006 wave of the study. The sample from the 2006 wave is a representative sample of the population born 1956 or earlier. It includes a main sub-sample of 4171 households and a vignette sub-sample of 2004 households. Both sub-samples were drawn using a three-stage sampling with selection of electoral districts in the first stage, selection of households/addresses in the second stage and screening for age-eligibility in the third stage. In the first stage, the 12466 electoral districts of Czech republic were classified in 21 strata by using the non-empty combinations of NUTS2 regional code (8 regions) and size of the municipality (3 groups: regional, middle and small municipalities).[2] After performing a preliminary factor analysis using the available and relevant socio-political information, the electoral districts of each stratum were ordered on the basis of their factor scores and then selected by systematic sampling with a fix step. The number of districts selected in each stratum was proportional to the total number of electoral districts, which was in turn strongly correlated with the size of the population in each stratum. In the second stage, a sample of about 40 households was drawn by simple random sampling within electoral each district selected in the first stage. Of these, about 27 households were randomly assigned to main sample and the remaining to the vignette sample. In few electoral districts where the size of the population was lower than 40 households, the overall district was included into the sample. In the third stage, a preliminary screening phase in the field was conducted by the interviewers to assess households with at least one individual born 1956 or earlier. All age-eligible household members, plus their spouses/partners independent of age, were considered to be eligible for the SHARE interview. The sample of the 2008 wave is just a follow-up of the sample from the 2006 wave and it does not include any new refreshment sample. The sample of the 2010 wave is a representative sample of the population born 1960 or earlier. In addition to the main and the vignette sub-samples from the

[2] Prague and Central Bohemia were classified in one and two strata respectively.

	2006 wave, it includes a new refreshment sub-sample of 8376 households drawn using a three-stage sampling design similar to that adopted in the 2006 wave. In the first stage, the 13194 electoral districts of Czech republic were classified in 23 strata by using the non-empty combinations of NUTS2 regional code (8 regions) and size of municipality (3 groups: regional, middle and small municipalities).[3] Within each stratum, electoral districts were ordered on the basis of their factor scores and selected by systematic sampling with a fix step. The number of districts selected in each stratum was again proportional to the total number of electoral districts. In the second stage, a sample of about 70 households/addresses was drawn by simple random sampling from each electoral each district selected in the first stage. In few electoral districts where the size of the population was lower than 70 households, the overall district was included into the sample. In the third stage, a preliminary screening phase in the field was conducted by the interviewers to assess households with at least one individual born 1960 or earlier. For households with more than one age-eligible person, the target person to be interviewed plus his/her partner/spouse (independent of age) were selected randomly by the Sample Management System. The other household members were not interviewed, even if age-eligible.
Remarks	Selection probabilities can only be computed for households completing the screening phase.
Auxiliary frame data that can be used by SHARE	None
Selection probabilities (sampling plus screening, if applicable)	Let $\pi_{ih}(w)$ be the probability of including person *i* of household *h* into the sample of wave *w* and denote by $\pi_h(w)$ the same probability for the whole household *h*. The probability of being included in the joint sample (i.e. main plus vignette) from the 2006 wave is $\pi_{ih}(w=1)=\pi_h(w=1)=\frac{d_t}{D_t}\frac{a_{dt}}{A_{dt}}I\left(n_h^{56}>0\right)$ where d_t and D_t are the target number of districts and the total number of districts in stratum t, a_{dt} and A_{dt} are the target number of addresses and the total number of addresses in district d of stratum t, n_h^{56} is the number of household members born 1956 or earlier, and $I(A)$ is the indicator function of the event A. Notice that, in the 2006 wave, all age–eligible household members were considered to be eligible for the SHARE interview. The probability of being included in the refreshment sample from the 2010 wave is: $\pi^*_{ih}(w=2)=\pi^*_h(w=2)=\frac{d_t}{D_t}\frac{a_{dt}}{A_{dt}}\frac{n_{ih}^{60}}{n_h^{60}}I\left(n_h^{60}>0\right)$ where n_h^{60} is the number of household members born 1960 or earlier, and $n_{ih}^{60}=1$ if the household member selected during the screening phase is single and $n_{ih}^{60}=2$ otherwise.
Design weights	Design weights in wave w are computed as the inverse of the underlying selection probability: $W_{ih}(w)=W_h(w)=\frac{1}{\pi_h(w)}$

[3] In this case, Prague and Central Bohemia were classified in three and two strata respectively.

Target response rate (for sampling purposes)	The expected household response rate is 58%.
Target sample size	The target sample size is 6000 interviews. The estimated number of longitudinal interviews is 1600, the expected response rate is 58%, the expected share of households with at least one individual born 1960 or earlier is 60% and 2 interviews are expected from about 50% of households. Thus, the size of the gross refreshment sample in wave 4 is 8376.

Denmark
Refreshment or baseline sample: Refreshment (Cohort)
Survey Institute: SFI-Survey
Country sampling contact: Karen Andersen-Ranberg
SHARE sampling expert: Peter Lynn
Reference survey: SHARE Wave 2
Date: 13 January 2011

Target population, Population coverage	All persons resident in Denmark in January 2011 and born in 1957-1960
Screening frame (if applicable)	Not applicable
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	
Sampling frame	Danish Population Register
Sampling frame problems	No serious problems. Some persons on the register (12%) are excluded from the frame as they have registered not to take part in research (so, some undercoverage).
Sampling design	Simple random sample of n = 563 persons (gross sample)
Remarks	
Auxiliary frame data that can be used by SHARE	
Selection probabilities (sampling plus screening, if applicable)	Equal probability, using same overall sampling fraction as wave 2 sample.
Design weights	W = 1.0 (relative to w2 sample)
Target response rate (for sampling purposes)	70%
Target sample size	390 interviewed (net sample)

Germany
Refreshment or baseline sample: Refreshment
Survey Institute: Infas (Institut für angewandte Sozialwissenschaft GmbH)
Country sampling contact: Birgit Jeske (Infas) / Annelies Blom (MEA)
SHARE sampling expert: Sabine Haeder
Reference survey: SHARE Wave 1
Date: 15 December 2010

Target population, Population coverage	All German speaking residents born 1960 or earlier and their spouses / partners at the time of interview independent of the spouse's/partner's age. The target population does not include those living in institutions.
Screening frame (if applicable)	Not applicable (no screening is necessary in Germany)
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	Not applicable
Sampling frame	Stage 1: List of all German municipalities Stage 2: Municipal population register
Sampling frame problems	Population figures used in the first sampling stage date from 31st December 2008. The proportion of persons living with a spouse or partner has been estimated fromSHARE wave 1. The municipal list of residents might include people who have moved away, but never informed the municipality about their move (especially if people moved abroad). The census test showed an over-/undercoverage of this frame of about 2%. Whether there is a partner/spouse to be interviewed is not known from the frame.
Sampling design	Stratified two-stage probability sampling Stratification: districts × regional size categories; 1,460 strata The data basis for the resident population will be provided by the Federal Statistical Institute. - Stage 1: Selection of 200 municipalities (PSUs). The municipalities are selected with probability proportional to the population size of the community (aged 50+ at 31st December 2008). This allocation ends up with 219 sample points since large cities have more than one sample point. The allocation is done by a controlled rounding procedure (Cox 1987). - Stage 2: In each of the sampling points, an equal size of individuals (44 per sample point, 9 born 1957-1960 and 35 born 1956 and earlier) will be selected (gross sample size = 9,636) from the local population register. 44 addresses per sample point should end up, with a response rate of about 31% and an ineligible rate of 10% in 4000/219= 18.3 interviews per sample point. Assumed is a factor of 1.5 interviews per individual address, i.e. additional interviews with a spouse or partner for 50% of the sampled individuals. Oversampling age cohort 1957-1960: In wave 1 individuals born 1954 and earlier were sampled. In wave 2 the refreshment sample oversampled persons born 1955 and 1956. In wave 4 we therefore oversample those born between 1957 and 1960. 14.62% of the population fall into this age bracket. In wave 1 the gross sample contained 3050 persons drawn from the register; in wave 2 the refreshment gross sample contained 1000 persons drawn from the register. In wave 4 we sample a total of 44*219=9636 individuals from the register, 35*219=7665 persons born 1956 and earlier (79.5%) and additonal 9*219=1971 persons born 1957-1960 (20.4%).

Remarks	MEA receives the full gross sample (including all names and addresses) before the start of fieldwork. This information was used to conduct checks on the contacting and interviewing procedures of the interviewers. SHARE Germany conducted respondent incentives, interviewer training and biomarker experiments. The gross sample was used to allocate the experimental groups.
Auxiliary frame data that can be used by SHARE	For the selected individuals of the gross sample sex, age and in some municipalities nationality. In addition, regional indicators.
Target sample sizes	Gross sample drawn from the register size n_gross_reg=44*219=9636 Expected gross sample size with partners n_gross=9636*1.5=14454 Expected response rate: 31% Ineligible rate: 10% n_net_reg=9636*0.31*0.9=2689 n_net=14454*0.31*0.9=4033 i.e. 4033/219=18.4 interviews per sample point (12.3 persons drawn from register and 6.1 partner/spouses) Oversampling (within above sample): From 44 individuals drawn in each sample point 9 have to be born 1957-1960 n_gross_reg_over=9*219=1971 Expected gross oversample size with partners n_gross=1971*1.5=2957 Expected response rate: 31% Ineligible rate: 10% n_net_reg_over=1971*0.31*0.9=550 n_net=2957*0.31*0.9=825 i.e. 825/219=3.7 interviews per sample point (2.5 persons drawn from register and 1.2 partner/spouses)

Estonia
Refreshment or baseline sample: baseline
Survey Institute: National Statistical Office of Estonia
Country sampling contact: Enn Laansoo Jr, Julia Aru
SHARE sampling expert: Annelies Blom
Reference survey:
Date: 28. July 2010

<table>
<tr><td>Target population, Population coverage</td><td>All Estonian speaking residents born 1960 or earlier and their spouses/ partners at the time of interview independent of the spouse's/ partner's age. Those living in institutions are not included.</td></tr>
<tr><td>Screening frame (if applicable)</td><td>Not applicable (no screening needed)</td></tr>
<tr><td>Screening frame problems (if applicable)</td><td>Not applicable</td></tr>
<tr><td>Screening design (if applicable)</td><td>Not applicable</td></tr>
<tr><td>Remarks</td><td>Not applicable</td></tr>
<tr><td>Sampling frame</td><td>Population Register. The frame includes all registered residents as of July 2010 born in 1960 or earlier. Persons with imprecise address are not included (ca. 1,2%).</td></tr>
<tr><td>Sampling frame problems</td><td>• The address on which an individual is registered is not always the address where the person lives.
• The sampling frame does not include telephone numbers. They have to be found using various directories.
• No frame information about household size.</td></tr>
<tr><td>Sampling design</td><td>Stratified sampling with simple random sampling of individuals within strata was used. Stratification was done by gender and year of birth.

Table 8.1. Sample and population size by stratum
<table>
<tr><th>Gender</th><th>Year of birth</th><th>Sample size (n_t)</th><th>Population size (N_t)</th></tr>
<tr><td>Male</td><td>- 1930</td><td>133</td><td>14546</td></tr>
<tr><td>Male</td><td>1931-1940</td><td>358</td><td>39174</td></tr>
<tr><td>Male</td><td>1941-1950</td><td>525</td><td>57509</td></tr>
<tr><td>Male</td><td>1951-1960</td><td>746</td><td>81610</td></tr>
<tr><td>Female</td><td>- 1930</td><td>410</td><td>44865</td></tr>
<tr><td>Female</td><td>1931-1940</td><td>686</td><td>75083</td></tr>
<tr><td>Female</td><td>1941-1950</td><td>747</td><td>81773</td></tr>
<tr><td>Female</td><td>1951-1960</td><td>895</td><td>97934</td></tr>
</table>

Within each gender-age stratum records are sorted by region to get better geographical allocation</td></tr>
<tr><td>Remarks</td><td>Prior to fieldwork sample will be double-checked with deaths register to exclude any possible deaths happened after sampling.</td></tr>
<tr><td>Auxiliary frame data that can be used by SHARE</td><td>Sex, age, address/region, number of persons aged 50+ living at the same address.</td></tr>
</table>

Selection probabilities (sampling plus screening, if applicable)	Let π_{ih} be the probability to include person *i* in household *h* into the sample and π_h the same probability for the whole household *h*. Note that here and after by household we mean a couple of a person selected from register and his/her spouse/partner (just single selected person in case he/she doesn't have a spouse/partner). So any other age-eligible persons living together with those two are not considered as part of their household. Let selected person belong to stratum *a* and his spouse/partner to stratum *b*. Recognising that strata are large and that any individual in a household has the same inclusion probability as its household, we have $\pi_{ih} = \pi_h = \begin{cases} \frac{n_a}{N_a}, \text{if no partner or partner not age-eligible;} \\ \frac{n_a}{N_a} + \frac{n_b}{N_b} - \frac{n_a}{N_a}\frac{n_b}{N_b}, \text{if partner is age-eligible} \end{cases}$
Design weights	$w_{ih} = w_h = 1/\pi_h$
Target response rate (for sampling purposes)	60% (including frame errors)
Target sample size	Target sample size is 3500 interviews. Expected response rate is about 60-65% and 2 interviews are expected from about 30% of households. Thus gross sample of 4500 persons is ordered from the register (plus ca 10% reserve to cover lower response rate if needed).

Spain
Refreshment or baseline sample: Refreshment
Survey Institute: TNS-Demoscopia/Instituto Nacional de Estadística (INE)
Country sampling contact: Laura Crespo, Pedro Mira
SHARE sampling expert: Giuseppe De Luca
Reference survey:
Date: 07 December 2010

Target population, Population coverage	All households with at least one Spanish speaking member born 1960 or earlier. All Spanish speaking residents born 1960 or earlier and their spouses/partners at the time of the interview independent of the spouse's/ partner's age.
Screening frame (if applicable)	Not applicable (no screening needed)
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	
Sampling frame	The sampling frame is a list of all census sections by municipality (in total some 33000) plus a population register of individuals born 1960 or earlier based on census and municipal registers managed by the National Statistical Office (INE).
Sampling frame problems	Dwellings with more than 20 individuals are removed from the sampling frame, so prisons and similar institutions do not appear. Small institutions for the elderly could instead be on the list. The sampling frame does not include information on household size and telephone numbers.
Sampling design	The sample of the 2004 wave is a representative sample of the population born 1954 or earlier. It includes a main sub-sample of 2849 individuals and a vignette sub-sample of 760 individuals. Both sub-samples were drawn using a two-stage sampling with selection of census sections in the first stage and selection of age-eligible individuals in the second stage. In the first stage, municipalities were classified in 7 strata on the basis of their population size. A stratified sample of 328 census sections was drawn using, within each stratum, systematic sampling with a random start and inclusion probabilities proportional to the population size of each census section. Of these, 259 census sections were assigned to the main sub-sample and the remaining were assigned to the vignette sub-sample. In the second stage, a sample of 11 age-eligible individuals was drawn using systematic sampling with a random start from each census section selected in the first stage. The sample of the 2006 wave is a representative sample of the population born 1956 or earlier. In addition to the two sub-samples from the 2004 wave, it includes a refreshment sub-sample of 506 individuals. The sampling design is similar to that adopted in the 2004 wave. In the first stage, a stratified sample of 46 census sections was drawn using a systematic sampling with a random start and inclusion probabilities proportional to the population size of each census section. In the second stage, a sample of 11 age-eligible individuals (of which 6 born 1954 or earlier and 5 born between 1955 and 1956) was drawn using systematic sampling with a random start from each census section selected in the first stage. Overall, the refreshment sub-sample from the 2006 wave includes 276 individuals born 1954 or earlier and 230 individuals born between 1955 and 1956. The sub-sample of 276 individuals born 1954 or earlier was entirely assigned to the vignette refreshment sub-sample. Of the 230 individuals born between 1955 and 1956, 173 were randomly assigned to the main refreshment sub-sample and 57 to the vignette refreshment sub-sample.

	The sample of the 2008 wave is just a follow-up of the sample from the 2006 wave and it does not include any new refreshment sample. The sample of the 2010 wave is a representative sample of the population born 1960 or earlier. In addition to the two sub-samples from the 2004 wave and the refreshment sub-samples from the 2006 wave, it includes a new refreshment sub-sample of 2131 individuals drawn using a sampling design similar to that adopted in the previous waves. The sample of primary sampling units consists of 118 census sections. In the second stage, a sample of 18 age-eligible individuals (of which 14 born 1956 or earlier and 4 born between 1957 and 1960) was drawn by systematic sampling with a random start from each census section selected in the first stage. Overall, the refreshment sample from the 2010 wave includes 1652 individuals born 1956 or earlier and 472 individuals born between 1957 and 1960.
Remarks	Selection probabilities can only be computed for responding households.
Auxiliary frame data that can be used by SHARE	Gender, year of birth, and province.
Selection probabilities (sampling plus screening, if applicable)	Let $\pi_{ih}(s;w)$ be the probability of including person *i* of household *h* into the sub-sample *s* of wave *w* and denote by $\pi_h(s;w)$ the same probability for the whole household *h*. The probability of being included in the sample from the 2004 wave is equal to the joint probability of being included in either the main or the vignette sub-samples. Assuming that the list of individuals adopted in the second stage of the sampling design was in random order, the probability of being included in sub-sample j (with $j=1$ for the main sub-sample and $j=2$ for the vignette sub-sample) is given by $\pi_{ih}(w=1,s=j)=\pi_h(w=1,s=j)=1-\left[1-n_t^j\frac{N_{ct}}{N_t}\frac{n_{ct}^{j,54}}{N_{ct}^{54}}\right]^{n_h^{54}}$ where n_t^1 and n_t^2 are the numbers of census sections drawn in stratum t for the main and the vignette sub-samples, N_{ct} is the total population size of census section c in stratum t, N_t is the total population size of stratum t, $n_{ct}^{1,54}=n_{ct}^{2,54}=11$ is target sample size of the second stage, N_{ct}^{54} is the size of the population born 1954 or earlier in census section c of stratum t, and n_h^{54} is the number of household members born 1954 or earlier. By treating the census sections of the main and the vignette sub-samples as drawn simultaneously, the selection probability for the joint sample of the 2004 wave is given by $\pi_{ih}(w=1)=\pi_h(w=1)=1-\left[1-(n_t^1+n_t^2)\frac{N_{ct}}{N_t}\frac{n_{ct}^{1,54}}{N_{ct}^{54}}\right]^{n_h^{54}}$ The probability of being included in the refreshment sub-sample from the 2006 wave ($j=3$) is equal to $\pi_{ih}(w=2,s=3)=\pi_h(w=2,s=3)$ $=1-\prod_{i=1}^{n_h^{56}}\left[1-n_t^3\frac{N_{ct}}{N_t}\left(I(A_i^{54})\frac{n_{ct}^{3,54}}{N_{ct}^{54}}+I(A_i^{55-56})\frac{n_{ct}^{3,55-56}}{N_{ct}^{55-56}}\right)\right]$ where n_h^{56} is the number of household members born 1956 or earlier, n_t^3 is the number of census sections drawn in stratum t for this refreshment sub-sample,

	$I\left(A_i^{54}\right)$ and $I\left(A_i^{55-56}\right)$ are binary indicators for individuals born 1954 or earlier and between 1955 and 1956, $n_{ct}^{3,54}=6$ and $n_{ct}^{3,55-56}=5$ are the target sample sizes adopted in the second stage for individuals born 1954 or earlier and between 1955 and 1956, and N_{ct}^{55-56} is the size of the population born between 1955 and 1956 in census section c of stratum t. The probability of being included in the refreshment sub-sample from the 2010 wave ($j=4$) is equal to $\pi_{ih}(w=4,s=4)=\pi_h(w=4,s=4)$ $=1-\prod_{i=1}^{n_h^{60}}\left[1-n_t^4\frac{N_{ct}}{N_t}\left(I\left(A_i^{56}\right)\frac{n_{ct}^{4,56}}{N_{ct}^{56}}+I\left(A_i^{57-60}\right)\frac{n_{ct}^{4,57-60}}{N_{ct}^{57-60}}\right)\right]$ where n_h^{60} is the number of household members born 1960 or earlier[4], n_t^4 is the number of census sections selected in stratum t for this refreshment sub-sample, $I\left(A_i^{56}\right)$ and $I\left(A_i^{57-60}\right)$ are binary indicators for individuals born 1956 or earlier and between 1957 and 1960, $n_{ct}^{4,56}=14$ and $n_{ct}^{4,57-60}=4$ are the sample sizes adopted in the second stage for individuals born 1956 or earlier and between 1957 and 1960, and N_{ct}^{56} and N_{ct}^{57-60} are the underlying population sizes.
Design weights	Design weights for wave w are computed as the inverse of the underlying selection probability: $W_{ih}(w)=W_h(w)=\frac{1}{\pi_h(w)}$
Target response rate (for sampling purposes)	60% (including frame errors)
Target sample size	The target sample size is 4000 interviews. The estimated number of longitudinal interviews is 2256, the expected response rate is 60%, the expected percentage of non-sample units is 9% and 2 interviews are expected from about 50% of households. Thus, the size of the gross refreshment sample in wave 4 is 2131.

[4] Notice that, according to the fieldwork rule of the 2010 wave, the household members considered to eligible for the interview are the age-eligible sampled person and his/her partner independent of age. Other age-eligible persons living in the same household are not eligible for the 2010 SHARE interview. This fieldwork rule implies that for single and couples with only one age-eligible partner and $n_h^{60}=2$ for couples with two age-eligible partners.

France
Country: France
Refreshment or baseline: Refreshment
Survey Institute: INSEE (Institut National de la Statistique et des Etudes Economiques)
Country sampling contact: VIGLINO Lionel (INSEE) / QUENUM Sylvain (INSEE)
SHARE sampling expert: Matthias Ganninger
Reference survey:
Date: 31 January 2011

Target population, Population coverage	- Eight regions in France: Île-de-France, Rhône-Alpes, Provence-Alpes-Côte d'Azur, Pays de la Loire, Aquitaine, Nord-Pas-de-Calais, Languedoc-Roussillon, Corse. - All individuals born between 1957 and 1960, and their spouses / partners at the time of interview whatever the spouse's / partner's age. - The target population does not include those living in institutions.
Screening frame (if applicable)	From the census, the birth date is used to select the individuals born between 01/01/1957 and 31/12/1960.
Screening frame problems (if applicable)	The Census does not provide the names of the individuals, but only the addresses of the dwellings.
Screening design (if applicable)	- The sample is a draw of dwellings, in which the interviewer will choose one inhabitant born between 1957 and 1960, and his eventual spouse/partner. - A dwelling represents the primary home all through this document. - A dwelling can be sampled if there is at least one inhabitant born between 1957 and 1960.
Remarks	Since the last edition of the panel Share in 2008, INSEE has built a new master sample based on the annual census and with new Interviewer Action Areas. But the interviewers have to return in the previous areas to re-interview the SHARE panel individuals, which represent the largest part of the sample. So it was necessary to keep those previous areas, hence it was not possible to use the current new master sample.
Sampling frame	The rolling population census. The 2009 annual census is itself a sample, with various weights within a large municipality. Nevertheless, each dwelling has the same weight.
Sampling frame problems	- The current census in France is an annual rolling one. And demographic results are built by compiling 5 annual censuses. So, the rolling areas of the census 2009 did not necessarily overlap with the former PUs from the 1999 master sample 1999, from which SHARE W1 and W2 samples were drawn. But it was possible to build an expansion coefficient with the last 2007 compiled results to pass from the dwellings in the rolling areas of census 2009, to the number of all dwellings that composed the PUs 1999.
Sampling design	The sample is drawn in 3-stages from a list of dwellings recorded at the 2009 annual census survey. In the first stage, the dwellings listed are located in primary units (PUs) constituting the Interviewer Action Areas in the former master sample from the 1999 census. <u>Stage 1: the primary units</u> The master sample 1999 is drawn from the 1999 general population census. The French territory is first divided into regions, then in five strata of primary units : - SG0 : rural communities or groupings of contiguous rural communities of 1800 to 3600 dwellings - SG1 : urban communities with less than 20000 inhabitants or groupings of such urban communities with at least 1800 dwellings - SG2 : urban units of 20000 to 100000 inhabitants - SG3 : urban units of more than 100000 inhabitants (except Paris) - SG4 : the urban unit of Paris.

	The PUs are drawn in each of these regional strata proportionally to the number of dwellings they have. (: the drawing procedure ensures an equal repartition between regions). The number of primary units drawn in SG0, SG1 and SG2 are respectively 128, 75 and 93 (i.e. a sampling rate of nearly 9%). For SG3 and SG4, all PUs are kept. Stage 2: the secondary units are the dwellings First, the resampling of the dwellings from census 2009 in order to give them the same weight within each PU. This resampling represents the new sampling frame. Then the dwellings are drawn in a stratified two-step sample, trying to obtain a self-weighted one. A first-step sample (sized 5000), which is drawn in a general population, is used for the coordination with the others surveys' samples. The second step sample (sized 500) is restricted to dwellings with at least one inhabitant born between 1957 and 1960. Stage 3: individuals The CAPI instrument selects a Kish individual born between 1957 and 1960, and his/her eventual spouse/partner.
Remarks	The PUs (and their selection probabilities) represent the demographic situation of France in 1999. The dwellings are drawn in the 2009 rolling annual census survey, and the expansion coefficients are built with the census compiled results 2007. So the final weights of Share should be calibrated.
Auxiliary frame data that can be used by SHARE	At the dwelling level: apartment building/ house, owner/tenant, house's surface, number of inhabitants
Selection probabilities (sampling plus screening, if applicable)	Definitions: - *i* represents one of the eight France regions covered by Share; - *j* represents one of the five strata of PUs ; - *k* represents a PU; - *m* represents a municipality. 1) Stage 1: Selection probability of PU k: π_{ijk} (they are given with the master sample 1999, and they were been calculated like that: $\pi_{ijk} = M_{ij} \frac{X_{ijk}^{99}}{X_{ij}^{99}}$ with: - M_{ij} : number of PUs drawn in the master sample 1999, within the region i and the stratum j ; - $X_{ijk}^{99} = \sum_{m} l_{ijkm}^{99}$: number of dwellings in the UP k (from census 1999) ; - $X_{ij}^{99} = \sum_{k,m} l_{ijkm}^{99}$: number of dwellings in the the region i and the stratum j (from census 1999).) 2) Stage 2: expansion coefficient within the UP k : r_{ijk} As the 2009 annual census 2009 is a rolling one, it does not contain all the municipalities that composed the UP k. So it is necessary to use an expansion coefficient :

$r_{ijk} = \frac{\sum_{m} l_{ijkm}^{09}}{\sum_{m} l_{ijkm}^{07}}$: the ratio of dwelling's number in the new sampling frame (from 2009 census) within the UP k, to the dwellings' number in all the municipalities that composed the UP k (from the 2007 census compiled results).

<u>expansion coefficient within the region i and stratum j:</u> t_{ij}

As the 2009 annual census 2009 is a rolling one, there are some UPs where no municipality is concerned by 2009 census . So it is necessary to use an expansion coefficient :

$t_{ij} = \frac{\sum_{k \in 09, m} \frac{l_{ijkm}^{07}}{\pi_{ijk}}}{\sum_{k,m} \frac{l_{ijkm}^{07}}{\pi_{ijk}}}$: the ratio of the dwellings' weighted sum in the UPs reached by the 2009 census within the region i and stratum j, to the dwellings' weighted sum in all the UPs contained in the region i and stratum j. The two numbers are calculated from the 2007 compiled census results.

<u>2-a) Step 1:</u>

Selection probability of a dwelling in the stratum ijk :

$$f_{ijk} = \pi_{ijk} \times r_{ijk} \times t_{ij} \times \frac{n_{ijk}}{X_{ijk}^{09}}$$

With:

- n_{ijk} : number of dwellings to draw in the stratum ijk ;
- $X_{ijk}^{09} = \sum_{m} l_{ijkm}^{09}$: number of dwellings in the new sampling frame (from census 2009) within the UP k.

<u>Self-weighted sample:</u>

To impose a self-weighted sample: $\forall i, \forall j, \forall k,\ f_{ijk} = f = \frac{5000}{\sum_{i,m} l_{im}^{07}}$

With :

- 5000 : all dwellings drawn in the first-stage sample;
- $\sum_{i,m} l_{im}^{07}$: all dwellings in the 8 regions (from census compiled results 2007).

So it's possible to calculate the size to draw in each stratum ijk :

$$n_{ijk} = \frac{5000 \times X_{ijk}^{09}}{\pi_{ijk} \times r_{ijk} \times t_{ij} \times \sum_{i,m} l_{im}^{07}}$$

	Finally, it is necessary to get a rounded size within each stratum ijk before making a simple random sampling. The rounding process does not modify much the self-weighted propriety. 2-b) Step 2: Within this 5000 sized sample, there are 539 dwellings with at least one inhabitant born between 1957 et 1960. Only these 539 dwellings are kept. The final sample is drawn by a simple random sampling in each stratum ijk with the same sampling rate $\frac{500}{539}$. The final dwellings' weight is the product of the weights of the two steps : $P_{ijk} = \left(\frac{1}{\pi_{ijk}} \frac{X_{ijk}^{09}}{n_{ijk}} \frac{1}{r_{ijk}} \frac{1}{t_{ij}} \right) \left(\frac{539}{500} \right)$ Step 1 Step 2 The 500 sized sample is nearly a self-weighted one. 3) Stage 3 : The CAPI instrument selects one inhabitant within the n^{ind} ones born between 1957 and 1960. The selection probability of an individual at the 3rd stage is $\frac{1}{n^{ind}}$ The probability of living with a spouse or partner for the age group 50+ in France is 0.4 (from census results).
Design weights	The final weight of the dwellings' sample is P_{ijk} For an individual born between 1957 and 1960 : $P_{ijk} \times \frac{n^{ind}}{1}$ For a spouse/partner : $\frac{P_{ijk} \times n^{ind}}{0.4}$
Target response rate (for sampling purposes)	69%
Target sample size	Net sample: 481 individuals (including partners/spouses) Gross sample: 500 persons (living in the 500 dwellings sampled from the 2009 rolling census) + approx. 200 partners/spouses

Hungary
Country: HUNGARY
Refreshment or baseline: BASELINE SAMPLE
Survey Institute: TARKI
Country sampling contact: Gabor Kezdi
SHARE sampling expert: Matthias Ganninger
Reference survey:
Date: 14 November 2012

Target population, Population coverage	The target population is the set of age-eligible individuals with Hungarian residence who speak Hungarian (non-Hungarian speakers are a negligible fraction of all residents). These are individuals who were born before December 31, 1960. The frame includes both institutionalized and non-institutionalized individuals.
Screening frame (if applicable)	Not applicable
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	Not applicable
Sampling frame	The Sampling frame is the list of individuals in the current population registry. The population registry of Hungary contains the name, address, gender and age of each resident of Hungary. The registry is based on the last census (from year 2001) and is updated by registered births, deaths and migration. It includes residents in private households as well as residents in institutional "households".
Sampling frame problems	There were no sampling frame problems. As the registry is based on the census, it gives us accurate information.
Sampling design	The sampling design is a stratified two-stage procedure, in which the inclusion probabilities are equal across strata.
Remarks	Stratification is by 2 dimensions: NUTS2 region and type of residence (city/town/village). The districts of Budapest (there are 23 of them) are treated as separate "towns" in the sense that the sample is stratified to them as well. The first stage is a sample of cities/towns/villages; the second stage is a sample of individuals (and their spouses). The first-stage sampling is with probability proportional to size (population) of the city/town/village. All large cities (i.e. settlements with an importance weight of 1 and over) are selected (including all districts of the capital, Budapest, separately), and the first-stage inclusion probability is proportional to the population size in the case of the smaller towns and the villages. The second stage inclusion probabilities compensate for the first-stage differences in order to get uniform (ex-ante) sampling probabilities at the household level. Recall that our sampling frame consists of age-eligible individuals. Therefore the sample we'll draw consists of individuals as well. Thus our case fits in group a) in the "SHARE Sampling Guide 2010" document (page 2.). Therefore the sample will consist of people in the original sample (of age-eligible individuals) and their spouses (regardless of their age).
Auxiliary frame data that can be used by SHARE	NUTS3

<table>
<tr><td>Selection probabilities (sampling plus screening, if applicable)</td><td>
<table>
<tr><td>Region</td><td colspan="4">Target sampling probabilities</td></tr>
<tr><td></td><td>Budapest</td><td>Cities</td><td>Smaller towns</td><td>Villages</td></tr>
<tr><td>1</td><td>0.0005533</td><td></td><td>0.0005544</td><td>0.0005524</td></tr>
<tr><td>2</td><td></td><td>0.0005464</td><td>0.0005515</td><td>0.0005570</td></tr>
<tr><td>3</td><td></td><td>0.0005591</td><td>0.0005548</td><td>0.0005506</td></tr>
<tr><td>4</td><td></td><td>0.0005526</td><td>0.0005531</td><td>0.0005546</td></tr>
<tr><td>5</td><td></td><td>0.0005582</td><td>0.0005531</td><td>0.0005555</td></tr>
<tr><td>6</td><td></td><td>0.0005571</td><td>0.0005556</td><td>0.0005526</td></tr>
<tr><td>7</td><td></td><td>0.0005486</td><td>0.0005555</td><td>0.0005513</td></tr>
<tr><td>Total</td><td></td><td>0.0005543</td><td>0.0005541</td><td>0.0005535</td></tr>
<tr><td>overall</td><td></td><td></td><td></td><td>0.0005538</td></tr>
</table>
</td></tr>
<tr><td>Design weights</td><td></td></tr>
<tr><td>Target response rate (for sampling purposes)</td><td>We targeted a response rate higher than 60%. Empirical evidence also suggested that the response rate for Budapest and cities is lower than for smaller towns and villages.</td></tr>
<tr><td>Target sample size</td><td>2000 households, 3000 individuals</td></tr>
<tr><td>REMARKS</td><td>During the fieldwork we realized that the quality of some of our interviews were low. Households with low quality interviews have been substituted in the same NUTS2 region and the same type of residence (in Budapest the same district). For having these new sample members we extended our whole sample. Both stages of our (stratified two-stage) sampling design were repeated again with fewer cases: the first stage was a sample of settlements (the selection of cities, towns and villages) and the second stage was the sample of individuals. Thus our gross sample size was boosted, but the selection probabilities remained the same as in the table above.</td></tr>
</table>

Portugal
Refreshment or baseline sample: Baseline
Survey Institute: GfK
Country sampling contact: Alice Delerue A. Matos
SHARE sampling expert: Giuseppe De Luca
Reference survey:
Date: 17 November 2010

Target population, Population coverage	All households with at least one Portuguese speaking member born 1960 or earlier. All Portuguese speaking residents born 1960 or earlier and their spouses/partners at the time of the interview independent of the spouse's/ partner's age.
Screening frame (if applicable)	Not applicable (no screening needed)
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	
Sampling frame	The sampling frame is a population register of individuals born 1960 or earlier from the National Health System.
Sampling frame problems	For each unit of the sampling frame there is an address attached. However, the sampling frame does not include the names of individuals using the National Health System. This means that it is not possible to identify the household member originally selected for the interview and the auxiliary sampling frame information does not necessarily refer the person effectively selected for the interview. Because of this problem, the Portuguese sampling frame is treated as a sampling frame of households. For each sampled households, we only know that there should be at least one person age 50+. The address on the health register may not coincide with the address where people live. For example, some people may change address without updating the health register because they want to avoid medical appointments in a different medical centre or with a different doctor. The address (i.e. the 7 digits zip code) is missing for about 5.8 percent of the units originally included in the sampling frame. These units were excluded from the sampling frame because it is not possible to know the region to which they belong. According to some consistency tests, there are no statistically significant differences in the age and sex distributions of the units included and excluded from the sampling frame. The sampling frame may not cover eligible individuals who are not registered on the Nation Health System. The extent of this coverage error is unknown, but it is expected to be very small. The sampling frame includes people living in institutions. The sampling framing does not always contain information on telephone numbers. The sampling framing does not contain information on household size.
Sampling design	Portugal is one of the countries who jointed SHARE in the 2010 wave of the study. The sampling design is a five-stage sampling with selection of 4-digit zip codes in the first stage, selection of parishes in the second stage, selection of 7-digit zip codes in the third stage, selection of addresses in the fourth stage, and screening for age-eligibility in the fifth stage. Details on these five stages are given below: **Stage 1:** Portugal was stratified in 22 sub-regions by using the 20 non-empty combinations of region (7 regions) and size of the 50+ population within the region (3 groups: less than 10000 inhabitants, between 10000 and 20000 inhabitants, and more than 20000 inhabitants), plus Madeira and Azores which

	were treated as separate strata.[5] One 4-digit zip code was then selected by simple random sampling from each sub-region. **Stage 2:** From each 4-digit zip code selected in stage 1, a sample of parishes was drawn with probability proportional to the number of their 7-digit zip codes. Notice that a parish may in general belong to more than one 4-digit zip code. In these cases, we considered only the portion of the parish which belongs to the 4-digit zip code selected in stage 1. **Stage 3:** From each parish selected in stage 2, a sample of 7-digit zip codes was drawn using simple random sampling.[6] **Stage 4:** From each 7-digit zip code selected in stage 3, a sample of (no more than 20) addresses was drawn using systematic sampling with a random start. Overall, the size of the samples drawn at stages 2, 3 and 4 was determined such that the number of addresses in each sub-region was proportional to the size of the corresponding 50+ population. The only exceptions are: (i) the two sub-regions of Madeira and Azores where number of selected addresses is proportional to five times the size of the 50+ population, and (ii) the two sub-regions of "Sul Interior" where number of selected addresses is proportional to two times the size of the 50+ population. **Stage 5:** A screening phase in the field was carried out by the interviewers through the SHARE Sample Management System in order to select randomly the age-eligible household member to be interviewed. The partner/spouse of the selected household member was interviewed independent of age, while the other household members were not interviewed even if age-eligible.
Remarks	
Auxiliary frame data that can be used by SHARE	Date of birth, gender and region.
Selection probabilities (sampling plus screening, if applicable)	Let π_{ih} be the unconditional inclusion probability of individual *i* in household *h* and denote by π_h the same probability for the whole household *h*. We also further denote by *s* an indicator for strata, *z* an indicator for 4-digit zip codes, *p* an indicator for parishes, *t* an indicator for 7-digit zip codes and *a* an indicator for addresses. In stage 1, the inclusion probability for the 4-digit zip code *z* in stratum *s* is given by $\pi_{z|s} = \frac{1}{Z_s},$ where Z_s denotes the total number of 4-digit zip codes in stratum *s*. In stage 2, the inclusion probability for the parish *p* in (*z*, *s*) is given by $\pi_{p|zs} = p_{zs} \frac{T_{pzs}}{T_{zs}},$ where p_{zs} is the number of parishes selected in (*z*, *s*), T_{pzs} is the total number of 7-digit zip codes in (*p*, *z*, *s*), and T_{zs} is the total number of 7-digit zip codes in (*z*, *s*). Notice that, for parishes belonging to more than one 4-digit zip code, T_{pzs} refers to the number of 7-digit zip codes of parish *p* which also belong to the 4-digit zip code *z* of stratum *s*.

[5] This stratification resulted in only one empty sub-region, namely "Sul interior" with population size greater than 20000 inhabitants aged 50+.
[6] Of course, 7-digit zip codes are finer geographical partitions of the 4-digit zip codes selected in stage 1.

	In stage 3, the selection probability for the 7-digit zip code t in (p, z, s) is given by $\pi_{t\|pzs} = \frac{t_{pzs}}{T_{pzs}},$ where t_{pzs} is the number of 7-digit zip codes selected in (p, z, s). In stage 4, the inclusion probability for address a in (t, p, z, s) is given by $\pi_{a\|tpzs} = \frac{a_{tpzs}}{A_{tpzs}},$ where a_{tpzs}=min(20, A_{tpzs}) is the number of addresses selected in (t, p, z, s), and A_{tpzs} is the total number of addresses in (t, p, z, s). In stage 5, the inclusion probability of individual i in (a, t, p, z, s) is given by $\pi_{i\|atpzs} = \frac{n_{atpzs}}{N_{atpzs}},$ where N_{atpzs} is the number of age-eligible individuals living in (a, t, p, z, s) and n_{atpzs} is equal to 1 if the age-eligible household member selected during the screening phase is single, and is equal to 2 otherwise. The unconditional inclusion probabilities of individual i and household h can be obtained by multiplying the conditional probabilities of these five stages: $\pi_{ih} = \pi_h = \pi_{i\|atpzs}\pi_{a\|tpzs}\pi_{t\|pzs}\pi_{p\|zs}\pi_{z\|s}$.
Design weights	$w_{ih} = w_h = 1/\pi_h$
Target response rate (for sampling purposes)	The target response rate is 60% at the individual level
Target sample size	The target sample size is 2000 interviews. The expected response rate is 60%, the expected percentage of non-sample units is 10% and 2 interviews are expected from about 50% of households. The size of the gross sample is 2507.

Italy
Refreshment or baseline: Refreshment
Survey Institute: DOXA S.p.A
Country sampling contact: Danilo Cavapozzi
SHARE sampling expert: Peter Lynn
Reference survey: SHARE wave 1 and wave 2
Date: 10 June, 2011

Target population, Population coverage	The target population of individuals consists of all Italian-speaking residents born in 1960 or earlier and their spouses/partners. The target population does not cover individuals who are incarcerated, hospitalized, institutionalized or out of Italy during the whole fieldwork period.
Screening frame (if applicable)	Not applicable (no screening is necessary in Italy)
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	The sampling design for the wave 4 refreshment sample derives from the one used in the previous SHARE data-collections run in Italy. See Paccagnellla and Bowater (2004), *SHARE: The Italian Sampling Design – Wave 1*, mimeo.
Sampling frame	Stage 1: List of all Italian municipalities Stage 2: List of electoral divisions from the Italian Ministry of Interior Stage 3: Gender specific municipal electoral registers
Sampling frame problems	The electoral registers do not cover people in institutions such as hospitals and nursing homes (unless they officially reside at their old address), nationals who have lost their voting rights (e.g. convicted criminals), non-citizens and does not capture temporary changes of address. Overall, the excluded individuals amount to about 5% of the total Italian population, but a large share is below 50 years of age.

Sampling design	Three-stage sampling Stage 1: Selection of municipalities Municipalities are stratified by population size 50+ as of 2009 (large, medium and small municipalities) and by geographical location (North-West, North-East, Centre, South and Islands). Overall, we define 15 strata.. We select 93 municipalities. The large municipalities included in the gross-sample are the 11 largest municipalities in terms of 50+ population. The remaining 82 medium and small municipalities to select are drawn by simple random sampling without replacement from each stratum. Stage 2: Selection of electoral divisions within municipalities For electoral purposes, municipalities are divided up into smaller regions known as electoral divisions, containing roughly the same number of people eligible to vote. The general aim is to select 4 electoral divisions by simple random sampling without replacement from the divisions in each sampled municipality. For the large municipalities of Rome, Milan, Turin and Naples we select 16, 12, 8 and 8 electoral divisions respectively. These sample size ratios have been used since the wave1 baseline data-collection. They are based on the 50+ population resident in these municipalities. If a municipality is made up of 1, 2 or 4 electoral divisions, all these divisions will be selected. If a municipality is made up of 3 electoral divisions, 2 divisions will be selected. Selection is always made using simple random sampling without replacement. Stage 3: 2-phase sampling of individuals within electoral divisions In each electoral division, electoral registers are gender specific and include all individuals eligible to vote, regardless of their age. It should be noticed that for each individual in the electoral registers we know name, age, gender and the address. The information in the electoral registers is updated on a regular basis (about every 6 months). *First phase* In the first phase we use simple random sampling without replacement to select a sample of 30 males and a sample of 30 females of any age from each electoral division. Finally, individuals aged less than 50 are deleted from the list of individuals sampled. *Second phase* Simple random sampling without replacement is used to select the individuals to include in the gross-sample from the list obtained at the end of the first phase. In general, the gross- sample at the end of this second phase will include 25 individuals (11 males and 14 females) from each selected municipality. In the cases of Rome, Milan, Turin and Naples we will include, respectively, 100 individuals (44 males and 56 females), 75 individuals (33 males and 42 females), 50 invididuals (22 males and 28 females) and 50 individuals (22 males and 28 females) in the gross-sample. Our sampling design is name based. We use the name of the initially-selected elector aged 50 or over as the sample person and then include in the survey the household containing that person. In each household, we will consider eligible for the interview the initially selected elector aged 50 or over and her

spouse/partner regardless of his age. No other household members will be interviewed, even if aged 50 or over.

Throughout this document, the sampling units are then defined as
the initially selected elector if she is single;
the initially selected elector and her spouse if the selected elector has a cohabiting partner.

Oversampling of the cohorts 1957-1960

The refreshment sample has two components: a random sample representative of the population of individuals 50+ in 2010 and the oversampling of the cohorts 1957-1960 needed to keep the overall gross-sample (refreshment + longitudinal) representative of the 50+ population in 2010. Indeed, individuals in these cohort were excluded from the sampling design of previous waves since they were no age-eligible at that time.

Let R be the the number of individuals included in the gross- sample at the end of the three-stage sampling, Y the number of those born between 1957 and 1960 (it includes the oversampling for these cohorts) and A the number of those born between 1956 or earlier.

$$R \quad Y \quad A$$

where

$$Y \quad \frac{P}{1 \quad P} n^{06}_{56} \quad Pn^{10}_{60}$$

$$A \quad (1 \quad P)n^{10}_{60}$$

$$P \quad \frac{N^{06}_{57,58,59,60}}{N^{06}_{57,58,59,60} \quad N^{06}_{56}}$$

n^{06}_{-56} is the number of households in the current longitudinal gross-sample of wave4 (2369);
n^{10}_{-60} is the number of households in the gross-sample representative of the 50+ population in 2010 (i.e. the refreshment gross-sample minus the oversampling);

$N^{06}_{57,58,59,60}$ is the number of individuals born between 1957 and in 1960 living in Italy in 2006;
N^{06}_{-56} is the number of individuals born in 1956 or earlier living in Italy in 2006.

In Italy, P=0.13 (calculation based on the numbers of the National Statistical Institute).

To achieve our targets (see below), we estimate R to be equal to 2500 (i.e. we draw 2500 individuals according to the three- stage sampling scheme described above):
601 individuals born between 1957 and 1960;
1899 individuals born in 1956 or earlier.

Remarks	Our interviewers are instructed to contact sampling units living in medium and small municipalities who have moved to a new address in the same municipality (whenever the new address is retrieved); sampling units living in large municipalities who have moved to a new address in the same district (whenever the new address is retrieved).
Auxiliary frame data that can be used by SHARE	Gender, year of birth.
Selection probabilities (sampling plus screening, if applicable)	Stage 1: Selection of municipalities Let us define M_S as the number of municipalities in a given stratum s =1,…15. From each stratum s we select m_S municipalities using simple random sampling without replacement. The selection probability for a given municipality m in a stratum s is $P_{m\|S}$ and depends on m_S and M_S. For each stratum s we know both m_S and M_S, then $P_{m\|S}$ can be always calculated. Note that $P_{m\|S}$ is equal to 1 for all municipalities in the strata including large municipalities. The number of municipalities m_S to be drawn in each stratum s is proportional to the share of Italian 50+ living in that stratum. Stage 2: Selection of electoral divisions within municipalities Let us define D_m as the number of electoral divisions in a given municipality m selected at the first stage. From each municipality m we select d_m electoral divisions using simple random sampling without replacement. The selection probability for a given electoral division d in a municipality m is $P_{d\|m}$ and depends on d_m and D_m. This probability is conditional on the selection of the municipality m at the first stage. For each selected municipality m, we know both d_m and

	D_m, then $P_{d\|m}$ can be always calculated. $P_{d\|m}$ =1 if D_m=1, 2 or 4 =2/3 if D_m=3 =4/D_m if D_m>4 Stage 3: 2-phase sampling of individuals within electoral divisions The third-stage selection probability of a sampling unit h included in the electoral division d is named $P_{h\|d}$ and depends on I_d= total number of persons aged 50-53 on the electoral registers in the selected electoral division d in municipality m; J_d= total number of persons aged 54+ on the electoral registers in the selected electoral division d in municipality m; i_d= number of persons aged 50-53 selected in to the gross-sample in municipality m; j_d= number of persons aged 54+ selected in to the gross-sample in municipality m. $Ph\|d$ =2i_d/I_d if the sampling unit h consists of two persons aged 50-53; =2j_d/J_d if the sampling unit h consists of two persons aged 54+; =(i_d/I_d)+(j_d/J_d) if the sampling unit h consists of two persons, one aged 50-53 and one 54+; =i_d/I_d if the sampling unit h consists of a single person aged 50-53; =j_d/J_d if the sampling unit h consists of a single person aged 54+. We record 1. the number of people included in each electoral register considered; 2. the number of people 49-, 50-53 and 54+ selected from each electoral register considered; 3. the number of people 50-53 and 54+ selected from each electoral register considered and included in the gross-sample (this allows calculating i_d and j_d). Notably, for 21 out of 93 sampled municipalities, the electoral registers are available in electronic format. For all these municipalities we can record I_d and J_d directly. For the remaining municipalities, I_d and J_d are not available but they can still be estimated on the basis of the recorded information described at points 1 and 2 of the list reported above. By the design of SHARE, the probability of selecting the sampling unit members is equal to the probability of selecting the sampling unit*. If we define $P_{h\|dms}$=$P_{m\|s}$· $P_{d\|m}$· $P_{h\|d}$ as the probability of selecting a given sampling unit h from the electoral division d of the municipality m, the probability of selecting each sampling unit member j is $P_{jh\|dms}$=$P_{h\|dms}$.

	* see De Luca and Rossetti (2008), *Sampling Design and Weighting Strategies in the Second wave of SHARE*, in Health, Ageing and Retirement in Europe (2004-2007). Starting the Longitudinal Dimension, editors A. Börsch-Supan, A. Brugiavini, H. Jürges, A. Kapteyn, J. Mackenbach, J. Siegrist and G. Weber, pp. 331-336, Mannheim: MEA.
Design weights	The design weight for a given sampling unit *h* included in the electoral division *d* of the municipality *m* is the inverse of its selection probability. If $w_{h\|dms}$ is the design weight of the sampling unit *h*, we have $w_{h\|dms}=1/P_{h\|dms}$. The design weight for each sampling unit member in a given sampling unit *h* is equal to $w_{h\|dms}$.
Target household response rate (for sampling purposes)	Our target is the achievement of a household response rate of 60%.
Target sample size	Our target is to conduct 1,929 individual interviews.

The Netherlands
Refreshment or baseline sample: Refreshment
Survey Institute: TNS NIPO
Country sampling contact: Marjolein Zonjee (TNS NIPO)
SHARE sampling expert: Matthias Ganninger
Reference survey: not applicable
Date: 15 September 2011

Target population, Population coverage	Sample from 26 municipalities in the Netherlands. Alkmaar Alphen ad Rijn Bergen op Zoom Enschede Goes Hilversum Lelystad Steenwijkerland Tytsjerksteradiel Amersfoort Beemster Bernheze Den Haag Den Helder Emmen Kampen Kerkrade Leeuwarden Leidschendam-Voorburg Moordrecht Nijkerk Rotterdam Slochteren Tilburg Utrecht Zwolle Dutch speaking residents of the 26 municipalities Born 1960 or earlier at the time of interview and their partners, independent of age. The target population includes those living in institutions.
Screening frame (if applicable)	Not applicable (no screening is necessary in the Netherlands, because names, addresses and ages of household are known in municipal administration).
Screening frame problems (if applicable)	Not applicable.
Screening design (if applicable)	Not applicable
Remarks	Not applicable
Sampling frame	29 municipalities are part of the longitudinal sample. We've asked these 29 municipalities to deliver a refreshment sample for Wave 4. 26 municipalities were willing to deliver a refreshment sample. The samples from the municipalities contained information about the sex and age of the target persons. So simple random sampling of individuals was possible.
Sampling frame problems	3 municipalities were not willing to deliver a sample

Sampling design	Stage 1: Contacting 29 municipalities. Stage 2: 26 municipalities were willing to deliver a refreshment sample with: - 25 households with at least 1 person born 1957 - 1960 - 34 households with at least 1 person born in or before 1956 Stage 3: Preparing refreshment gross sample: random selection of 22 or 23 households per municipality for cohort 1957 – 1960 random selection of 31 or 32 households per municipality for cohort <1957 Stage 4: Checking and preparing addresses for fieldwork.
Remarks	We've sent CentERdata the sample data to check the sample.
Auxiliary frame data that can be used by SHARE	
Selection probabilities (sampling plus screening, if applicable)	
Design weights	
Target response rate (for sampling purposes)	50% response on individual level for refreshment sample 1,5 individuals per household
Target sample size	Net sample refreshment: 1045 individuals Gross sample refreshment: 1395 households (592 cohort 1957-1960, 803 cohort <1957).

Sweden
Refreshment or baseline sample: Refreshment
Survey Institute: Intervjubolaget IMRI
Country sampling contact: Per Johansson, Daniel Hallberg
SHARE sampling expert: Giuseppe De Luca
Reference survey:
Date: 01 October 2010

Target population, Population coverage	All households with at least one Swedish speaking member born 1960 or earlier. All Swedish speaking residents born 1960 or earlier and their spouses/partners at the time of the interview independent of the spouse's/ partner's age.
Screening frame (if applicable)	Not applicable (no screening needed)
Screening frame problems (if applicable)	Not applicable
Screening design (if applicable)	Not applicable
Remarks	The target population includes individuals living in institutions for elderly, but not those who live in prisons or similar institutions.
Sampling frame	The sampling frame is the population register NAVET of the Swedish tax authority (Skatteverket). It includes all registered residents as of 2011-02-16 born in 1956 or earlier.
Sampling frame problems	The sampling frame does not include individuals who have a protected and secret identity and address (less than 0.1 percent of the total population). The address on which a person is registered is not always the address where the person lives. For instance, immigrants may *de facto* have returned to their home countries but are still registered as residents in Sweden. Another example is persons in bad health who live somewhere else than their old home at the registered address. The sampling frame does not include information on household size and telephone numbers. The latter have to be found using various directories. In case of household split, the population register NAVET cannot be used to find contact information on the new household of a spouse/partner who was age-eligible at the time of sampling. In such circumstances, contact information must be obtained during field work by approaching the original sampled person.
Sampling design	The sample of the 2004 wave is a representative sample of the population born 1954 or earlier. It includes a main sub-sample of 3150 individuals, a supplementary sub-sample of 950 individuals and a vignette sub-sample of 600 individuals. Main and supplementary sub-samples were drawn in two different periods using stratified sampling with simple random sampling of individuals within strata. Stratification was done by gender and year of birth. Sample and population size by strata are provided in Tables 8.1 and 8.2 respectively. The vignette sample was drawn using a stratified two-stage sampling design with regions as primary sampling units and individuals born 1954 or earlier as secondary sampling. In the first stage, primary sampling units were stratified in 5 strata (Stockholm, Gothenburg, Malmö, plus the southern and the northern parts of Sweden). The three largest regions (Stockholm, Gothenburg and Malmö) formed three separate strata and were included with certainty. From the fourth stratum (i.e. the southern part of Sweden) 9 of 48 regions were randomly selected, while 4 of 19 regions were randomly selected from the fifth stratum (i.e. the northern part of Sweden). In the second stage, individuals were randomly drawn from each region selected in the first stage. The sample size used in the second stage was constant for all regions within the same stratum $(n_1 = 107; n_2 = 53; n_3 = 34; n_4 = 34; n_5 = 25)$.

	The sample of the 2006 wave is a representative sample of the population born 1956 or earlier. In addition to the three sub-samples from the 2004 wave, it includes a new refreshment sub-sample of 624 individuals which was drawn using a stratified sampling with simple random sampling of individuals within strata.[7] As for the first wave, stratification was done by gender and year of birth. However, it was based on a finer partition of the year of birth to account for oversampling of individuals born between 1955 and 1956. The relevant sampling design information is provided in Table 8.3. The sample of the 2008 wave is just a follow-up of the sub-samples from the first two waves and it does not include any new refreshment sample. Due to lack of funds, the sample of the 2010 wave is also a follow-up of the sub-samples from the first two waves and it does not include any new refreshment sample.
Remarks	The sample of the 2010 wave does not include a refreshment sample because of lack of funds.
Auxiliary frame data that can be used by SHARE	Gender, year of birth, marital status, number of children, if immigrant and country of origin.
Selection probabilities (sampling plus screening, if applicable)	Let $\pi_{ih}(s;w)$ be the probability of including person *i* of household *h* into the sub-sample *s* of wave *w* and denote by $\pi_h(s;w)$ the same probability for the whole household *h*. The probability of being included in the sample from the 2004 wave is equal to the joint probability of being included in one of its three sub-samples: main, supplementary and vignette. As for the main and the supplementary sub-samples, it is worth noticing that strata are large, household members can belong to different strata, and any age-eligible household member has the same inclusion probability as the whole household. Thus, the probability of being included in one of these two sub-samples ($s=1$ for the main sub-sample and $s=2$ for the supplementary sub-sample) is $\pi_{ih}(w=1;s)=\pi_h(w=1;s)=\left[1-\prod_{i=1}^{n^*_{h,54}}\left(1-\frac{n_{t(i)s}}{N_{t(i)s}}\right)\right]I(n^*_{h,54}>0),$ where $n^*_{h,54}$ is the number of household members born in 1954 or earlier, $n_{t(i)s}$ and $N_{t(i)s}$ are the target number of sample units and the total number of population units in stratum $t(i)$ for sub-sample *s* (see Tables 8.1 and 8.2), and $I(A)$ is the indicator function of the event A. Here, strata are functions of *i* because they depend on gender and year of birth of the age-eligible household members. As for the vignette sub-sample, it is worth noticing that all age-eligible household members belong to the same region. Thus, the probability of being included into the vignette sub-sample is $\pi_{ih}(w=1;s=3)=\pi_h(w=1;s=3)=\left[1-\left(1-\frac{r_{t(h)}}{R_{t(h)}}\frac{n_{r(h)}}{N_{r(h)}}\right)^{n^*_{h,54}}\right]$ where $r_{t(h)}$ and $R_{t(h)}$ are the target number of regions and the total number of regions in stratum $t(h)$, $n_{r(h)}$ and $N_{r(h)}$ are the target number of 50+ individuals and the total number of 50+ individuals in region $r(h)$, and $n^*_{h,54}$ is the number of household members born in 1954 or earlier. The inclusion

7 The sample of the second wave does not include any refreshment for the supplementary sub-sample because it was considered as part of the main sub-sample.