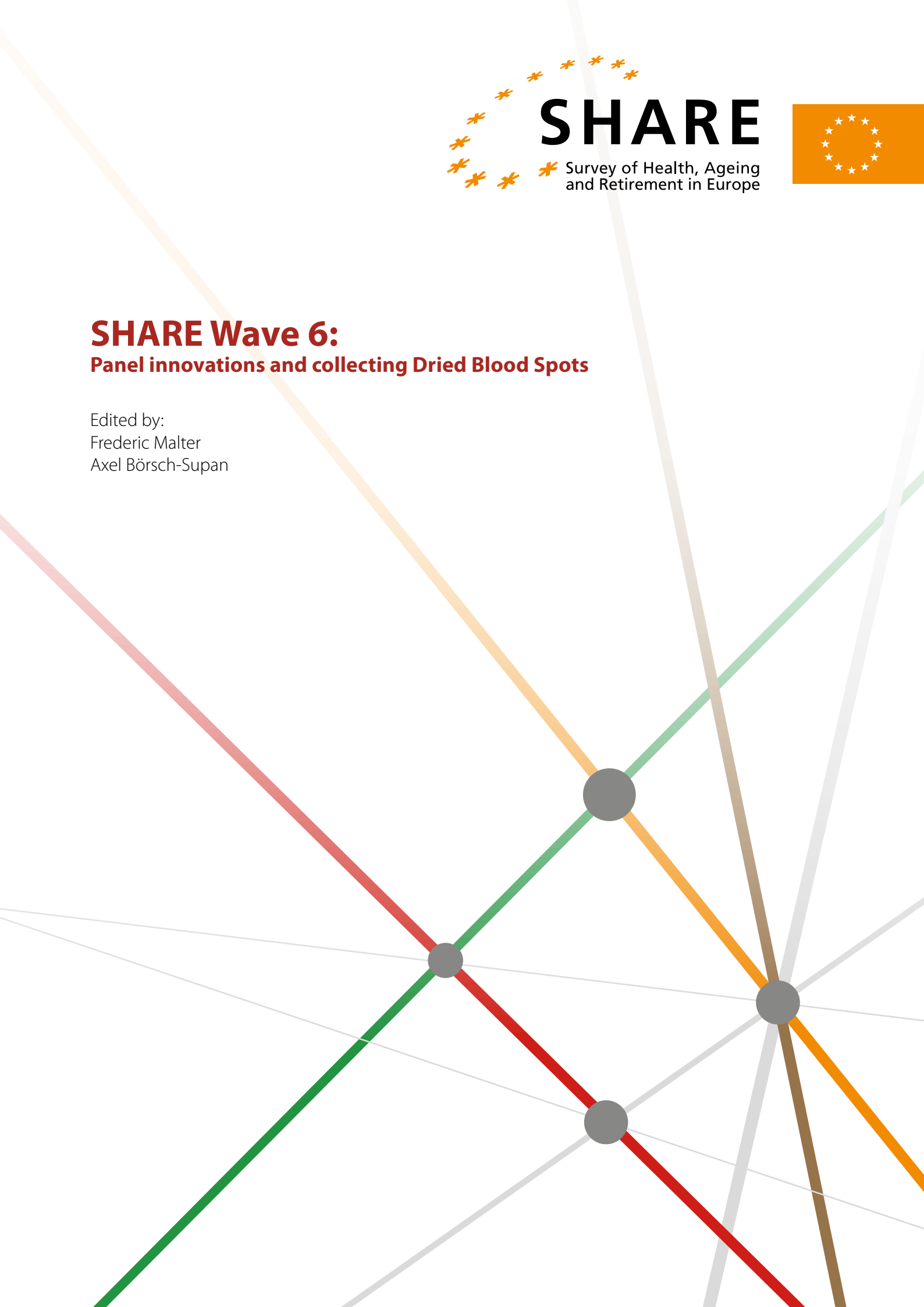
SHARE
Survey of Health, Ageing and Retirement in Europe

SHARE Wave 6:
Panel innovations and collecting Dried Blood Spots

Edited by:
Frederic Malter
Axel Börsch-Supan



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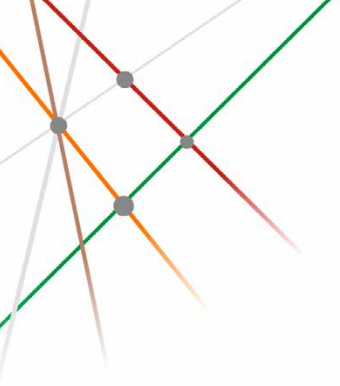

1 SHARE Wave 6: Panel innovations and collecting Dried Blood Spots

Axel Börsch-Supan and Frederic Malter, Munich Center for the Economics of Aging (MEA) at the Max Planck Institute for Social Law and Social Policy (MPISOC)

This volume documents the most important questionnaire innovations, methodological advancements and new procedures introduced during the sixth wave of the Survey of Health, Ageing and Retirement in Europe (SHARE). SHARE's main aim is to provide data on individuals as they age and their environment in order to analyse the process of individual and population ageing in depth.

The questionnaire of Wave 6 remains stable with respect to the major areas of life of our respondents and the research interests of our scientists, namely health status and health behavior, socio-economic matters like work, retirement, income and wealth, social networks, cognitive functioning, the use of health care, a number of psychological variables (e.g. mental health, well-being, life satisfaction), and many more. The key innovation of Wave 6, however – a truly cutting-edge endeavour – was the inclusion of the Dried Blood Spots data collection with lay interviewers. Accordingly, a substantial part of this volume will deal with this innovation (see chapter 6).

At the end of Wave 6 in November 2015, roughly 71,000 interviews were collected from individuals aged 50 or over (and their partners irrespective of age) in 19 countries. Croatia (HR) was the only country entering SHARE with a baseline sample in Wave 6.

1.1 Innovations and methodology in Wave 6

This report is structured along the major innovations we introduced in the sixth wave of SHARE, putting a strong emphasis on all matters related to the collection of Dried Blood Spots (see chapter 6).

The introduction of Dried Blood Spots into the sixth wave of SHARE presented all involved collaborators with brand new challenges not encountered in any previous SHARE wave. As such, the preparations for this part of the SHARE questionnaire pre-dated the actual kick-off which commenced at the SHARE meeting in September 2013 in Zurich, Switzerland. At that meeting, the SHARE consortium took stock of its current strength and weaknesses in governance and funding, and first proposals were made with regard to questionnaire changes. For example, the responsible scientists proposed the introduction of a job coding tool into the questionnaire (see chapter 2.3 of this volume), introduction of a new way to measure alcohol consumption, (see chapter 2.2) and the dropping of several items on oral health. Several other proposals on questionnaire changes were discussed which did not make it to the final version of Wave 6 (e.g. the introduction of a personality measure on the "Big Five" personality dimensions) and are thus not a topic of this report.

The next iteration of questionnaire design was entered with the meeting of the Questionnaire Board in Liege, Belgium, in November of 2013. By that time, we had obtained a general review of the English language questionnaire from an external collaborator which was given to the Area Coordinators for their further review.

In January 2014, the generic English questionnaire was frozen and made available to the country teams through the translation management tool (TMT). At the end of the development cycle, all countries conducted pilot interviews in February 2014. A the SHARE meeting in March 2014 in Ohalo, Israel, the consortium together with the Scientific Management Board (SMB) discussed the findings and implications for further questionnaire design. In June and July of 2014, SHARE countries conducted pretest interviews and all involved actors gathered experience in a fully-fledged, albeit small data collection that closely resembled the actual fieldwork of the main data collection. A brief summary of all major new content that was ultimately included in the sixth wave of SHARE can be found in the introduction of chapter 2.

After another round of revisions to the generic English questionnaire and the national-language questionnaires, the data collection of Wave 6 started in February of 2015 and lasted until November 2015. All efforts and outcomes of fieldwork management are described in chapter 5 of this volume. Due to complications and delays with (not) obtaining national funding, the Netherlands had to improvise and conducted a mixed-mode experiment with a web survey rather than a full implementation of SHARE. Details can be found in chapter 5. Many others also struggled to obtain national (co-)funding in the run-up to Wave 6 but others were remarkably successful and their funding enabled them to do refreshment sampling. Michael Bergmann, Giuseppe De Luca, and Annette Scherpenzeel describe all aspects of defining our population, sampling frames and related statistics in their chapter on sampling (chapter 4).

As was true for every previous SHARE wave, we again engaged in some major revisions of our software tools. Iggy van de Wielen, Maurice Martens and Arnaud Wijnant describe all major innovation in their chapter on software updates (chapter 3).

The closing chapter of this book deals with all matters related to the planning, conducting and analyzing of the DBS, the key innovation of SHARE's sixth wave. Martina Börsch-Supan and Karen Andersen-Ranberg lay the foundation in chapter 6.1 on the scientific concepts and merits of this large-scale operation. Daniel Schmidutz and Luzia Weiss document legal, ethical and organizational aspects in chapter 6.2. Outcomes of fieldwork – most notably consent rates and acceptance of the DSB procedure by respondents and interviewers were written up by Sabine Friedel, Luzia Weiss in chapter 6.3. Finally, Sabine Friedel, Martina Börsch-Supan, and Luzia Weiss summarize the status quo of analyzing the DBS samples at the time of writing (fall of 2017) in chapter 6.4.

1.2 SHARE ERIC update

SHARE became the first European Research Infrastructure Consortium (ERIC) in March 2011 and – considered as implemented – was deemed a "success story" in the 2010 ESFRI Roadmap and in the 2016 ESFRI Roadmap as "ESFRI landmark".

SHARE-ERIC has now thirteen members: Austria, Belgium, the Czech Republic, France, Germany, Greece, Hungary, Italy, Israel, the Netherlands, Poland, Slovenia and Sweden, with Switzerland as observer. Croatia, Denmark, Estonia, Lithuania, Luxembourg, Portugal, and Spain are not yet members, but partner countries within the SHARE Consortium. In 2016 all so far missing continental EU member state countries joined the SHARE Consortium: Bulgaria, Cyprus, Finland, Latvia, Malta, Romania, and Slovakia.

1.3 Acknowledgements

As in previous waves, our greatest thanks belong first and foremost to the participants of this study. None of the work presented here and in the future would have been possible without their support, time, and patience. It is their answers which allow us to sketch solutions to some of the most daunting problems of ageing societies. The editors and researchers of this book are aware that the trust given by our respondents entails the responsibility to use the data with the utmost care and scrutiny.

The country teams are the backbone of SHARE and provided invaluable support: Rudolf Winter-Ebmer, Nicole Halmdienst and Michael Radhuber (Austria); Tim Goedeme, Koen Decancq, Daniela Skugor, Martine Vandervelden, Jorik Vergauwen (Belgium-NL), and Sergio Perelman, Stephanie Linchet, Jean-François Reynaerts, Laurent Nisen, Marine Maréchal, Xavier Flawinne and Jérôme Schoenmaeckers (Belgium-FR); Šime Smolić, Ivan Čipin, Anđelko Akrap, Veda Varnai (Croatia); Radim Bohacek, Michal Kejak and Jan Kroupa (Czech Republic); Karen Andersen-Ranberg and Jørgen Lauridsen (since Wave 8), Mette Lindholm Eriksen and Astrid Roll Vitved (Denmark); Luule Sakkeus, Kaia Laidra, Tiina Tambaum, Liili Abuladze, Orsolya Soosaar, Kati Karelson, Ardo Matsi, Maali Käbin, Lauri Leppik, Anne Tihaste, Lena Rõbakova and the whole team of Statistics Estonia, who carried out the fieldwork (Estonia); Marie-Eve Joël and Florence Jusot (since Wave 7), Anne Laferrère, Nicolas Briant, Romain Sibille, Ludivine Gendre and Emily Bourgeat (since Wave 7) (France); Annette Scherpenzeel, Felizia Hanemann and Michael Bergmann (Germany); Antigone Lyberaki, Platon Tinios, Tassos Philalithis, Clive Richardson, George Papadoudis, Thomas Georgiadis (Greece); Howard Litwin, Lahav Karady and Noam Damri (Israel); Guglielmo Weber, Elisabetta Trevisan, Martina Celidoni, Andrea Bonfatti, Marco Bertoni (Italy-Padua) and Agar Brugiavini, Giacomo Pasini, Danilo Cavapozzi, Raluca Elena Buia (Italy-Venice); Maria Noel Pi Alperin, Gaetan de Lanchy, Jordane Segura (LISER) and Wim van Oorschot (KU Leuven) (Luxembourg); the Dutch Internet experiment was made possible through provided funds by the Netherlands Organisation for Scientific Research (NWO), Ministry of Social Affairs and Employment, Erasmus University Rotterdam, Free University Amsterdam, Maastricht University, Netspar (Tilburg University), University of Amsterdam, University of Groningen, and Utrecht University; Michał Myck, Monika Oczkowska, Mateusz Najsztub, Dominika Duda and Michał Kundera (Poland); Alice Delerue Matos, Pedro Pita Barros, Katiusce Perufo, Fátima Barbosa, Cristina Barbosa, Patrícia Silva (Portugal); Pedro Mira, Laura Crespo and Yarine Fawaz (Spain); Josep

Garre-Olmo, Laia Calvò-Perxas, Secundí López-Pousa and Joan Vilalta-Franch (Spain, Girona); Gunnar Malmberg, Mikael Stattin, Filip Fors and Jenny Olofsson (Sweden); Carmen Borrat-Besson (FORS), Sarah Vilpert (IUMSP), Jürgen Maurer (HEC), Alberto Holly (HEC) and Peter Farago (FORS) (Switzerland); Boris Majcen, Vladimir Lavrač, Saša Mašič, Andrej Srakar and Sonja Uršič (since Wave 7) (Slovenia).

The innovations of SHARE rest on many shoulders. The combination of an interdisciplinary focus and a longitudinal approach has made the English Longitudinal Survey on Ageing (ELSA) and the US Health and Retirement Study (HRS)[1] our main role models. We are grateful to James Banks, Carli Lessof, Michael Marmot and James Nazroo from ELSA; to Jim Smith, David Weir and Bob Willis from HRS; and to the members of the SHARE Scientific Monitoring Board (Arie Kapteyn, chair, Orazio Attanasio, Lisa Berkman, Nicholas Christakis, Mick Couper, Finn Diedrichsen, Michael Hurd, Annamaria Lusardi, Daniel McFadden, Pierre Pestieau, Norbert Schwarz, Andrew Steptoe, Arthur Stone and Robert Willis) for their intellectual and practical advice, and their continuing encouragement and support.

We are very grateful to the contributions of the four area coordination teams involved in the design process. Guglielmo Weber (University of Padua) led the economic area with Agar Brugiavini, Anne Laferrère, Giacomo Pasini and Elisabetta Trevisan. The health area was led by Karen Andersen-Ranberg and assisted by Mette Lindholm Eriksen and Camilla Riis Nielsen (University of Southern Denmark). Health care and health services utilization fell into the realm of Hendrik Jürges (University of Wuppertal) and Florence Jusot (as of Wave 7). The fourth area, family and social networks, was led by Howard Litwin from Hebrew University with assistance from Ella Schwartz, Noam Damri and Maayan Levinson.

The coordination of SHARE entails a large amount of day-to-day work which is easily understated. We would like to thank Kathrin Axt, Corina Lica, and Andrea Oepen for managing SHARE ERIC and SHARE finances, Stephanie Lasson, and Hannelore Henning at MEA in Munich for their administrative support throughout various phases of the project. Martina Brandt (and her successor Thorsten Kneip) and Frederic Malter acted as assistant coordinators and constituted the backbone to coordinating, developing, and organizing Wave 6 of SHARE. Preparing the data files for the fieldwork, monitoring the survey agencies, testing the data for errors and consistency are all tasks which are essential to this project. The authors and editors are grateful to Johanna Bristle, Christine Czaplicki, Christine Diemand, Fabio Franzese, Stefan Gruber, Felizia Hanemann, Christian Hunkler, Markus Kotte, Julie Korbmacher, Gregor Sand, Daniel Schmidutz, Morten Schuth, Stephanie Stuck, Melanie Wagner, Luzia Weiss, and Sabrina Zuber for questionnaire development, dried blood spot logistics, data cleaning and monitoring services at MEA in Munich. We owe thanks to Giuseppe de Luca and Claudio Rosetti for weight calculations and imputations in Palermo and Rome.

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1 HRS is the SHARE‚sister' study in the United States of America.

The fieldwork of SHARE relied in most countries on professional survey agencies: IFES (AT), CELLO, Univ. de Liège (BE), Link (CH), SC&C (CZ), TNS Infratest (DE), DST Survey (DK), GfK (EE), TNS Demoscopia (ES and sub-study in the Region of Girona), GfK-ISL (FR), Kapa research (GR), GfK (HR), Cohen Institute (IL), Ipsos (IT), CEPS-INSTEAD (LU), TNS Polska (PL), CECS (PT), Ipsos Observer (SE), and Ipsos (SI). We thank their representatives for a productive and successful cooperation. We especially appreciate their constant feedback, the many suggestions, their patience in spite of a sometimes arduous road to funding, and their enthusiasm to embark innovative survey methods and contents. Much gratitude is owed to the nearly 2000 interviewers across all countries whose cooperation and dedication was, is and will be crucial to the success of SHARE.

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2 Questionnaire innovations of the sixth wave of SHARE

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We start this chapter with an overview of cuts and additions of the sixth wave of SHARE over the fifth wave. In Table 2.1 below (organized by modules in alphabetical order), it can be seen that there were substantial changes in the questionnaire content of Wave 6 when compared to Wave 5.

In the run-up to each SHARE wave, efforts are made at so-called "smoothing" of the questionnaire which refers to changes that are not necessarily content innovations but mostly methodological improvements, sometimes not even visible in the released data. To give one example of such "smoothing efforts" that did become visible in the released data we report here the remedy of an issue within the Children module (CH, see table 2.1 below) which had to do with identifying how a child is related to the respondent (couple).

The children module (CH) collects detailed information about the respondents' children. One aspect is the so-called "child relation". A child can be related to a parent by birth, adoption, or can be a foster child. These relations can differ between the two individuals of couples that are interviewed for SHARE. For example, a child can be a natural child of one respondent and adopted by the partner of that respondent. Furthermore, the questions on children are answered by only one of the respondents on behalf of the couple in order to save interview time and to reduce interview burden. The assessment of the child relations is complex and had some flaws in the past. For example, when partners had children from previous relationships, it was unknown whether the child of the partner was adopted by the respondent or not, a potentially important question for SHARE-using researchers of family sociology. For this reason, the questions on the relation between the respondent, the partner, and the children (items CH002, CH010 and CH011) needed to be replaced by a cascade of simple yes/no questions.

First, we made sure that the most common case was covered: are all children natural children from both partners (item CH302)? In 88% of interviews of Wave 6 this was the case. Only for the remaining 12% of interviews a follow-up question asked to indicate which children were not natural children of both partners (item CH303). Then, for each of these remaining children (not a natural child of both partners) it was asked whether the child was a natural child of the respondent (item CH102), a natural child of the current partner (item CH103), a child of a former relationship of the respondent (item CH104), a child of a former relationship of the current partner (item CH105), whether the child was adopted by the respondent (item CH106), by the current partner (item CH107), and whether the child was a foster child (item CH108). This cascade of questions stopped as soon as the relation of the child to both partners was clear.

Table 2.1. Changes in the content and amount of items between Wave 5 and Wave 6

Module	Change over Wave 5	Number of items with differences between W5-W6
Assets (AS)	Dropped item on reasons respondent did not own a bank account	−1
Behavioral Risk (BR)	Revision of questions regarding smoking, drinking and nutrition	−5
Dried Blood Spots (BS)	New Module on Dried Blood Spots (DBS)	+9
Children (CH)	New way of asking for the relation between child and partner of respondent	+7
Consumption (CO)	Shortening of module regarding financial shortcomings	−5
Chair Stand & Peak Flow (CS/PF)	Chair Stand rotated with Peak Flow	−2
Employment and Pensions (EP)	Cut of long intro texts, easier way for asking about occupational pensions and income sources	−7
Expectations (EX)	Revision of partner questions	−1
Financial transfers (FT)	New questions to link persons with SN and CH	+8
Health Care (HC)	Revision and new wording of questions regarding medical treatment	+2
Household (HH)	Dropped items regarding access to public places (Social Exclusion items)	−6
Housing (HO)	Revision and change of questions regarding accommodation payments	−1
Interviewer observations (IV)	Shortening of module	−2
Mini-Childhood (MC)	Module dropped (for details see methodology volume of SHARE Wave 5)	−15
Mental Health (MH)	Beck Anxiety Scale dropped	−5
Physical Health (PH)	Revision and new ways of asking about physical health	−1
Social Networks (SN)	New questions to link persons with SP and CH	+7
Social Support (SP)	New questions to link persons with SN and CH	+10
End of life interview (XT)	Revision and addition of questions regarding palliative care services and physical disability	+4

The detailed information was then made available in an easier format in the generated variables children module, which is a new service to the SHARE users. More information to the module "gv_children" can be found in paragraph 14.14 of the SHARE release guide.

All in all, the new way of assessing child relations yields complete information on child relations to the family respondent and the partner, and the new generated variables module on children makes this information more easily accessible to SHARE users.

In the following subchapters, the authors provided details on questionnaire innovations so a brief summary down below will suffice to set the stage for these detailed reports. Note that all questions regarding the collection of DBS, including adaptations to the CAPI questionnaire, have been addressed in an entirely separate chapter of this volume.

Ella Schwartz, Howard Litwin and Markus Kotte lay out all details of the first longitudinal version of the ego-centric social network module that was introduced to SHARE in Wave 4 (2010) in its baseline version. Obviously, social networks of respondents change and these changes can have profound impacts on people's lives. The longitudinal version of Wave 6 will allow an assessment of new confidants as well as confidants who disappeared between Wave 4 and Wave 6, including the reasons for their disappearance.

Karen Andersen-Ranberg, Camilla Riis Nielsen, Melanie Wagner, and Frederic Malter describe their efforts at improving the measurement of self-reported alcohol use by providing a method with country-specific pictograms of typically consumed alcoholic beverages. It is a response to the very cursory assessment of alcohol consumption in previous waves of SHARE that was deemed insufficient for two key reasons: its inability to address country-specific variation of alcohol consumption in the participating SHARE countries and the cognitive burden of respondents when they were asked to average their consumption across types of alcohol and frequency of consumption. Both shortcomings were deemed serious risks to measurement error.

The last contribution of advancements in questionnaire design comes from Agar Brugiavini, Michele Belloni, Maurice Martens, and Raluca Elena Buia. The authors introduce us to a brand-new tool within the SHARE questionnaire, the so-called "job coder". It is a small software tool that enables lay interviewers to quickly and efficiently map an open answer given by a respondent to a job title coded through the International Labour Organization's standardized job title classification system, called International Standard Classification of Occupations (ISCO). In essence, it enables researchers to work with fine-grained job titles and create better measures of socioeconomic status than was possible with previous occupational measurement in SHARE.

2.1 Measuring Social Network and network changes in SHARE Wave 6

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2.1.1 Introduction

Social networks are the collection of personal ties that individuals variously maintain and from which they gain a range of benefits, supports and services. These networks are related to health and well-being across the life course and they are particularly important in older age. Given the significance of the social network construct for both science and for policy, SHARE initiated a new module for the measurement of social network in its fourth wave, which took place in 2010.

The SHARE Social Network Module (SN) was based principally on the approach that was employed in the National Social life, Health and Aging Project, in the United States. The inventory in question applies a name generating mechanism in which respondents identify the people who are important to them and then subsequently add information on each person (up to seven named). The data obtained from this procedure have allowed the computation of a wide range of variables, all of which are detailed in the SHARE Wave 4 book on "Innovations and Methodology" (Litwin, Stoeckel, Roll, Shiovitz-Ezra, & Kotte, 2013).

Moreover, SHARE's SN module went beyond the NSHAP model and uniquely incorporated identification of the social ties that were involved in social exchange as well, that is, the financial and/or time transfers in which people engage. As such, the SHARE Project has been the only large database thus far to address the social networks of its respondents in relation to socio-economic aspects as well as in relation to socio-emotional facets. The SHARE SN data have also facilitated the construction of composite measures of the social network phenomenon, which have been variously employed in order to better understand the role of the interpersonal milieu through a range of outcomes that are relevant in late life.

The sixth wave of SHARE has revisited the domain of social network with the inclusion of an expanded SN module, which serves as the focus of the current chapter. As will become apparent in the following sections, the SHARE Wave 6 SN Module offers several new additions. First, as in the NSHAP model, the Wave 6 SN module allows investigators to trace the changes that have occurred in respondents' respective networks since the prior administration of the inventory four years earlier. The variables that facilitate such comparisons are outlined in a separate section of this chapter. Second, the Wave 6 SN Module increased the number of probes asked about each named network member, probes that are termed "name interpreters" in the social network methodological literature. The additional name interpreters available in the Wave 6 data are also spelled out in the current chapter. Finally, the Wave 6 administration of the expanded SN module also extended the number of respondents for whom the SN data were collected. The countries and the individuals thus added are also detailed and described.

2.1.2 The Wave 6 Social Network (SN) module

As in SHARE Wave 4, the SN module in Wave 6 starts with the interviewer asking the respondent "Over the last 12 months, who are the people with whom you most often discussed important things?" The respondent is permitted to provide a list of up to six names. Following that, the respondent is invited to mention one additional person who is important to him or her "for some other reason." Additional information is then asked about each of the individuals listed in the network roster. The persons named in the roster will be referred to as "social network members" throughout this chapter. The name interpreters that were asked in Wave 4 include role relation categories, gender, residential proximity, frequency of contact and emotional closeness. Wave 6 introduced three additional name interpreters, namely the year of birth of each person named, their occupational status and their partner status. Finally, as in Wave 4, respondents are asked to rank their overall satisfaction with their social network on a single global measure that ranges from 0-10.

In order to save interview time, some name interpreter questions were skipped in Wave 6 on certain categories of social network members. Specifically, skipping occurred if the same information was available from questions asked elsewhere in the interview. In such cases, the relevant information was linked during the data cleaning stage. Thus, respondents were not asked about the gender, residential proximity, partner status, occupational status and year of birth of any of their children who were named in the SN inventory, as the same information is solicited in the CH module. Similarly, respondents were not asked the year of birth, occupational status and partner status of their spouse, if the spouse was named in the SN name generator, as that information is available from other modules or from the spouse's interview. In a similar vein, respondents were not asked about the residential proximity, contact frequency and year of birth of parents who were named in the name generator, as that information was available from the DN module (more information on this procedure is available in Table 2.5). Moreover, confidants who were reported to live with the respondent were automatically assumed to have daily contact.

The Wave 6 SN module also inquired about linkage between persons named in Waves 4 and 6 (only in the case of respondents who also participated in Wave 4, of course). This procedure was modelled after the one used in NSHAP, with some modifications. Following the identification of the Wave 6 roster (i.e. the list of persons named), respondents were shown a list of their Wave 4 social network members on the computer screen by name and role relationship (an example of such a screen appears in Figure 2.1). The bottom of the screen displayed a list with the names of the Wave 4 roster that was previously reported. Respondents were asked to indicate next to each of the people named in Wave 4 (shown at the bottom of the screen) the number they were assigned in the Wave 6 roster (which is shown at the middle section of the same screen).

If a person named in Wave 4 was not mentioned again in Wave 6, he or she was given the value of 96. Respondents were then asked the reason for not naming that person again. The response options were:

1. I forgot, should have been included
2. I moved
3. Named person moved
4. Named person died
5. I became ill or had a health problem
6. Named person became ill or had a health problem

7. Respondent does not recognize the named person
8. We are no longer close
9. Wrong, named person WAS mentioned this time
97. Other reason (specify – open ended question).

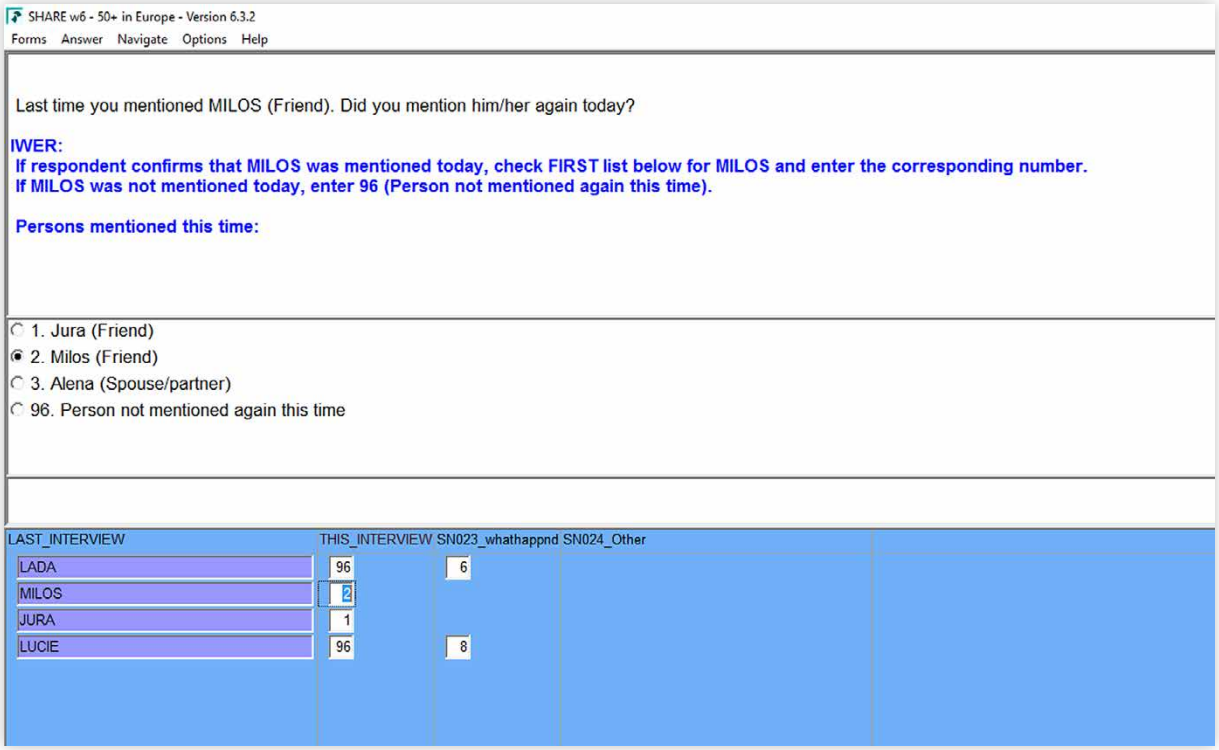

Figure 2.1. Linking Wave 4 and Wave 6 social network members (CAPI screenshot)

SN linkage with Financial Transfer module and Social Support module

As in Wave 4, persons named in the SN roster in Wave 6 were linked with information in the modules that queried financial transfers (FT) and social support (SP). The data in question identify who was involved in the exchange of financial and social support with the respondent (that is, who was the giver or receiver of money and/or time transfers). This allows the investigator to distinguish between support exchanges with members of the social network (i.e. those named in the SN name generator) and support exchanges with other persons (i.e. people who were not named in the SN inventory).

It should be pointed out that the Wave 6 linkage process in this matter was carried out differently than the way in which it was handled in Wave 4. In Wave 4, the identification process was such that in each query as to the identity of persons with whom respondents exchange time or money, the names from the social network roster (and their corresponding role relationships) appeared first in the list of role relationships, and the respondent could indicate these particular people directly. In Wave 6, in contrast, following each question about the identity of a person with whom the respondent exchanged support, respondents were asked in a follow-up question whether the person indicated was the same as the one with the same role relationship mentioned earlier in the SN roster (this question is illustrated in

Figure 2.2). Respondents were routed to receive the follow-up question only if the person with whom they indicated having an exchange of support had the same role relationship as a person nominated in their SN roster. If it was a child who was cited as the recipient or provider of support, the respondents were asked to identify the child from the list of their children that was shown in the FT/SP module, based on information from the children module (CH). If that same child was cited as a social network member, respondents were not asked the follow-up question to identify that child from the SN roster. The identified child was later linked with the corresponding social network member in the Generated Variables module as the recipient/receiver of support.

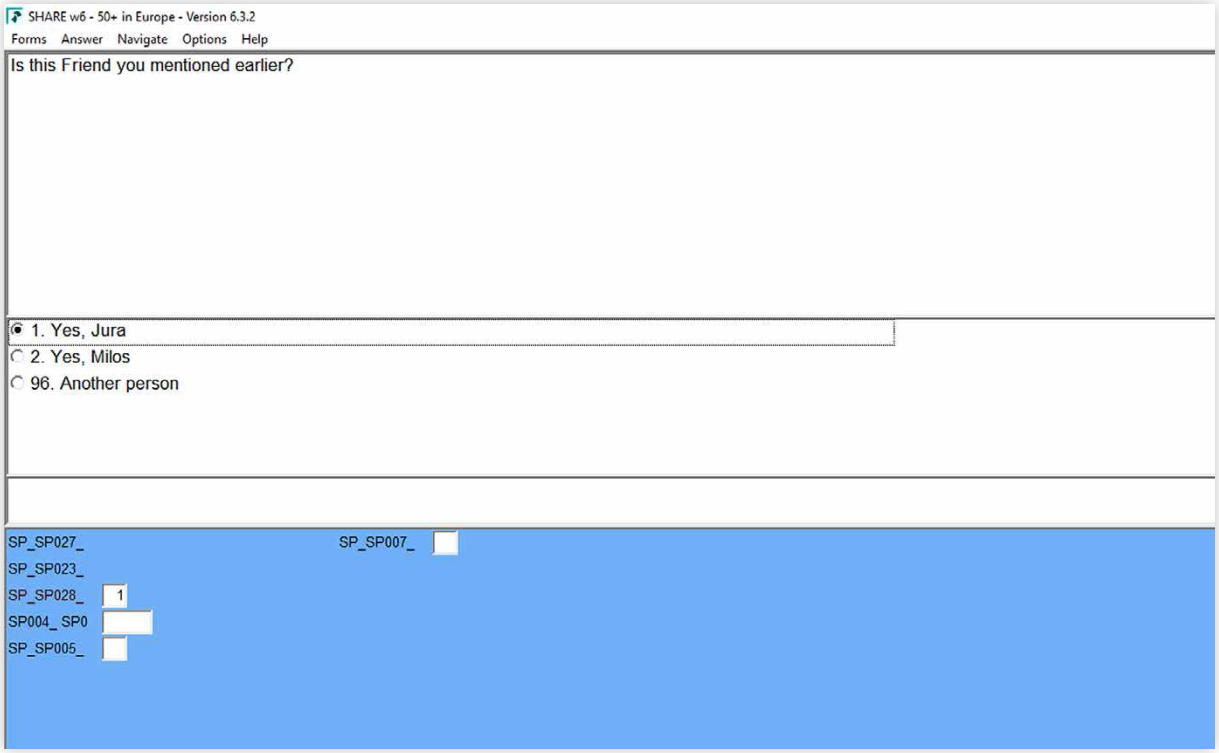

Figure 2.2. SP / FT linkage to social network members (CAPI screenshot)

Wave 6 also saw a change in the issue of response level in relation to exchange (individual respondent versus financial or family respondent level questions). As recalled, in Wave 4, the FT module was collected at the financial respondent level and several of the SP questions were collected at the family respondent level (specifically, the questions about receiving help from outside the household – sp002_ and its ensuing questions). In these cases, the social network members who appeared in relation to the relevant FT or SP questions were the persons named in the rosters of the financial respondent or the family respondent only. They were not the persons named in the rosters of the partner (in cases in which there was a partner in the household). In essence, the FT and SP exchange questions were inclusive of respondent and partner and did not specify if the respondent or the partner was the one giving or receiving the exchange. To overcome this ambiguity, the Wave 6 SP module was modified such that all the SP questions were asked of all respondents individually. This allowed for a full linkage between the persons named in the SN roster and the social support exchanges with them. The FT module remained

at the household level, however, as it is assumed that financial support is exchanged at the household level and that monetary support is usually given and received by both partners.

2.1.3 Derived Social Network variables (Generated Variables module "gv_networks")

The Wave 6 Social Network module offers the possibility to derive several types of variables due to its combination of longitudinal and cross-sectional aspects. These derived variables appear in the Generated Variables module (gv_networks). The first type of derived variables marks the change between the waves, the second type is aggregated variables, and the third type is data with full information about the persons named (i.e. the data from the SN module and data retrieved from other modules, combined).

The variables in the data set are ordered such that all the aggregated variables appear first, followed by all the raw variables, which contain full information on all the social network members. Within the aggregated variables, first appear the panel variables, then the SN W6 variables, followed by the FT and SP variables. The raw variables are ordered in the same manner.

2.1.3.1 Panel variables

The longitudinal nature of the Wave 6 SN module required information about each respondent's pattern of panel participation. Hence, the variable "panel_status" identifies the wave in which respondents completed the SN module. It is divided into four categories:

1. SN module in Wave 4 only – a small percentage of respondents who participated in both Waves 4 and 6, but did not get the SN module in Wave 6. These respondents were skipped because they had a proxy interview in Wave 6 (sn014=5), and proxies are not eligible to respond to subjective questions, as in the case of the SN module.
2. SN module in Wave 6 only – respondents who were not interviewed in Wave 4 and were given the SN module for the first time in Wave 6. These are respondents from countries that did not participate in Wave 4 (Israel, Greece, Luxembourg and Croatia) and respondents from all countries who did not participate in Wave 4 but joined SHARE in Wave 5, or joined a previously participating longitudinal household.
3. SN module in both Wave 4 and 6 – about half of the sample, over 30,000 respondents with panel SN information, that is, they answered the SN module in Waves 4 and 6.
4. No SN data in Wave 4 & Wave 6 – two types of respondents received this label. The first were those who were not eligible to get the SN module because they were part of newly recruited refresher samples in Wave 6 (among the Wave 4 countries). That is, they participated in SHARE for the first time in Wave 6. The second type were respondents from countries that did not participate in Wave 4 and were thus eligible to receive the SN in Wave 6, but had a proxy interview (sn014=5), making them ineligible.

The Generated Variables module also contains linkage information between the persons named in Waves 4 and 6, for those respondents who have social network data in both waves. The linkage information includes both data at the level of specific social network members and aggregate data on the number of lost, new and continued relationships. Data on specific social network members indicate the wave in which they appear and their location within the social network, and is delineated in Table 2.2.

These variables were created based on the process explained earlier in this chapter (Figure 2.1). Following data collection, we tracked social network members who were incorrectly matched across the rosters in Waves 4 and 6, and corrected their linkage based on their names, gender and role relationship in both waves.

Table 2.2. Derived SN variables: Transitions among specific social network members

Variable name	Variable description	Values	Missing values
w4_sn_mentioned_again_x	Was w4 SN member X mentioned again in w6?	0 = No; 1 = Yes	-25 = No SN in W6 & W4 -23 = W4 SN size of 0 -22 = W6 only -21 = W4 only -9 = Does not apply (No SN member X in W4)
w6_sn_mentioned_before_x	Was w6 SN member X mentioned before in w4?	0 = No; 1 = Yes	-25 = No SN in W6 & W4 -24 = W6 SN size of 0 -22 = W6 only -21 = W4 only -9 = Does not apply (No SN member X in W6)
w6_sn_w4_position_x	The position of w6 person X in w4	1-7	-25 = No SN in W6 & W4 -24 = W6 SN size of 0 -22 = W6 only -21 = W4 only -9 = Does not apply (No SN member X in W6; SN member X not mentioned in W4)

The derived variables module also provides a count of the social network members who were named at Wave 4 but not at Wave 6 ("lost"), those who were named at both Wave 4 and Wave 6 ("continued"), and those who were named for the first time at Wave 6 ("new"). The variable "panel_lost" counts the social network members who were mentioned in Wave 4 but not mentioned again in Wave 6. The variable "panel_new" counts those who were mentioned in Wave 6 for the first time and were not mentioned before in Wave 4. The variable "panel_continued" counts Wave 4 ties that were mentioned again in Wave 6. These variables are described in Table 2.3.

Table 2.3. Derived SN variables: Transitions in the social network

Variable name	Variable description	Missing values
panel_lost	Count of lost Wave 4 SN members	-25 = No SN in W6 & W4 -23 = W4 SN size of 0 -22 = W6 only -21 = W4 only
panel_new	Count of new Wave 6 SN members	-25 = No SN in W6 & W4 -24 = W6 SN size of 0 -22 = W6 only -21 = W4 only
panel_continued	Count of w6 SN members that were mentioned before in w4	-25 = No SN in W6 & W4 -23 = W4 SN size of 0 -22 = W6 only -21 = W4 only

Losses in the social network can occur for various reasons, and the Wave 6 questionnaire asks about them. As described earlier, if a respondent indicated that a Wave 4 social network member was not named again in Wave 6, he or she was asked to pick from a list of possible explanations, or provide an open answer if none of the reasons was suitable. The open responses were later coded into categories by having two independent raters go over them and classify them. Inter-rater agreement was 87 percent and Cohen's Kappa was 0.8 (Cohen's Kappa is a measure of inter-rater agreement; Kappa of over 0.7 indicates good reliability). Raters discussed the responses that were not agreed upon until reaching an agreement. The coding process yielded two new categories: (10) for uncodable and (11) for technical issues. The updated categories appear in Table 2.4.

As noted, respondents were able to give the following explanation: "Wrong, WAS mentioned this time". To confirm the veracity of this response, we went over the raw social network data, which included social network members' names in addition to the other information elicited in the module. This allowed us to detect whether a specific social network member was indeed named in Wave 6, even though he or she was initially classified as "lost". If these persons were found to have been mentioned again, we re-coded them and corrected their linkage information. Please note: The variable indicating the reasons for not naming social network members again, sn023c_X, appears in the Social Networks module and not in the Generated Variables module.

Table 2.4. Raw social network change variable: Reason for not naming a social network member again (sn module)

Variable name	Variable description	Categories
sn023c_x	Reason did not mention sn person X (coded)	1. I forgot, should have been included 2. I moved 3. SN person moved 4. SN person died 5. I became ill / had a health problem 6. SN person became ill / had a health problem 7. Respondent does not recognize the named person 8. No longer close 9. Wrong, WAS mentioned this time 10. Uncodable (sn024) 11. Technical issue

2.1.3.2 Raw Wave 6 name interpreter questions

As mentioned in the overview of the interview process, some name interpreter questions were skipped for certain categories of social network members, if the information was available from questions asked elsewhere in the interview. The missing information was retrieved from other modules during the data cleaning process and the variables with full information can be found among the derived variables. For this reason, it is recommended to use the name interpreter variables in the Generated Variables module to obtain data on specific social network members, instead of using raw data from the SN module. The only exception to this recommendation is the use of two name interpreter questions that did not require retrieval of missing information because they were asked of all named persons: those regarding role relationship (sn005_x) and emotional closeness (sn009_x). Table 2.5 presents the name interpreter variables as they appear in the social networks module and their matching variables with full information in the Generated Variables module. As of the first public release of Wave 6 (release 6), some questions are still missing information for certain social network members. This information should be retrieved in future releases of the data. Specifically, some of the social network members who are partners are missing information about year of birth and occupation status. Some children in the social network lack information on gender, proximity, year of birth, occupation and partner status. In addition, children named in the name generator who were under the age of 16 were not asked about their occupation and partner status and were coded as "Does not apply" (-9).

Detailed versions of raw Wave 6 name interpreter questions

While retrieving information from other modules, we encountered some discrepancies between the response options in the social networks module and the response options to the corresponding questions in other parts of the interview. More specifically, these discrepancies concerned name interpreter questions about occupation and partner status. The question concerning occupation (sn028_x) was skipped for those social network members who were named as partners or children in the name generator. While the information for children was easily retrieved, the response options for social network members who were nominated as partners were different than those in sn028_x and required some adjustments. The partner occupation information was taken from the respondent's answer to question ex103 if the partner was not interviewed and from the partner's responses to question ep005, if he

Table 2.5. Derived SN variables: SN variables and their full GV versions

Variable name raw data SN module	Variable name GV module (with retrieved information)	Variable description	Who got skipped (SN module)	-9 "Does not apply" description (GV module)
sn002a_x	sn_person_x	Was there an SN person x?	Full information	-9 = didn't get ths social network module
sn005_x	rel_x	Relationship	Full information	-9 = no social network in Wave 6; no social network member x
sn005a_x	gender_x	Gender	Some children	-9 = no social network in Wave 6; no social network member x
sn006_x	prx_x	Geographic proximity	Some children; parents	-9 = no social network in Wave 6; no social network member x
sn007_x	contact_x	Frequency of contact	Parents; confidants living in same household as respondent (sn006_x=1)	-9 = no social network in Wave 6; no social network member x
sn009_x	close_x	Emotional closeness	Full information	-9 = no social network in Wave 6; no social network member x
sn027_x	year_x	Year of birth	Spouse; children	-9 = no social network in Wave 6; no social network member x
sn028_x	occ_x	Occupation	Spouse; children	-9 = no social network in Wave 6; no social network member x; children under the age of 16
sn028_x	occ_det_x	Detailed occupation	Spouse; children	-9 = no social network in Wave 6; no social network member x; children under the age of 16
sn029_x	partner_x	Relationship status	Spouse; children	-9 = no social network in Wave 6; no social network member x; children under the age of 16
sn029_x	partner_det_x	Detailed relationship status	Spouse; children	-9 = no social network in Wave 6; no social network member x; children under the age of 16

or she was interviewed. The discrepancy was that one of the response options to these questions – "(2) Employed or self-employed (including working for family business)" – could be matched with three possible response options in the SN occupation name interpreter: "Full-time employed" \ "Part-time employed" \ "Self-employed or working for own family business".

To find the appropriate occupation option for partners we looked for supplementary information in other parts of the interview. We first coded the partner relationships who were "employed or self-employed" (ex103/ep005=2) as working full time. They were then coded as self-employed if they scored "(3) self-employed" in variables ep009_ or ex105_, which inquire about the type of employment. Classification as working part time or full time was conducted based on the variable ep013_, which asks about total hours of work during the week. Partners who work more than 30 hours were classified as working full time and those working 30 hours or less were classified as working part time, in accordance with the OECD's definition[1]. It should be noted that this is a generalization, since different countries have different definitions of part time work, and these definitions can also differ for different professions within the same country.

The occupation name interpreter has two versions – detailed ("occ_det_x"), which mirrors the classification process, and not detailed ("occ_x"). The not-detailed version contains full information on occupation for all social network members and uniform response options for all of them. The detailed version contains full information as well, but the information is classified using different labels for persons named as partners and those who are not partners. The partner labels are different from the non-partner labels for partners who are employed, and they are classified as working in the private sector, public sector or self-employed, based on the variables ep009_ and ex105_. They were sorted into part time and full time employment in the not detailed version. Partners who had missing values for ep009_ or ex105 received the label "Partner: Category 13, 14 or 15 (details unknown)" in the detailed version.

A similar issue was encountered regarding the partner status of social network members. Respondents were not asked about the partner status of children named in the name inventory (sn029_x) and this information was retrieved from the CH module, question ch012_x ("What is the marital status of X?"). However, there were differences between the response options for these questions, since question sn029_x inquires about partner status while ch012_x asks about marital status. In detail, the response options of sn029_x were: (1) "No partner" (2) "Living with a partner" (3) "Has a partner but not living with him/her". The options for ch012_x were: (1) "Married and living together with spouse" (2) "Registered partnership" (3) "Married, living separated from spouse" (4) "Never married" (5) "Divorced" (6) "Widowed". Children who were said to be (1) "Married and living together with spouse" and (2) "Registered partnership" were coded as sn029_x = (2) "Living with a partner". Children who were (3) "Married, living separated from spouse" were coded as sn029_x = (3) "Has a partner but not living with him/her". Children who were 4 "Never married", 5 "Divorced" or 6 "Widowed" were coded as sn029_x = (1) "No partner". The detailed version of this variable ("partner_det_x") shows the different categories for children and non-children, on which we base the variable "partner_x" (Table 2.5).

1 https://data.oecd.org/emp/part-time-employment-rate.htm; http://www.oecd.org/eco/growth/2733470.pdf

2.1.3.3 Aggregated variables

The data collected in the social networks module can be aggregated into a wide range of variables to be used for analysis. The Generated Variables module in Wave 6 includes variables which aggregate information about different aspects of respondents' social networks based on the name interpreter questions. The aggregated variables pertain, first, to the social network's composition, size and satisfaction with the social network. They also summarize information about the relationship between survey respondents and their social network members, specifically about geographical proximity, frequency of contact and emotional closeness. An additional aggregate variable is based on a name interpreter question that appeared in Wave 6 for the first time, about social network members' birth year. The aggregated variables are based on a summary of information on all social network members, so they are set as missing if one of the social network members has missing information on that variable. Missing values due to missing information are coded as "(-20) Missing information". Due to a relatively large number of respondents with missing information on the occupation and partner status of some social network members (mostly children and spouses, as explained above), we did not create aggregated variables based on occupation and partner status.

Many of the aggregated variables are replicated from Wave 4, while some were left out to save space. The main change in relation to the Wave 4 variable set is not constructing dummy and percentage characterizations of the composition and nature of the social network, as this can be done by researchers based on the existing count variables. The list of aggregated variables constructed for Wave 6 is presented in Table 2.6.

Table 2.6. Derived SN variables: Aggregated variables

Variable name	Variable description	Generated variable coding description	-9 "Does not apply" description
sn_size_w6	SN size Wave 6	rel_1 - rel_7	
sn_size_w4	SN size Wave 4	sn005_1 - sn005_7	
panel_change_size	W6 SN size – w4 SN size (if both done)	sn_size_w6 - sn_size_w4	
sn_satisfaction	Satisfaction with social network – combined sn012_ & sn017_	sn012_; sn017_	-9 = no SN module in Wave 6
spousenet2	Spouse in social network – dummy	rel_x = 1	-9 = no social network; no SN module in Wave 6; no spouse
partner_var	Identify for whom the spousenet variables do not apply because no partner was reported by the respondent	Partner in household (in cv_r/sn006=1) / partner outside household (dn040=1/sn006>1)	
famnet	Family members in social network - count	rel_x = 1-20	-9 = no social network; no SN module in Wave 6

Variable name	Variable description	Generated variable coding description	-9 "Does not apply" description
childnet	Children in social network – count	rel_x = 10, 11	-9 = no social network; no SN module in Wave 6; no children
siblingnet	Siblings in social network – count	rel_x = 8, 9	-9 = no social network; no SN module in Wave 6; no living siblings
parentnet*	Parents in social network – count	rel_x = 2, 3	-9 = no social network; no SN module in Wave 6; no living parents
friendnet	Friends in social network – count	rel_x = 21	-9 = no social network; no SN module in Wave 6
formalnet	Formal helpers in social network – count	rel_x = 25-27	-9 = no social network; no SN module in Wave 6
othernet	Others in social network – count	rel_x = 22-24, 96	-9 = no social network; no SN module in Wave 6
womennet	Women in social network – count	rel_x = 2	-9 = no social network; no SN module in Wave 6
mennet	Men in social network – count	rel_x = 1	-9 = no social network; no SN module in Wave 6
prx_mean	SN proximity – Average		-9 = no social network; no SN module in Wave 6
most_prx	Proximity of closest SN member		-9 = no social network; no SN module in Wave 6
prx_5km	Number of SN members within 5 km	prx_x = 1-4	-9 = no social network; no SN module in Wave 6
prx_1km	Number of SN members within 1 km	prx_x = 1-3	-9 = no social network; no SN module in Wave 6
contact_mean	SN contact – Average		-9 = no social network; no SN module in Wave 6
most_contact	Contact with most contacted SN member		-9 = no social network; no SN module in Wave 6
contact_daily	Number of SN members with daily contact	contact_x = 1	-9 = no social network; no SN module in Wave 6
contact_week	Number of SN members with weekly contact	contact_x = 1-3	-9 = no social network; no SN module in Wave 6
spouse_contact	Average contact with spouse in SN	Average of contact_x when rel_x = 1	-9 = no social network; no SN module in Wave 6; no spouse; no spouse in social network

Variable name	Variable description	Generated variable coding description	-9 "Does not apply" description
fam_contact	Average contact with family members in SN	Average of contact_x when rel_x = 1-20	-9 = no social network; no SN module in Wave 6; no family members in SN social network
child_contact	Average contact with children in SN	Average of contact_x when rel_x = 10-11	-9 = no social network; no SN module in Wave 6; no children; no children in social network
sibling_contact	Average contact with siblings in SN	Average of contact_x when rel_x = 8-9	-9 = no social network; no SN module in Wave 6; no living siblings; no sibling in social network
parent_contact	Average contact with parents in SN	Average of contact_x when rel_x = 2-3	-9 = no social network; no SN module in Wave 6; no living parents; no parents in social network
friend_contact	Average contact with friends in SN	Average of contact_x when rel_x = 21	-9 = no social network; no SN module in Wave 6; no friends in social network
formal_contact	Average contact with formal helpers in SN	Average of contact_x when rel_x = 25-27	-9 = no social network; no SN module in Wave 6; no formal helpers in social network
other_contact	Average contact with others in SN	Average of contact_x when rel_x = 22-24, 96	-9 = no social network; no SN module in Wave 6; no others in social network
close_mean	SN emotional closeness – average		-9 = no social network; no SN module in Wave 6
most_close	Emotional closeness of closest SN member		-9 = no social network; no SN module in Wave 6
close_ very	Number of SN – very to extremely close	close_x = 3-4	-9 = no social network; no SN module in Wave 6
year_mean	SN year of birth – Average		-9 = no social network; no SN module in Wave 6

* Survey limitations did not allow for identification of living status of parents for all survey respondents. These cases are coded as missing for these derived variables.

2.1.3.4 The Social Connectedness Scale

The Wave 6 derived variables module includes a measure of social connectedness – a summary scale of the social network data that has been used previously in research (Litwin & Stoeckel, 2015). The scale incorporates the five main characteristics of the social network into one composite measure in order to capture the key facets of social network resources within a single indicator. These characteristics in-

clude (1) the number of persons cited (network size), (2) the number of cited social network members living within 25 km (proximity), (3) the number of cited persons with weekly or more contact (contact frequency), (4) the number of cited persons with very or extremely close emotional ties (support), and (5) the number of different types of relationships present within the network (diversity). The first four of these characteristics were scored as follows: 0=0, 1=1, 2=2–3, 3=4–5, and 4=6–7 persons cited. The fifth characteristic reflects the number of different relationship categories [(a) spouse, (b) other family, including children, (c) friend, and (d) other] that were present in the network (0–4). For each of these individual components of the scale, the underlying assumption is that having more social network members in each category is representative of stronger network resources. Principal component factor analysis conducted on the Wave 6 sample confirmed that the 5 items in the scale loaded on a single factor. The total raw score on the scale ranged from 0 to 20. A calibrated version of the scale (sn_scale) was employed according to the following conversion: 0=0, 1=1–5, 2=6–10, 3=11–15, and 4=16–20. By default, survey respondents who did not identify any social network members received a score of zero. Respondents who did not answer the social networks module in Wave 6 were coded as "does not apply".

2.1.3.5 Linkage of SN Members who are children

The SHARE interview allows for linkage between social network members identified as children and the information about them in the CH (children) module, which probes about respondents' children. If one wishes to link the children from the SN to their position in the CH, this is possible using the variable "sn_loop_child_x" in the CH module. This variable provides the SN position (1-7) for each child X.

If respondents identified social network members as children, some name interpreter questions were not asked about these members, since the information exists in the CH children module. This missing data was retrieved from the CH module, and as mentioned before, the variables with full information appear in the Generated Variables module.

2.1.3.6 Financial transfers with social network members

The list of social network members gathered in the Social Network module was linked with the Financial Transfer module in Wave 6, as was done in Wave 4. As mentioned before, the linkage was performed following each exchange variable in the FT module that identifies to whom or from whom financial transfers were exchanged. Respondents were asked in a follow-up question whether the person who was the receiver/provider of financial support was the same as a social network member nominated earlier in the SN roster, who had the same role relationship. It should be recalled that the Financial Transfers module is collected from the identified financial respondent of the household. Thus, the information collected about social network members who are involved in financial exchanges is applicable only to the financial respondent because of the individual nature of the social network roster. It is recommended, therefore, that research using financial support information of the social networks be conducted only in relation to the financial respondent.

A series of variables was derived to identify if survey respondents exchanged financial support with their social network members, similarly to Wave 4. The derived variables were termed as "fin_gave/received" if the financial support in question was the equivalent of about 250 Euros or more, and they were called "gift_gave/received" if the exchange involved the equivalent of 5,000 Euros or more. The derived variables concerning financial support in Wave 6 are listed as follows: Within each type of support, the

first derived variable counts the people involved in the exchange in general, followed by a variable that counts the number of social network members involved, specifically. At the end of the variable list in the module, appear variables ranging from 1-7, which state for each social network member whether he or she was involved in that type of an exchange. We only constructed the count variables, similarly to Wave 4, without constructing the dummy and percentage characterizations of the financial support within the network, which can be created based on the existing count variables. The financial support variables are listed in Table 2.7.

The questions regarding financial transfers were skipped for named social network members who were the respondents' children. That information was retrieved based on another question in the Financial Transfers module, which asks for the identity of the child who was involved in the exchange. The information was later linked. Full information on financial transfers concerning all social network members can be found in the derived variables "fin_gave_sn_x", "fin_received_sn_x", "gift_received_sn_x" and "gift_gave_sn_x". It is therefore recommended to use these variables for analysis at the level of specific social network members, and not the corresponding (but incomplete) variables in the Financial Transfers module itself.

2.1.3.7 Social support exchanges with social network members

The social network in Wave 6 is linked to social support exchange information in a similar manner to the previously described linkage with financial transfers. Following questions about social support, respondents were asked whether the receiver/provider of support is a social network member, and were presented with a list of possible social network members who were the same role relationship as the receiver/provider of support. If the person with whom the support exchange was performed was a child, respondents were asked to locate that child in a list of their children, and were not asked to locate that child also within their social network. The main change in the Social Support module in relation to the Financial Transfers module is that all respondents received the social support questions, making the linkage between social support and social network members applicable for all respondents.

The derived variables refer to four types of support – help received outside of the household, help given outside of the household, help received within the household and help given within the household. Within each domain, the first variable provides a count of the people who were involved in the exchange in general, and the second counts the social network members involved. At the end of the variable list in the module the raw variables appear which state whether each social network member was involved in that type of exchange. These variables, at the level of specific ties, contain full information on all social members, including a linkage with the children who were involved in support transactions and nominated as part of the social network. For this reason, it is advised to use the derived variables when conducting an analysis based on specific persons. In Wave 6 we only constructed the count variables similarly to Wave 4, without the dummy and percentage characterization of the social support within the network, which can be constructed based on the count variables. The social support variables are listed in Table 2.8.

Table 2.7. Derived SN variables: Financial support

Variable name	Variable description	Generated variable coding description	-9 "Does not apply" description
fin_gave	Number of persons financial help was given to (250 or more)	ft003_1-ft003_3=1-96	-9 = non-financial respondent
snfin _gave	umber of SN members financial help was given to (250 or more)		-9 = non-financial respondent; no social network; no SN module in Wave 6; fin_gave=0
fin_gave_sn_x	Gave financial help to Wave 6 SN member x		-9 = non-financial respondent; no social network member x
fin_received	Number of persons financial help was received from (250 or more)	ft010_1-ft010_3=1-96	-9 = non-financial respondent
snfin_receive	Number of SN members financial help was received from (250 or more)		-9 = non-financial respondent; no social network; no SN module in Wave 6; fin_received=0
fin_received_sn_x	Received financial help from Wave 6 SN member x		-9 = non-financial respondent; no social network member x
gift_received	Number of persons financial gift was received from (5000 or more)	ft017_1-ft017_5=1-96	-9 = non-financial respondent
sngift_received	Number of SN members financial gift was received from (5000 or more)		-9 = non-financial respondent; no social network; no SN module in Wave 6; gift_received=0
gift_received_sn_x	Received financial gift from Wave 6 SN member x		-9 = non-financial respondent; no social network member x
gift_gave	Number of persons financial gift was given to (5000 or more)	ft027_1-ft027_5=1-96	-9 = non-financial respondent
sngift_gave	Number of SN members financial gift was given to (5000 or more)		-9 = non-financial respondent; no social network; no SN module in Wave 6; gift_gave=0
gift_gave_sn_x	Gave financial gift to Wave 6 SN member x		-9 = non-financial respondent; no social network member x

Table 2.8. Derived SN variables: Social support

Variable name	Variable description	Generated variable coding description	-9 "Does not apply" description
outhh_receive_care	Received personal/practical help from person(s) outside hh – Count	sp003_1-sp003_3=1-96	
outhh_snreceive_care	Number of SN members personal/practical was received from outside hh		-9 = no social network; no SN module in Wave 6; outhh_receive_care =0
outhh_receive_care_sn_x	Received personal/practical help from Wave 6 SN member x		-9 = no social network member x
outhh_gave_care	Gave personal/practical help to person(s) outside hh – Count	sp009_1-sp009_3=1-96	
outhh_sngave_care	Number of SN members personal/practical help was given to outside hh		-9 = no social network; no SN module in Wave 6; outhh_gave_care =0
outhh_gave_care_sn_x	Gave personal/practical help to Wave 6 SN member x		-9 = no social network member x
hh_gave_care	Gave personal help to person(s) inside hh – Count	sp019_1-sp019_3=1-96	-9 = household size = 1
hh_sngave_care	Number of SN members personal help was given to inside hh		-9 = household size = 1; no social network; no SN module in Wave 6; hh_sngave_care =0
hh_gave_care_sn_x	Gave personal help to Wave 6 SN member x		-9 = no social network member x
hh_receive_care	Received personal help from person(s) inside hh – Count	sp021_1-sp021_3=1-96	-9 = household size = 1; ph048_ =96 or ph049=96
hh_snreceive_care	Number of SN members personal help was received from inside hh		-9 = household size = 1; ph048 =96 or ph049=96; no social network; no SN module in Wave 6; hh_receive_care =0
hh_receive_care_sn_x	Received personal help from Wave 6 SN member x		-9 = no social network member x

2.1.4 Concluding remarks

The Social Networks module in Wave 6 maps respondents' social networks in addition to capturing their changes and transformations over time. The Generated Variables module allows researchers to take advantage of this information by creating key variables such as network size, measures of average frequency of contact and network composition, as well as retrieving skipped information. The name generator also allows researchers to identify changes within the network by creating summary scores such as the number of initially named persons who are no longer cited and the extent of new persons cited as confidants. Moreover, it links social network members with the child module and with persons cited as recipients or providers of support. This module is therefore a useful and informative tool to better understand older Europeans' social environments.

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2.2 New format of alcohol consumption

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Alcohol is the third leading cause of ill health and premature death in the world, as well as the third leading risk factor for disease and mortality in the European region (WHO, 2012). Europe being the region with the highest alcohol consumption in the world, it is faced with the negative mental and physical health effects of excessive alcohol consumption as well as with the associated social and economic burdens for individuals, family, work and society (e.g. stress, anxiety, impaired work productivity, unemployment and increased social welfare costs; WHO, 2012).

Thus, alcohol consumption is an important measure in a multidisciplinary European survey like SHARE, as it serves as a significant explanatory as well as potentially "confounding" variable in the cross-disciplinary research based on SHARE data. However, there is no universal agreement on how to measure alcohol consumption in surveys despite a number of international guidelines (Nugawela, et al., 2016; WHO, 2000; Bloomfield, Hope, & Kraus, 2013).

One current international guideline advises on including three essential measures in (cross-cultural) surveys: a) questions about frequency of drinking, b) quantity of consumed alcoholic beverages and c) frequency of binge drinking (Nugawela et al., 2016). Each of these three essential measures are picked up in core questions on alcohol consumption across all waves of SHARE (see Table 2.9), with the ex-

ception of the lack of measuring binge drinking in the 1st wave. There were, however, several changes made across different panel waves in the form of elimination, addition or adaptation of questions (see Table 2.9).

From Wave 2 to Wave 5, SHARE has largely harmonized its core alcohol questions about frequency, quantity and binge drinking with corresponding questions in the Health and Retirement Study (HRS) in the US. In the run-up to Wave 6, it was decided to do justice to the fact that alcohol consumption is highly influenced by cultural factors. It was thus considered imperative for a multi-cultural survey like SHARE to apply questions that capture differences in drinking culture, alcoholic content, and drink sizes. The ultimate goal was a reduction in measurement bias owed to a lack of necessary cultural adaptation and hence to improve cross-national comparative estimations (Bloomfield, Stockwell, Gmel & Rehn, 2003). Thus, in an effort to obtain a more reliable and cross-country comparable measure of alcohol consumption, SHARE has revised the format of the alcohol questions during the preparation of the 6th wave.

Revising questionnaire items in a longitudinal survey like SHARE is critical, as it is done at the expense of panel stability, and in this specific case also at the expense of harmonization with HRS (see Malter, 2015). In the run-up to Wave 6, improving the measurement properties of the alcohol items trumped these considerations.

2.2.1 Revision of questions

In this 6th wave of SHARE, the alcohol consumption questions have been condensed to simply covering the three most essential items when measuring alcohol consumption (see above) which resulted in dropping two items that were used in previous waves (see Table 2.9). Compared to the equivalent questions in the previous waves of SHARE, changes have been made to the wording as well as the reference period in addition. The new measurement approach also necessitated the creation of a new show card (see Figure 2.3 below).

2.2.1.1 Shortened reference period

A major issue when measuring alcohol consumption in surveys is relying on respondents' self-reports unaided by any diary methods. Several studies have found that self-reported alcohol consumption is often heavily underreported and that it only accounts for 40-60 percent of the amount of alcoholic beverages known to be sold in the population of the specific survey (Boniface, Kneale & Shelton, 2014). It is suspected that this significant underreporting can be explained by a combination of recall error and/or bias responses due to social desirability. In fact, it has been shown that the shorter the reference period for recollection, the higher the reported amounts of alcohol consumption in a given survey population (Bloomfield et al., 2003).

Thus, in order to improve the validity of self-reported alcohol consumption in the 6th wave of SHARE, the reference period has been shortened for the questions concerning frequency and quantity of alcohol consumption. In the prior waves of SHARE, a reference period of three months has been used. Respondents were asked about how often (frequency) they had an alcoholic beverage within the last three months, and how many drinks (quantity) they usually had on the days they drank. These were followed by a question on how often they had six or more drinks on one occasion (binge drinking) within the last

Card 15

During the last 7 days, overall how many units of alcoholic beverages did you have?

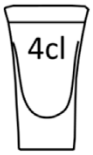
Drinks	Examples	N° of units
Beer 33 cl * 4-6% alcohol		[___] units
*If the respondent usually drinks 50cl glasses of beer use the following table to calculate units: **Amount of 50cl-beer** / **N° of units**: 1 → **1,5**; 2 → **3**; 3 → **4,5**; 4 → **6**; 5 → **7,5**; 6 → **9**; 7 → **10,5**; 8 → **12**; 9 → **13,5**; 10 → **15**		
Wine 12 cl 10-13% alcohol		[___] units
Fortified wine 8 cl 17-22% alcohol		[___] units
Spirits 4 cl 38-42% alcohol		[___] units
Please, sum up all units and copy the total number in the CAPI	**total :**	**[___] units**

Figure 2.3. New generic show card to measure alcohol consumption across countries

Table 2.9. Alcohol questions across SHARE Wave 1, 2, 4, 5 and 6

	Wave 1	Wave 2	Wave 4	Wave 5	Wave 6
Frequency	During the last 6 months, how often have you drunk any alcoholic beverages, like beer, cider, wine, spirits or cocktails? 1. Daily or almost daily 2. Five or six days a week 3. Three or four days a week 4. Once or twice a week 5. Once or twice a month 6. Less than once a month 7. Not at all in the last 3 months	During the last 3 months, how often have you drunk any alcoholic beverages, like beer, cider, wine, spirits or cocktails? 1. Daily or almost daily 2. Five or six days a week 3. Three or four days a week 4. Once or twice a week 5. Once or twice a month 6. Less than once a month 7. Not at all in the last 3 months	During the last 3 months, how often have you drunk any alcoholic beverages, like beer, cider, wine, spirits or cocktails? 1. Daily or almost daily 2. Five or six days a week 3. Three or four days a week 4. Once or twice a week 5. Once or twice a month 6. Less than once a month 7. Not at all in the last 3 months	During the last 3 months, how often have you drunk any alcoholic beverages, like beer, cider, wine, spirits or cocktails? 1. Daily or almost daily 2. Five or six days a week 3. Three or four days a week 4. Once or twice a week 5. Once or twice a month 6. Less than once a month 7. Not at all in the last 3 months	During the last 7 days, have you had at least one alcoholic beverage? 1. Yes / 2. No
Quantity	During the last six months, how often have you had more than two glasses or cans of beer or cider in a single day?* During the last six months, how often have you had more than two glasses of wine in a single day?* During the last six months, how often have you had more than two cocktails or drinks of hard liquor in a single day?* * Response options: 1. Daily or almost daily 2. Five or six days a week 3. Three or four days a week 4. Once or twice a week 5. Once or twice a month 6. Less than once a month 7. Not at all in the last 6 months	In the last three months, on the days you drank, about how many drinks do you have? IWER: As a rule of thumb, you can estimate that one drink is: 1 bottle/can of beer=33cl, 1 glass table wine=12cl, 1 glass fortified wine=8cl, and 1 glass spirits=4cl.	In the last three months, on the days you drank, about how many drinks do you have? IWER: As a rule of thumb, you can estimate that one drink is: 1 bottle/can of beer=33cl, 1 glass table wine=12cl, 1 glass fortified wine=8cl, and 1 glass spirits=4cl.	In the last three months, on the days you drank, about how many drinks do you have? IWER: As a rule of thumb, you can estimate that one drink is: 1 bottle/can of beer=33cl, 1 glass table wine=12cl, 1 glass fortified wine=8cl, and 1 glass spirits=4cl.	Please look at card 15, which shows standard units of alcoholic beverages. During the last 7 days, overall how many units of alcoholic beverages did you have?
Binge drinking		In the last three months, how often did you have four or more drinks on one occasion? 1. Daily or almost daily 2. Five or six days a week 3. Three or four days a week 4. Once or twice a week 5. Once or twice a month 6. Less than once a month 7. Not at all in the last 3 months	In the last three months, how often did you have six or more drinks on one occasion? 1. Daily or almost daily 2. Five or six days a week 3. Three or four days a week 4. Once or twice a week 5. Once or twice a month 6. Less than once a month 7. Not at all in the last 3 months	In the last three months, how often did you have six or more drinks on one occasion? 1. Daily or almost daily 2. Five or six days a week 3. Three or four days a week 4. Once or twice a week 5. Once or twice a month 6. Less than once a month 7. Not at all in the last 3 months	In the last three months, how often did you have six or more units of alcoholic beverages on one occasion? 1. Daily or almost daily 2. Five or six days a week 3. Three or four days a week 4. Once or twice a week 5. Once or twice a month 6. Less than once a month 7. Not at all in the last 3 months
Excessive Drinking			Was excessive drinking a problem at any time of your life? 1. Yes / . No	Was excessive drinking a problem at any time of your life? 1. Yes / 2. No Since we last interviewed you, has excessive drinking been a problem at any time? 1. Yes / 2. No	
Drinker-/Abstainer-Status		Have you ever drunk alcoholic beverages? 1. Yes / 2. No	Have you ever drunk alcoholic beverages? 1. Yes / 2. No	Have you ever drunk alcoholic beverages? 1. Yes / 2. No	

three months. For the 6th wave of SHARE, the reference period was shortened to "(…) last 7 days" for the frequency and quantity questions. As a consequence, respondents were now first asked whether they have had at least one alcoholic beverage within the last 7 days, with the answer options being "yes" or "no". If the respondent answered yes, he/she was then asked to recollect how many units of alcoholic beverages he/she had consumed within those last 7 days. To support the correct calculation, a show card was shown for this question (see details on show card below). As binge drinking is a less frequent occurrence in the SHARE target population of people 50 years and older, but an important measure of "problematic" alcohol consumption, it was considered reasonable to keep the reference period for this question so for binge drinking there was no change in the reference period (see Table 2.9 above).

However, a noteworthy limitation of the shorter reference period (which must be considered when interpreting data) consists of its inability to capture the drinking patterns of infrequent drinkers (Allen & Wilson, 2003).

2.2.1.2 Creation of new show card

Another issue in relation to measuring alcohol consumption in SHARE has been the lack of a cross-national standardization of beverage sizes. In previous waves of SHARE, respondents have been asked to report the amount of "drinks" consumed, with an interviewer instruction stating: "As a rule of thumb, you can estimate that one drink is: 1 bottle/can of beer=33cl, 1 glass table wine=12cl, 1 glass fortified wine=8cl, and 1 glass spirits=4cl". However, the degree to which the respondent would correctly grasp the meaning of "a drink" based on this information was uncertain. Ensuring a standardization of alcoholic beverage sizes in a cross-national survey like SHARE was important in order to produce valid data that can be fairly compared across countries. There is tremendous cross-country variation in the size, products and alcohol content of alcoholic beverages. To give an example: what an Italian respondent might consider being "a drink" would different considerably in size and/or alcohol content from a Polish respondent would consider "one drink". It has been recommended to provide respondents with pictograms of what a standard unit (WHO, 2000) of different alcoholic beverages looks like as a way to assist them with how many "standard units" of alcohol they consumed during the reference period. Further, a study found that for cross-national surveys on alcohol consumption it is preferable to have respondents report the number of units of alcohol for each specific type of different alcoholic beverages (Gmel, Graham, Kuendig & Kuntsche, 2006).

Based on these recommendations, a show card was designed with pictograms of the quantity question in SHARE. If a respondent answered "yes" to have had at least one alcoholic beverage within the last 7 days, they are provided that show card (see Figure 2.3 above).

The show card lists typical alcoholic beverages (beer, wine, fortified wine, spirits) and the amount that constitute a unit of alcohol was written and illustrated by a pictogram of a typical container used to consume each of the four main types of alcoholic beverages. The respondent was asked to sum up the number of units of alcohol he/she has consumed within the last 7 days for each of the listed types of beverages. In the end, the total number of consumed units of alcohol was recorded by the interviewer in the CAPI instrument. For this last step, a copy of the show card was included into the recording booklet. The interviewer could write down the numbers given for each type of alcoholic beverage and sum them up in these recording booklets, an established procedure in SHARE to avoid computational

mistakes by the interviewer. National adaptations were permissible to account for the cross-cultural variation in alcohol consumption (for some examples of national adaptations, see the appendix of this chapter).

2.2.2. Methodological challenges and experiences made

The generic (English-language) show card served as a template for the national show cards (see Figure 2.1) and two types of changes were allowed to account for cross-country variation.

First, countries vary with respect to the unit of measurement for liquids: In some countries, drinks are measured in liters or its decimals, whereas other countries use deciliter or milliliter as a more common unit. So the show cards could be adapted to display the most-commonly used unit of measurement in a given country. This means that one country could include 120 ml of wine, whereas another country was allowed to call the same amount 12 cl of wine. However, the volume of the drink on the pictogram had to stay unchanged, as this volume defines one standard unit of alcohol. So no country was allowed to use e.g. 200 ml of wine instead of 120 ml even if in this country wine is served in glasses of 200ml.

The second change tackled exactly this problem, the volume of the drinks. As the volume of the pictogram defined one standard unit of alcohol, the volume was not allowed to change. However, countries vary a lot between glass sizes, especially for wine and beer. For this reason we allowed to include a conversion table for different sizes of glass, cans, or bottles in a table below the pictogram. Examples can be seen in the appendix below.

2.2.3 Preliminary results using the new alcohol measurement of SHARE Wave 6

First descriptive results show the variation across countries and how men and women differ within these countries.
Figure 2.4 shows the average number of units of alcohol consumed in the last week including all respondents who said that they did not drink at all. It can be seen that respondents in Israel, Estonia, and Poland reported drinking the lowest amounts, whereas French, Danish and Portuguese respondents reported the largest quantities across the European countries displayed in the figure. In all countries there was a large sex difference with women reporting less alcohol consumption than men.

When looking at the age distribution across countries (see Figure 2.5) it can be seen that the "oldest old" (85 and older) reported drinking the least units of alcohol (again including those who did not report drinking any at all).

2.2.4 Concluding remarks

Questions regarding alcohol consumption have been revised in order to improve the validity and cross-national comparability of data for the 6th wave of SHARE. The reference period for questions about frequency and quantity of alcohol consumption has been shortened compared to previous waves in order to minimize recall bias. Further, a show card has been included as a means to harmonize the concept of "a standard unit of alcohol" across countries, which will hopefully increase the validity and comparability across countries. The largest efforts were in making sure that national adaptations did not violate the harmonization without which SHARE would not be the internationally acclaimed data set that it is.

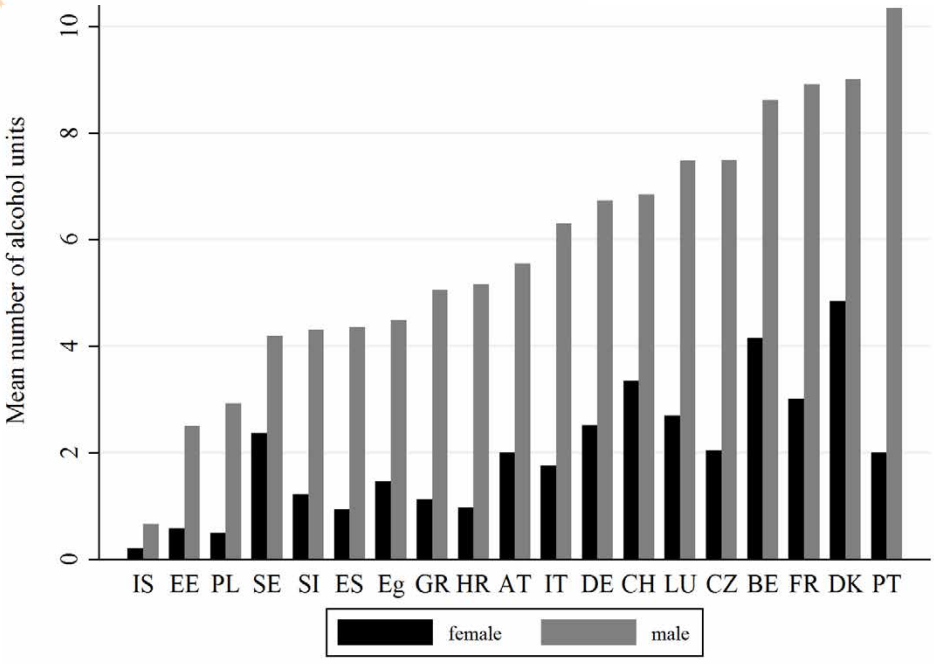


Figure 2.4. Weekly alcohol consumption by sex & country

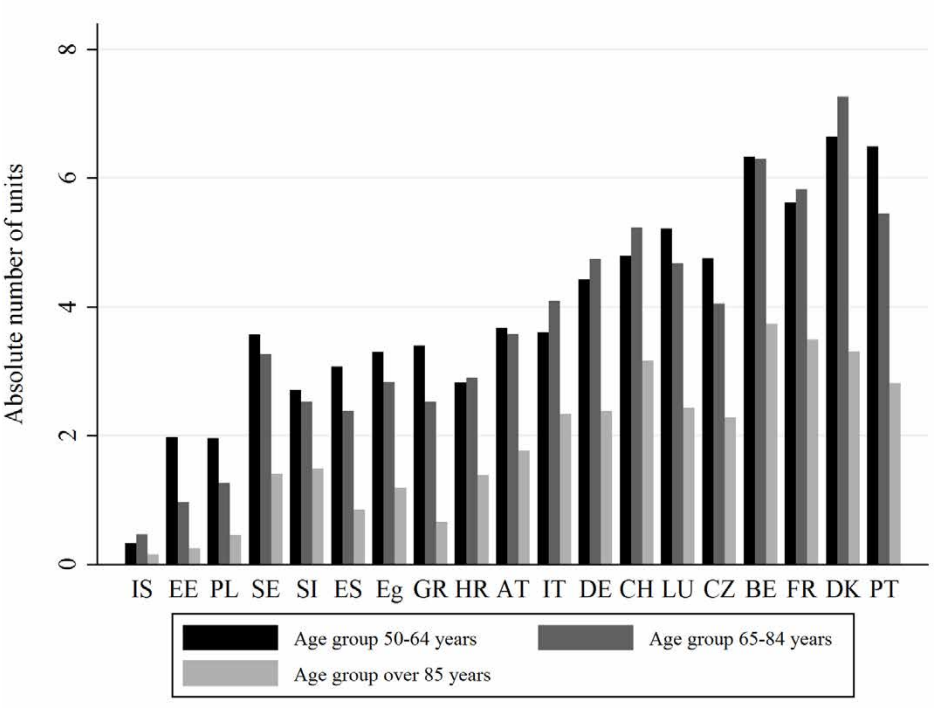


Figure 2.5. Weekly alcohol consumption by age group and country

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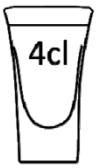
Appendix: Show cards of the new alcohol measure in three selected national adaptations

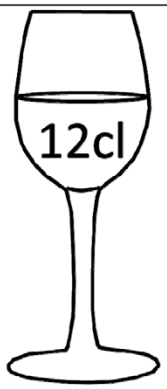
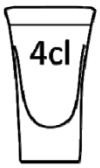
France

Boissons	Exemples	Nb d'unités
Bière 33 cl 4-6% d'alcool		[___] unités
Vin 12 cl 10-13% d'alcool		[___] unités
Vin liquoreux 8 cl (ex: muscat, madère, porto,…) 14-22% d'alcool		[___] unités
Spiritueux 4 cl (ex : pastis, rhum, eau-de-vie,…) 23% d'alcool ou plus		[___] unités
Veuillez additionner toutes les unités et recopier le nombre total dans le CAPI.	**total :**	**[___] unités**

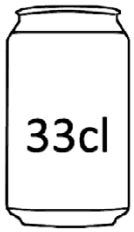
*Pour des bières de 25cl ou 50cl, utilisez la table suivante pour calculer les unités :

Pinte : 50cl		1		2		3		4		5
Demi : 25cl	1	2	3	4	5	6	7	8	9	10
Nb unités	**0,8**	**1,5**	**2,3**	**3,0**	**3,8**	**4,5**	**5,3**	**6,1**	**6,8**	**7,6**

Greece

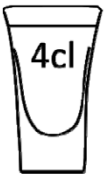
Ποτά	Παραδείγματα	Ν° από μεζούρες
Μπύρα 330 ml (ένα ποτήρι 500 ml είναι 1,5 μεζούρες) 4-6% αλκοόλ		[___] μεζούρες
Κρασί 120 ml (ένα συνηθισμένο ποτήρι κρασί σε εστιατόριο – όχι επιδόρπιο κρασί) 10-13% αλκοόλ		[___] μεζούρες
Ενισχυμένος Οίνος 80 ml (βερμούτ, μπράντι μαυροδάφνη) 14-22% αλκοόλ		[___] μεζούρες
Οινοπνευματώδες 40 ml (ουίσκι, βότκα, τσίπουρο, ούζο) 23% αλκοόλ και πάνω		[___] μεζούρες
Παρακαλώ αθροίστε όλες τις μεζούρες και αντιγράψτε τον αριθμό στο CAPI	**σύνολο:**	**[___] μεζούρες**

Spain

Bebidas	Ejemplos	N° de unidades
Cerveza 33 cl* (lata, tercio) 4-6% alcohol	 	[___] unidades

*Si el entrevistado bebe cerveza en vasos más pequeños, utilice la tabla siguiente para calcular las unidades:

Número de cervezas de **20cl** (quinto, caña)	1	2	3	4	5	6	7	8	9	10
Número de unidades	**0,6**	**1,2**	**1,8**	**2,4**	**3**	**3,6**	**4,2**	**4,8**	**5,4**	**6**

Vino 12 cl 10-13% alcohol		[___] unidades
Vinos generosos 8 cl (Vermú, moscatel, Jerez, Oporto, Madeira, vinos dulces,...) 14-22% alcohol		[___] unidades
Alcoholes destilados 4 cl 23% alcohol y más		[___] unidades
Por favor, sume todas las unidades y copie el número total en el CAPI	**total :**	**[___]unidades**

2.3 The "Job Coder"

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Maurice Martens, CentERdata

2.3.1 Introduction: Innovation in the job coding literature[2]

Knowing an individuals' occupation is important for many studies in social sciences. For instance in economics, sociology, and other disciplines occupation is often considered as a proxy for socioeconomic status. In this extensive literature, the quality of occupational data is hardly discussed, despite the fact that measuring occupation in social surveys is a rather complex issue. Handbooks by international organizations, including the International Labour Organization (ILO) (e.g. ILO, 2010) detail how to ask for occupation in Labour Force Surveys and Censuses. However, empirical research on best practices and on miscoding is scant.

The difficulty to provide researchers with an accurate measure of occupation firstly regards the choice of the methodology and the question(s) to include in the questionnaire, which in turn requires accurate training of the interviewers and an effective methodology for ex post conversion of job titles into occupational codes. The statistical agencies of 150 countries associated in the ILO have adopted the International Standard Classification of Occupations (ISCO) to harmonize the measurement of occupations. The Commission of the European Communities (2009) has adopted ISCO-08 as its occupational classification, and the European statistical agency Eurostat has put effort in supporting European countries in developing coding indexes for their occupation data collected in Labour Force Surveys and similar surveys. In 2012 almost half of the 150 countries used ISCO with the other half either not classifying occupations or maintaining their own classification (UN 2014).

The ILO provides a classification and task descriptions for all 4-digit occupational units in ISCO (ILO, 2014). The task descriptions provide also a coding index, but only in English. Therefore, coding occupations becomes particularly challenging in international surveys, such as SHARE where the occupational codes should be fully comparable across countries, because it is problematic for countries to map their specific occupations and job titles into the international ISCO categories.

Most of occupational information in survey data is obtained from direct questions addressed to respondents. The question about occupation is usually asked as an open text field (see for an overview of survey questions Tijdens 2014b). Open-ended questions allow classifying occupations at a detailed level of disaggregation, but their main drawback – excluding very recent developments discussed below – is that the text fields require recoding afterwards ('office coding'). The classification of occupational information is in fact achieved through a coding process that converts the reported job titles into a set of codes. That can be done manually or semi-automatically, using a computerized coding system ('computer-assisted coding') or by a combination of both. Manual coding requires a lot of training for coders and coders' supervisors (see Hoffmann, Elias, Embury and Thomas, 1995; Ganzeboom, 2008). A noticeable example of computer-assisted coding is represented by CASCOT

2 This section draws from Belloni et. al. (2016).

(http://www2.warwick.ac.uk/fac/soc/ier/software/cascot/) developed at the Institute for Employment Research in 1993 and since then continuously updated and used by over 100 organisations in the UK and abroad. Semi-automatic coding tools are becoming more and more reliable instruments using semantic matching with previously coded occupations. Recently, machine-learning algorithms appear to be a promising development, requiring a substantial amount of manually coded occupations to be used as training data for the automatic classification (Bethmann et al 2014; Cheeseman Day 2014).

Occupational information can also be obtained using a tick list, where respondents have to self-classify with a list of occupational titles. Depending on the survey mode, this list consists of a limited set of necessarily broad occupational groups in mail surveys or lists of thousands of items in web surveys. The main advantage with self-classification (or 'self-coding') is that surveys do not need a costly and time-demanding coding process. There are, however, many shortcomings with self-coding. A limited choice-set may result in lower data quality, because it is difficult to assure consistency in how respondents fit their own job titles into the highly aggregated categories, thereby introducing aggregation bias (De Vries and Ganzeboom 2008). Both the validity (correct categorization) and the reliability (same categorization made by different interviewers of equivalent responses) of pre-coded occupational categories have been shown to be very poor. An extensive look-up table with a search tree leads to drop-out in web-surveys, but this problem may be tackled in case of text string matching (Tijdens 2014a).

A very recent development in occupational coding procedures consists in the attempt of coding job descriptions during the interview. The main advantage of this approach is to give the interviewer the possibility to ask for an alternative definition of the interviewee's job, if the quality of the first given answer was poor. In this way, one may expect to increase coding quality and reduce the costs and efforts related to ex-post coding. A coding-during-the-interview approach was introduced in SHARE Wave 6 (so-called "Job Coder") developed by CentERdata (http://www.centerdata.nl/). A detailed description of the Job Coder used in SHARE Wave 6 is given in the next section; we also describe how occupational information was collected and coded in the previous waves of SHARE. In section 2.3.3, we describe the questions on occupation in SHARE Wave 6 and provide an evaluation of the Job Coder performance. In section 2.3.4.1, we describe the distributions of occupations by ISCO groups obtained using the Job Coder. In the same section (2.3.4.2), we compare these distributions with those obtained from the previous waves of SHARE (Waves 2 to 5). Section 2.3.5 concludes this chapter.

2.3.2 Occupational coding in SHARE: from manual ex-post coding to the Job Coder

Starting in Wave 1 up to Wave 6, SHARE adopted three different approaches to gather and code occupational information.

In SHARE Wave 1, respondents were asked the following open-ended question: "What is your [main/last] job called? Please give the exact name or title". This question was asked to both employed/self-employed and retired/unemployed individuals (the latter conditional on having worked earlier in life). SHARE also collects information on respondents' second job, parents' job and former partner's job. SHARE country teams manually coded the text strings on respondents' job titles into ISCO-88 (COM) – the International Standard Classification of Occupations in place at that time. Each country team hired and trained coders independently. Coders were asked to follow a protocol providing them with gui-

delines on how to code "critical" jobs (e.g. managers in agriculture or teachers). These guidelines were partly common to all countries, and partly language-specific. SHARE coders made also use of ancillary information on training and qualifications needed for the job (the latter was not included in the public release of the data) and on the industry the respondent was working in, based on the question "What kind of business, industry or services do you work in (that is, what do they make or do at the place where you work)?".On the one hand, SHARE coders were asked to code job descriptions at the maximum possible level of detail, i.e. at 4-digit or unit group ISCO-88 level. On the other hand, they were suggested to code unclear responses by means of trailing zeros: this means that in case they were unsure if a given job description could have been attributable to a given unit group, they should have attributed it to either a minor (i.e. 3-digits), sub-major (2-digits) or major (1-digit) group. Two variables – one for current main job (ep016_) and one for last job (ep052_) – reporting generated ISCO-88 codes were finally published (for further details, see MEA, 2013, p. 29).

SHARE Waves 2 up to 5 followed a tick list approach, completely defined within a menu. Respondents were asked to choose what best described their job among the following available alternatives (corresponding to the 10 major ISCO groups): 1. Legislator, senior official or manager; 2. Professional; 3. Technician or associate professional; 4. Clerk; 5. Service worker and shop and market sales worker; 6. Skilled agricultural or fishery worker; 7. Craft and related trades worker; 8. Plant and machine operator or assembler; 9. Elementary occupation; 10. Armed forces. However, this methodology seemed too restrictive, as respondents were forced to classify their jobs into one of the ten categories; in some cases, the meaning of these categories was not totally clear (such as "Elementary occupation").

Some efforts towards developing a semi-automated coding had already been made in the DASISH project (http://dasish.eu/) with the idea of extending the existing "CASCOT" coding, available in English, to other languages. However, bearing in mind that the CASCOT software has to be run ex post and code the open-ended answers provided by the respondents after the fieldwork is completed, the adaptation of the CASCOT methodology to all the SHARE languages proved highly ineffective and very complex, so this procedure was used only as a test on a restricted number of cases. Another approach was the use of the coding tools that were already developed by CentERdata for online questionnaires: this approach could not be pursued since interviewers` laptops would have needed an internet connection available during the interview.

In SHARE Wave 6, it was finally decided to reintroduce the finer and more informative coding of occupations (4 digits ISCO-08) by implementing a coding module into the questionnaire in the form of lookup tables to help interviewers finding the respondent occupation from an existing list. This was done through a "two-step" coding approach.

In the first step, the interviewer asks for the job title and fills the answer in open text format (Figure 2.6: DN_DN029_J field).

Next, a pop-up window appears (see Figure 2.7). This Job Coder window is a program developed in .NET that shows a list of job titles. As you type, it adapts the list to find the best matching job titles. One further advantage is that, while this program is running, all the interviewer actions are stored as to preserve all the relevant information.

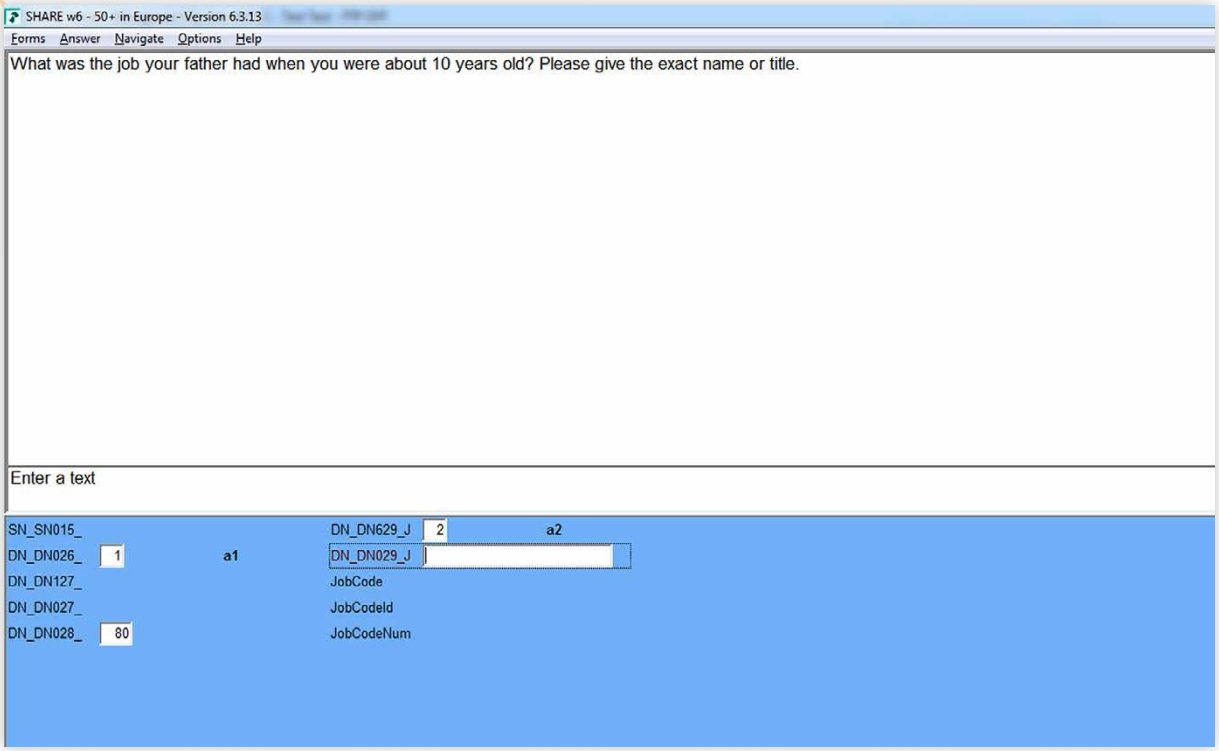

Figure 2.6. Screenshot of question on father's job (first step)

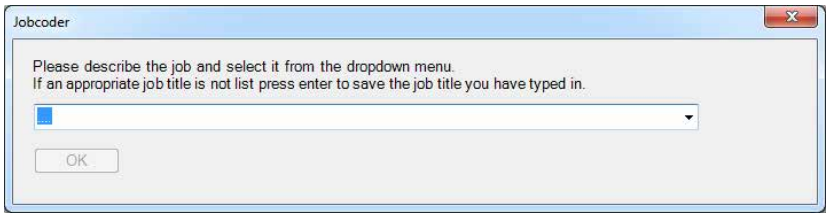

Figure 2.7. Screenshot of the Job Coder pop-up window

The searching procedure to find the best match is activated immediately: as the interviewer types, the list of matching occupations becomes smaller and smaller. Three scenarios could play out at this stage:

a) The list shows up empty because there is no matching job title with what the interviewer filled in. This could indicate the interviewer printed a typo, or that the job title was not available in the list. The interviewer was trained to first check if the spelling was correct and if so to ask for an alternative name of the occupation in the hope there was a match. If there ultimately was no matching job, they could type in any job title and continue nevertheless.

b) A small list of job titles is shown. The interviewer could then pick the correct one, or read out the options to the respondent and find the correct job title (e.g. Figure 2.8).

c) A large list of job titles matches with the entered answer. In this case, there is a need for a more specific description. The interviewer asks the respondent to further specify or rephrase (e.g. Figure 2.9).

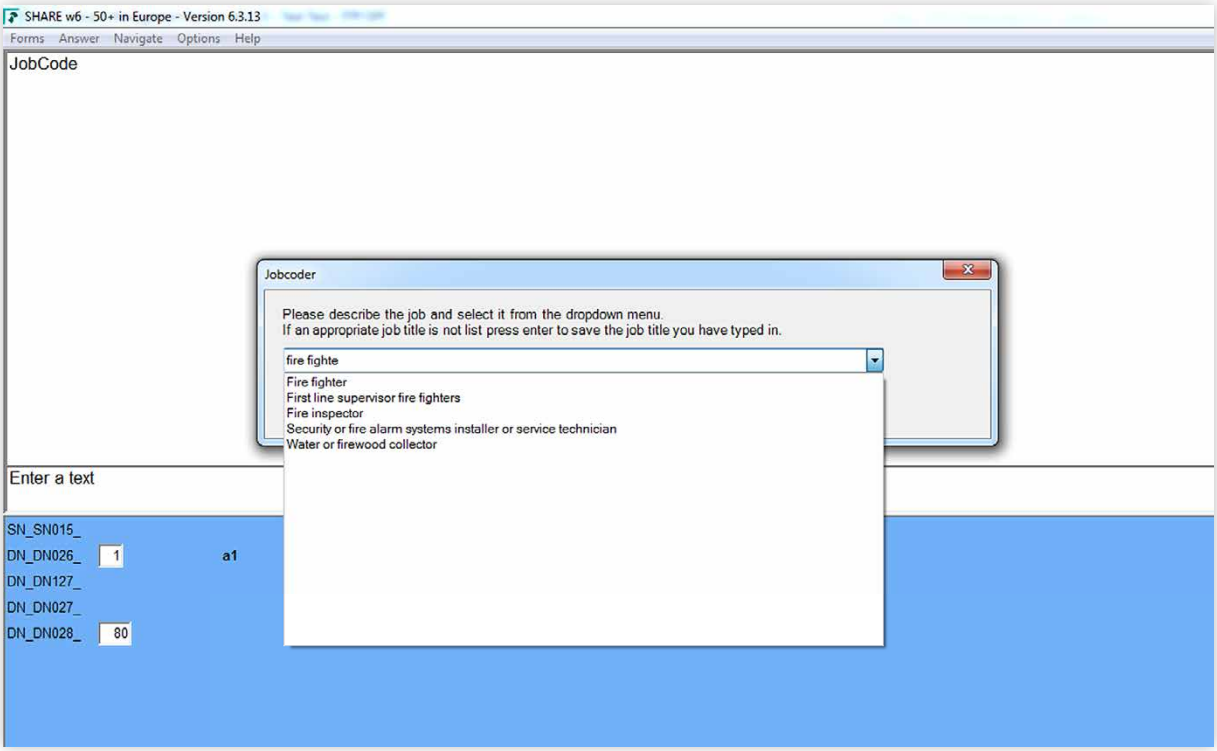

Figure 2.8. Screenshot of the Job Coder in action (second step: A small list of job titles is shown)

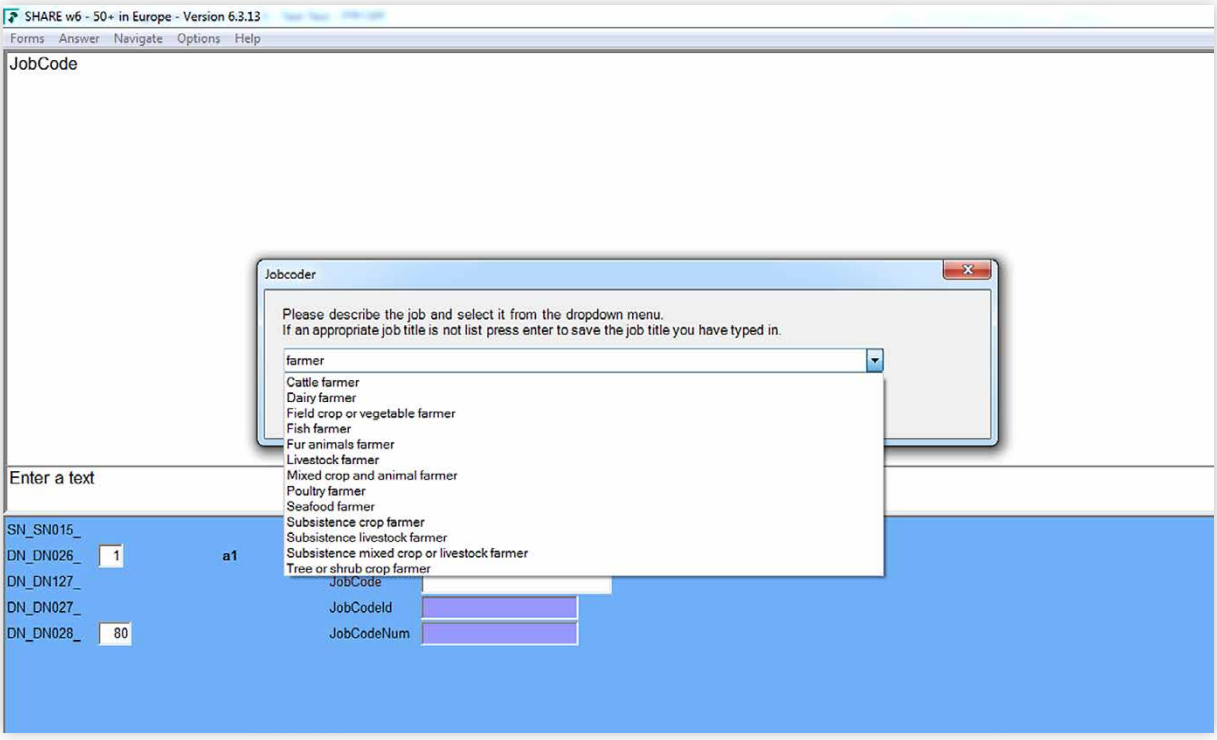

Figure 2.9. Screenshot of the Job Coder in action (second step: The interviewer asks the respondent to further specify or rephrase)

When the respondent selects a job title and clicks the OK button, several fields in the database get set (Figure 2.10). The ISCO-08 code (JobCodeid field), the selected job title (JobCode field) and the typed in field DN_DN029_J field) are stored.

The SHARE CAPI instrument was developed in the Blaise language. Blaise provides some options to show and use lookup tables while running. Therefore, one option could have been to build the Job Coder in Blaise and add it to the SHARE CAPI. However, some important characteristics could not be handled in this way, namely full tracking of the steps involved and an improved search algorithm capturing the character sets that we needed to support. Hence, we developed an external tool that could be called from Blaise.

The main challenge to create the Job Coder was to obtain an appropriate list of job titles, coded into ISCO-08 in all languages used in SHARE. The "Wageindicator" project (http://www.wageindicator.org/main) provided us with lists of 2,000 to 4,000 ISCO-08 coded job titles in almost all SHARE languages. Exceptions were Israel (Hebrew) and Estonia: the involved country teams provided for similar lists in their own countries.

Obviously, the development of an innovative software such as the Job Coder required feedback from the country teams and was not free of criticism during its implementation. After a test run in the pretest phase of the SHARE Wave 6 development, some problems emerged in some countries. Sometimes the software did not behave properly or the Job Coder did not open up at all. This had to do with the set

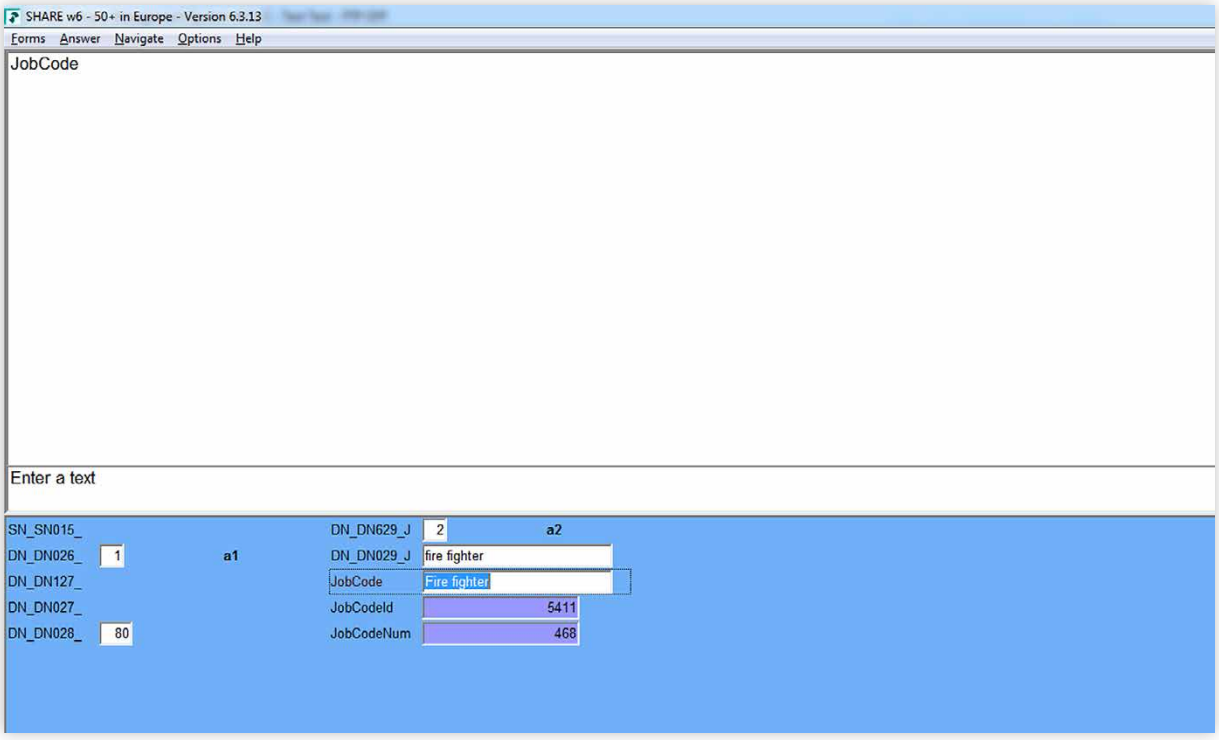

Figure 2.10. Screenshot of the Job Coder in action (second step: when the respondent selects a job title and clicks the OK button, several fields in the database get set)

of libraries that needed to be installed on the interviewer's laptops, which were not always preinstalled. These problems were solved once these DLL's were added to the installer.

Some country teams voiced dissatisfaction with the list of occupations: many felt the list was not exhaustive[3]. Some countries provided their own ISCO code lists, which replaced the list that were used in the pre-test when there would be time-saving. After careful reviewing the problems encountered in the pre-test, and after estimating to what extent these issues could be repaired, it was decided to also apply the Job Coder in the main fieldwork. Unfortunately, in Denmark the Job Coder failed to work, mostly due to miscommunication between software developers and the Danish agency. From a technical point of view, the lack of functioning in this country was due to installation problems in the interviewers' laptop.

2.3.3 Description of questions and the Job Coder performance

The questionnaire contains five questions on occupation: two in the Employment and Pensions module (EP616_, EP152_), two regarding the parents' occupations (DN029_) and one regarding the partner's occupation (EX603_).

The first question (EP616_) asks the respondents for the title of their current job. The question is asked to all the baseline reporting to be employed (EP005==2) or to have done some paid work during the last four weeks previous to the interview (EP002==1). It is also asked to panel respondents who report that there have been changes in their job since the previous interview. EP152_, instead, refers to the respondent's last job. This question is asked only to baseline respondents who report to be retired from work or unemployed or in general not employed at the time of the interview, but who have done some paid work in the past. Note that the routing for both EP616_ and EP152_ (EP016_ and EP052 respectively in Waves 2 to 5) remained the same in all the waves of the survey successive to the first one.

In the DN module, the baseline cases are requested to report their parents' jobs when they were 10 years old (DN029_). We observe that there has been an important change starting with Wave 4, because in Waves 1 and 2 this question was asked for the parents' last jobs. Moreover, while this information was always collected as an open answer, in Waves 2 to 5 it has not been released because the raw string data have not been coded.

Finally, item EX603_, which collects the title of the partner's job for all the baseline cases whose partners cannot or refuse to take part in the interview, was introduced in Wave 6 for the first time and consequently does not allow for a comparative study across waves.

To assess the performance of the Job Coder, we define and classify possible outcomes of the routine into four categories: "coded", "string not coded", "refusal/don't know" and "fail/missing". The first category includes all the answers that have been coded during the interview as output of the Job Coder, meaning that an ISCO code has been associated to the open answer of the respondent. The second case, "string not coded", refers to the situations in which the individuals provided an open answer to the occupation

3 Many complained that "farmer" and "housekeeper" were not in their country list. It has to be pointed out, however, that farmers is a too vague definition in terms of ISCO (i.e. there are many types of farmers differently classified into ISCO groups depending on their tasks and duties, see screenshot 2.9); there is no ISCO code for "housekeeper".

query but the Job Coder was unable to generate/associate an ISCO code. The "refusals/don't know" are the cases in which the respondent refused or did not know how to answer the question (recorded as –2 and –1 respectively). Finally, the "fail/missing" are the situations in which, due to technical problems, a missing value is registered and, as a result, the ISCO variable is also missing.

The analysis of the Job Coder performance is carried out on SHARE Wave 6 release 0. In Table 2.10 we report the total number of occupational questions asked in the survey and the percentage of answers falling into the first two categories defined above, by country and by questionnaire module.[4] From these figures we observe that the share of answers coded by the Job Coder in the EP module (where the frequency of occupational questions asked is highest) is generally around or above 80 percent, except for Luxemburg (70 percent) and Denmark (see Section 2.3.2). Exceptionally high percentage of coded answers have been obtained in Sweden and Portugal (around 90 percent).

Leaving aside Denmark, there are about 4815 cases (out of 26387 questions regarding occupation) of "string not coded". It is important to distinguish between two alternative types of the Job Coder failure: the first one (42 percent of these failures) occurs when the respondent's string-answer was not coded, and that string-answer was identical to that given by another respondent in the same country whose job title was coded. This type of failure may be the result of lack of compatibility between the application and the specific laptop in use. In fact, a high frequency is observed in some specific countries (see Table 2.11, "type of failure 1"). The second case ("type of failure 2" in Table 2.11) is when a string-answer was not coded due to other reasons which comprise: typos in recording the answer, laptop-application incompatibility, but also the incompleteness of the job list in some countries.

4 The analysis by country is particularly interesting because different results may also reveal language/translation-related issues. Note that the remaining percentages (very low) concern answers falling into one of the other two categories ("refusal/don't know" and "fail/missing"). Therefore, the sum of percentage of coded and "string not coded" in Table 2.10 does not necessarily sum up to 100.

Table 2.10 Total number of occupational questions in SHARE Wave 6 and percentage of coded/"string not coded", by country and module

	Total number of occupational questions, by module			Percentage of coded answers, by module			Percentage of "string not coded" answers, by module		
Country	**EP**	**DN**	**EX**	**EP**	**DN**	**EX**	**EP**	**DN**	**EX**
Austria	139	63	2	82.0	85.7	100.0	18.0	7.9	0.0
Germany	385	86	1	80.5	82.6	100.0	18.7	16.3	0.0
Sweden	572	172	1	89.9	89.0	100.0	9.4	9.3	0.0
Spain	233	152	7	84.5	87.5	71.4	8.2	7.2	28.6
Italy	1192	1176	62	86.4	83.6	83.9	12.5	15.5	16.1
France	539	378	75	82.2	73.8	86.7	17.6	25.1	12.0
Denmark	695	403	59	1.0	0.7	3.4	97.3	98.5	96.6
Greece	2191	2898	74	76.4	69.2	75.7	23.1	30.3	20.3
Switzerland	267	45	3	78.3	80.0	100.0	20.6	15.6	0.0
Belgium	1405	1320	141	86.6	84.3	85.8	12.9	15.1	13.5
Israel	174	92	4	81.6	81.5	50.0	12.1	8.7	0.0
Czech Republic	358	180	0	77.4	68.3	0.0	18.7	26.1	0.0
Poland	427	502	45	84.1	82.1	88.9	15.5	15.9	8.9
Luxembourg	488	489	70	70.3	71.6	70.0	29.1	27.0	30.0
Portugal	251	173	3	90.8	90.2	100.0	7.6	3.5	0.0
Slovenia	1563	1390	90	82.7	80.9	73.3	16.9	17.1	20.0
Estonia	961	1019	81	86.9	86.3	91.4	11.0	8.2	4.9
Croatia	2241	2162	45	80.1	79.1	82.2	19.3	19.9	17.8
TOTAL	**14081**	**12700**	**763**	**78.0**	**76.1**	**75.9**	**21.0**	**22.3**	**21.9**

Table 2.11. Frequency and percentage of "string not coded", by type of Job Coder failure and by country (all modules)

	Frequency		Percentage	
Country	**type of failure 1**	**type of failure 2**	**type of failure 1**	**type of failure 2**
Austria	1	29	3.3	96.7
Germany	13	73	15.1	84.9
Sweden	15	55	21.4	78.6
Spain	3	29	9.4	90.6
Italy	162	179	47.5	52.5
France	55	144	27.6	72.4
Greece	967	431	69.2	30.8
Switzerland	1	61	1.6	98.4
Belgium	92	307	23.1	76.9
Israel	3	26	10.3	89.7
Czech Republic	16	98	14.0	86.0
Poland	47	103	31.3	68.7
Luxembourg	36	259	12.2	87.8
Portugal	1	24	4.0	96.0
Slovenia	150	370	28.8	71.2
Estonia	66	128	34.0	66.0
Croatia	412	459	47.3	52.7
Total	2040	2775	42.4	57.6

2.3.4 Descriptive analysis

2.3.4.1 Results from the Job Coder in Wave 6

In what follows we briefly describe the results of the coding process in the sixth wave of SHARE (release 0). To highlight the quality of the information retrieved while preserving a parsimonious representation, we rely on occupation ISCO codes at 1, 2 and 3 digits respectively, by gender. We do not provide details by country – since for some of them the refreshment sample was very small[5] – neither show results at ISCO 4-digit level.

Figures 2.11, 2.12 and 2.13 respectively present the distribution of the current, last and parents' job of the respondent, by ISCO major group (1 digit) and by gender.

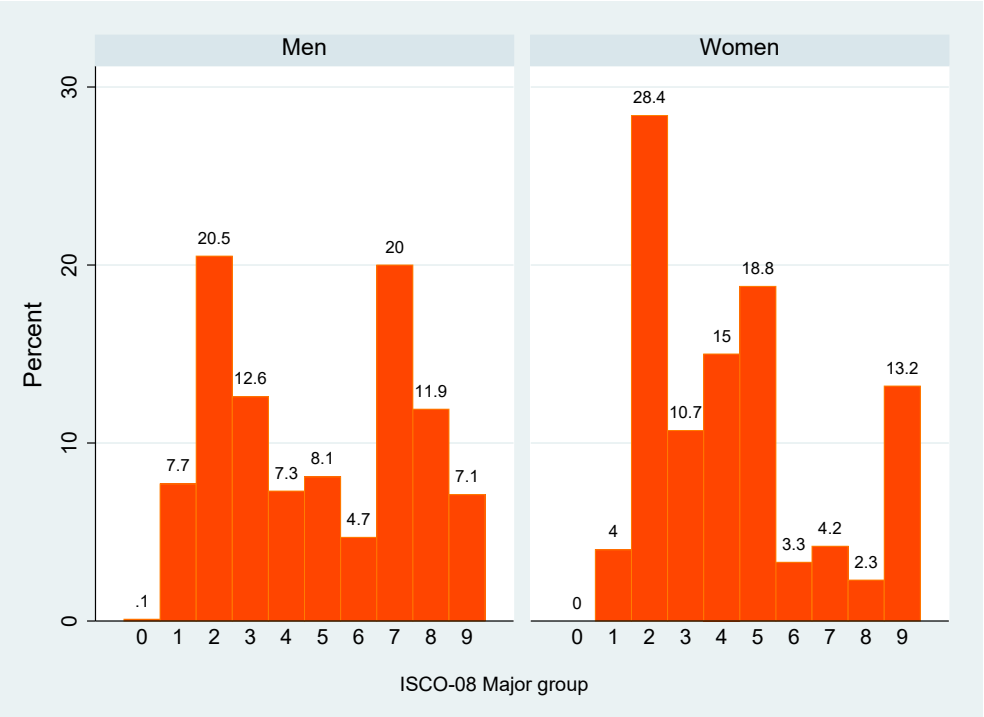

Figure 2.11. Distribution of current job, by ISCO major group (1 digit) and by gender – SHARE Wave 6

***Legend:** 0 = Armed Forces occupations, 1 = Legislators, senior officials and managers, 2 = Professionals, 3 = Technicians and associate professionals, 4 = Clerks, 5 = Service workers and shop and market sales workers, 6 = Skilled agricultural and fishery workers, 7 = Craft and related trades workers, 8 = Plant and machine operators and assemblers, 9 = Elementary occupations.*

There are marked gender differences emerging from Figure 2.11. Women are concentrated in a few major ISCO groups such as "Professionals" (28 percent), "Service and sales workers" (19 percent) and "Clerical support workers" (15 percent). They are hardly represented in some others such as "Skilled agricultural, forestry, fishery workers" and "Plant and machine operators and assemblers". Men are spread more

5 As detailed previously, the Job Coder mostly operates on the sample of baseline cases.

uniformly than women across the ten categories even if "Professionals" and "Craft and related trades workers" show a significantly higher prevalence. Important differences also emerge across genders for occupations such as "Managers" (7.6 percent men vs. 4 percent women) and "Elementary occupations" (7.1 percent men and 13.2 percent women). To be noted that the ISCO major group "Armed forces occupations" is practically not represented in the data.

The distribution of last job reported in Figure 2.12 shows, in some cases, patterns that are similar to the current job: examples are "Managers" and "Elementary occupations". Remarkably, last jobs of men are highly concentrated in the "Craft and related trade occupations" (almost 27 percent; cf. with 20 percent for current job). Differences between distributions in Figure 2.11 and 2.12 might be due to several reasons, including differences in pension eligibility rules across jobs and countries. Finally, the distribution of parents' occupations as reported in Figure 2.13 is, as expected, shifted to the right with respect to current (and to lesser extent) last job: occupations characterized by high skills and/or higher education are less frequent both for men (fathers) and women (mothers).

In Figures 2.14 and 2.15 we show the distributions of men's (Figure 2.14) and women's (Figure 2.15) current job at a finer level of coding: ISCO-08 2 digits level (sub-major groups). Figure 2.14 shows that a large percentage of men was employed both in low skill jobs such as "Drivers and mobile plant operators" (about 9 percent) or "Metal, machinery and related trades workers" (around 7.2 percent) and in higher-skill jobs such as "Science and engineering associate professionals" (almost 8 percentage points). Clerical or service jobs are characterized by percentages around 3 percent (e.g. "General and Keyboard Clerks", "Legal, social and cultural professionals", "Teaching professionals"). Occupations of women (Figure 2.15) are typically related to education, services and health-care, i.e. they are in ISCO groups such as: "Teaching professionals" (approximately 10.7 percent), "Cleaners and helpers" (9.4 percent) and "General and keyboard clerks" (7.4 percent), "Sales workers", "Personal service workers" and "Health professionals" (between 6.5 percent and 6.7 percent).

Finally, Figures 2.16 and 2.17 present the distribution of current occupation at 3-digit level of ISCO-08, for men and women respectively. The picture of the typical occupations of men, given also the previous figures, becomes clearer: there is a high prevalence in jobs such as: "Heavy trucks and bus drivers" (4.5 percent), "Building frames and related trades" (4.1 percent), "Engineering professionals", "Machinery mechanics and repairer", "Electrical equipment installers". Office clerks and Sales and Purchasing agents are less prevalent (around 2.6 percent). The most typical occupations of women are by far "Domestic, hotel and office cleaners and helpers" (about 8.7 percent), followed by "Primary school and early childhood teachers" (around 4.7 percent) and "General office clerks" (4.5 percent).

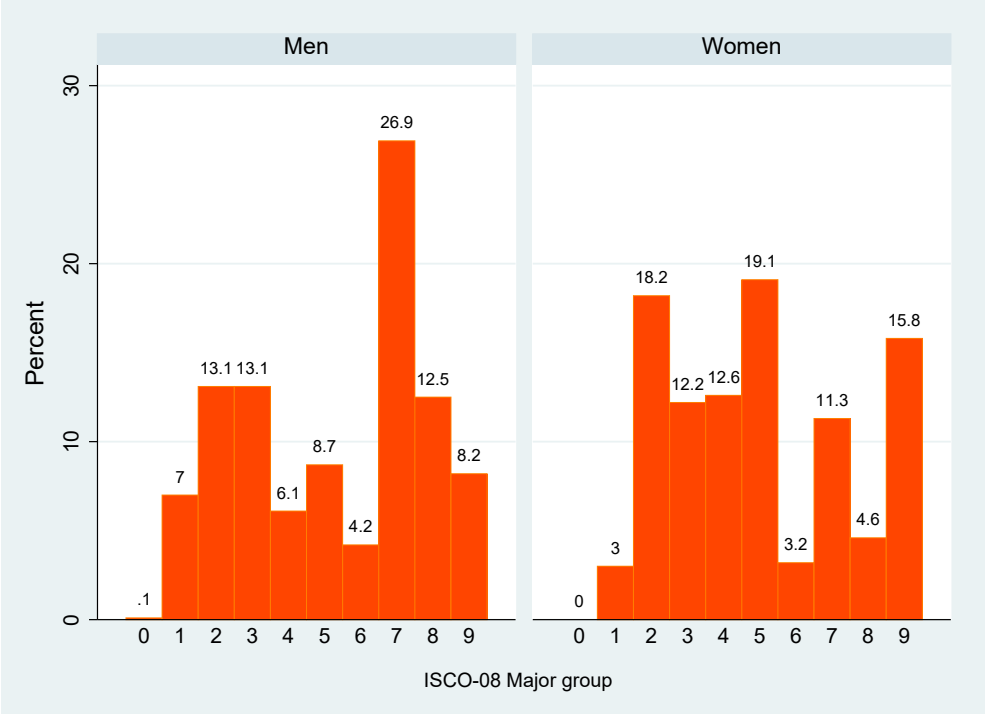

Figure 2.12. Distribution of last job, by ISCO major group (1 digit) and by gender – SHARE Wave 6.

Legend: see Figure 2.11.

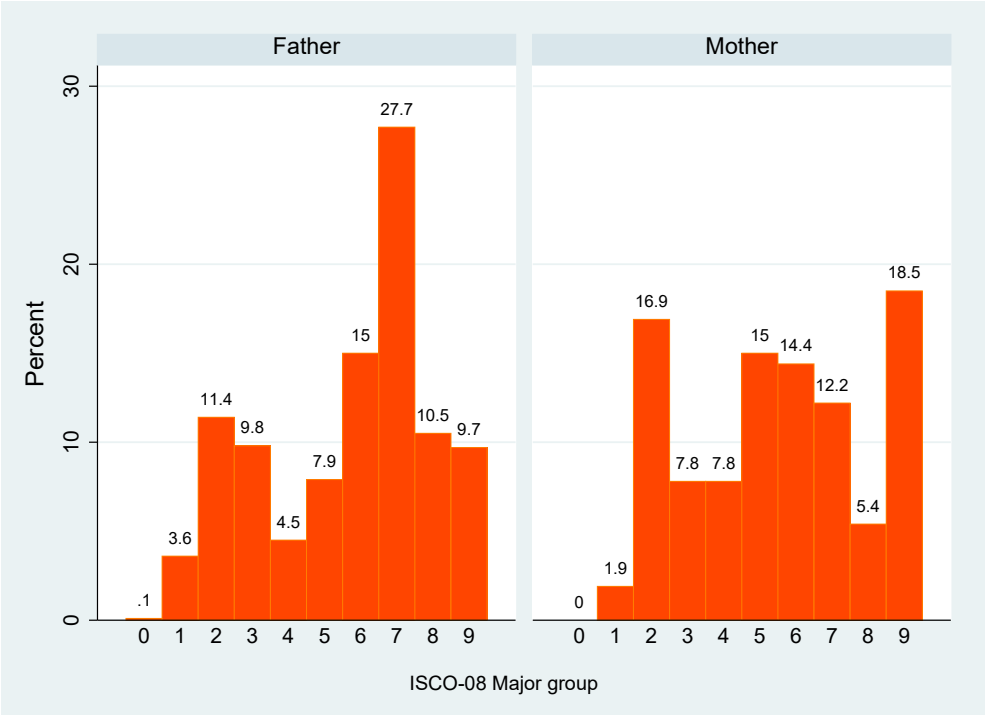

Figure 2.13. Distribution of father and mother's job, by ISCO major group (1 digit) and by gender – SHARE Wave 6.

Legend: see Figure 2.11.

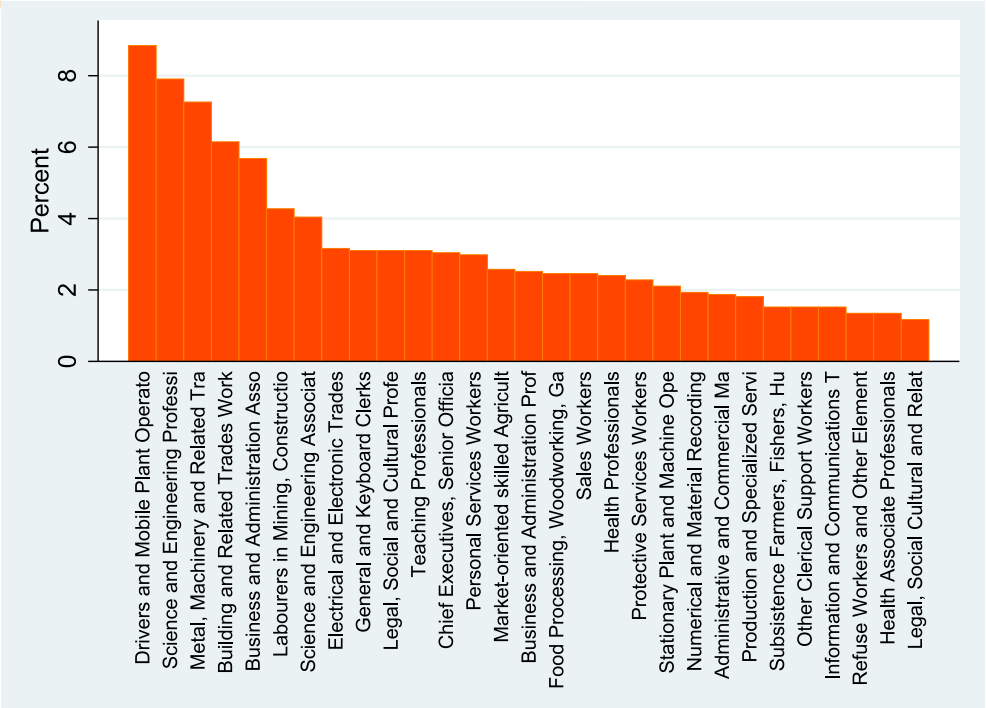

Figure 2.14. Distribution of men's current occupation by ISCO-08 sub-major group (2 digits)

Note: groups with a percentage lower than 1 percent are not reported

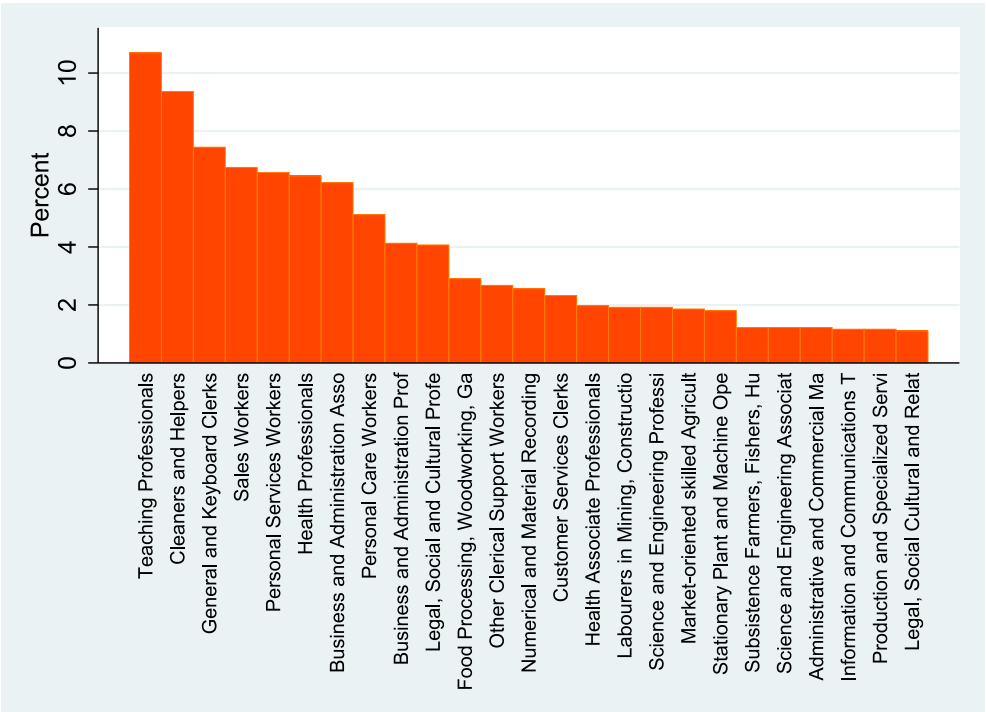

Figure 2.15. Distribution of women's current occupation by ISCO-08 sub-major group (2 digits)

Note: groups with a percentage lower than 1 percent are not reported

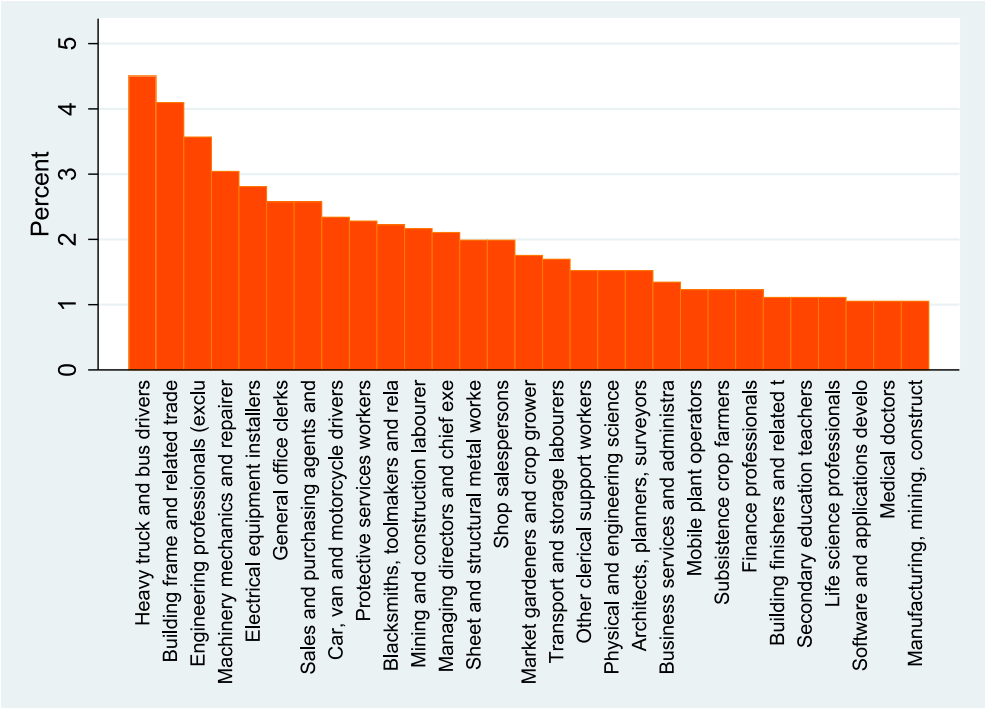

Figure 2.16. Distribution of men's current occupations by ISCO-08 minor group (3 digits)

Note: groups with a percentage lower than 1 percent are not reported

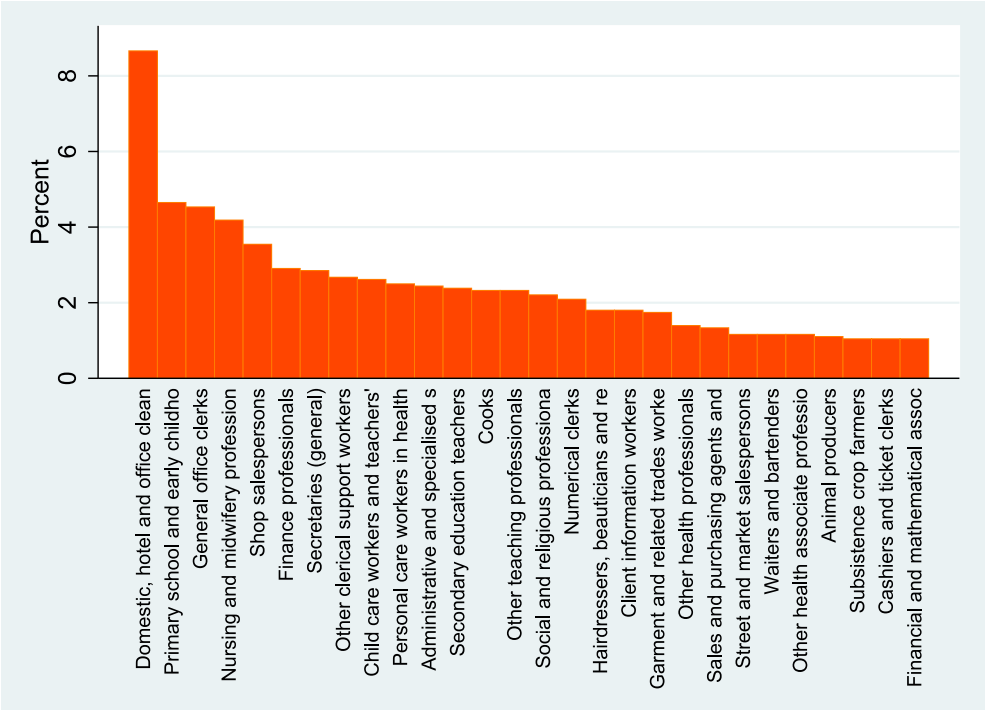

Figure 2.17. Distribution of women's current occupations by ISCO-08 minor group (3 digits)

Note: groups with a percentage lower than 1 percent are not reported

2.3.4.2 Comparing the results of occupational coding across waves

In this section, we compare the recorded occupations of the different waves of SHARE. In particular, we compare Waves 2, 3, 4, 5 with Wave 6. In Waves 2 to 5 the respondents had to pick their occupation from a menu-driven set of ten categories that corresponded to the ten ISCO-88 major groups. Hence, comparison must be carried out at the 1-digit level. Most importantly, as outlined in the introduction, results among waves are very difficult to compare because the tick-list approach tends to give biased distributions even at 1-digit level.

Figures 2.18 and 2.19 compare the distribution of current occupations, for men and women respectively, in Wave 2 up to Wave 5, vis-à-vis that of Wave 6. Some similarities emerge between the two distributions, for example in terms of the overall shape of the distribution for both genders and the prevalence of "craft and related trades workers" for men. There are, however, more differences than similarities across waves. In the case of men we observe statistically significant differences in the prevalence between waves for five groups out of ten, while in the case of women this occurs for three groups only ("Professionals", "Clerical support workers" and "Service and sales workers"). The "Professionals" category displays higher prevalence in Wave 6 than in Waves 2-5 (for men: 14.3 percent vs. 20.5 percent; for women: 15.1 percent vs. 28.4 percent).

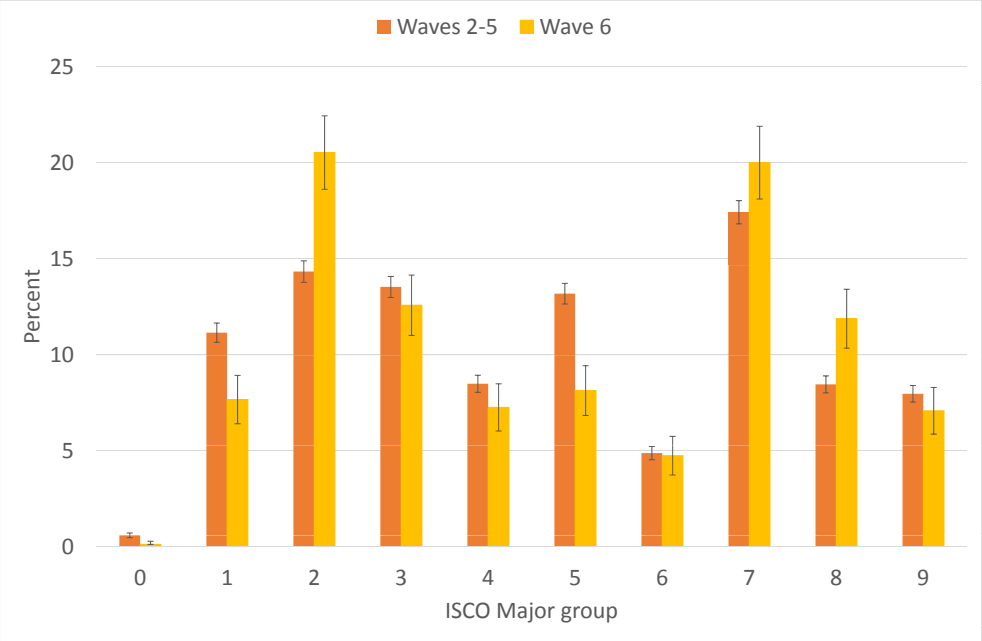

Figure 2.18. Distribution of men's current occupation by ISCO major group (1 digit): SHARE Waves 2 to 5 vs. Wave 6

Legend: see Figure 2.11.

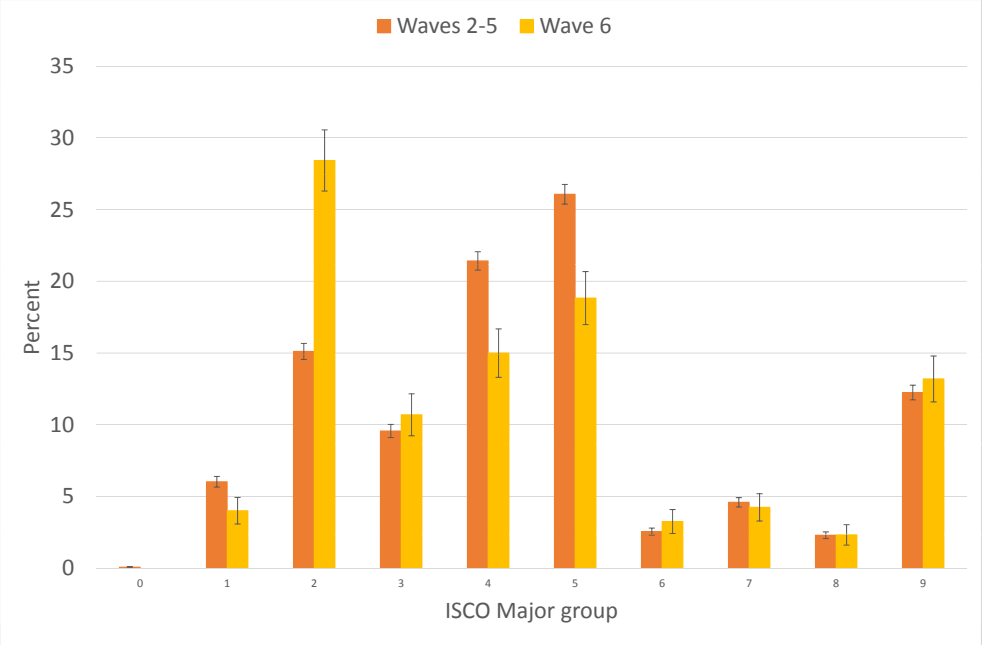

Figure 2.19. Distribution of women's current occupation by ISCO major group (1 digit): SHARE Waves 2 to 5 vs. Wave 6

Legend: see Figure 2.11

Similar patterns can be observed when comparing the corresponding distributions of last job (Figures 2.20 and 2.21, for men and women respectively). Indeed, while for men the prevalence of working as "Technicians and associate professionals" are almost equal in the past waves and in Wave 6 (about 13 percent), the percentage of "Professionals" and "Craft and related trades workers" has increased notably in Wave 6 (13.1 and 26.9 percent respectively in Wave 6, versus 9 and 20 percent respectively, in the previous waves). For women, the distribution in Wave 6 shows a significant increase in the prevalence of "Professionals" and "Technicians and associate professionals". Finally, for both men and women the distribution displays an important decrease in "Elementary occupations" (from 12 to 8.2 percent for men and from 20.7 to 15.8 percent for women).

These patterns may reflect different drivers: on the one hand, young generations tend to be employed in high-skill jobs, on the other hand, self-reported occupation if constrained within a fixed number of categories may create a bias away from "professional" and detailed occupation coding.

The result that the younger generations may be more concentrated in high-skill occupations is confirmed by the comparison, for the same survey waves, of the distribution of the last (collected for retired or unemployed individuals) and current occupation (collected for individuals who are employed at the time of the interview – hence younger cohorts). The latter shows a shift towards the high-skill occupations for both genders and both in the case of Waves 2-5 and of Wave 6.[6]

6 We could not perform a similar analysis for the parents' jobs because in the Waves 2- 5, although the answer was collected by means of an open question (and not self-classified), the information was not processed nor was released.

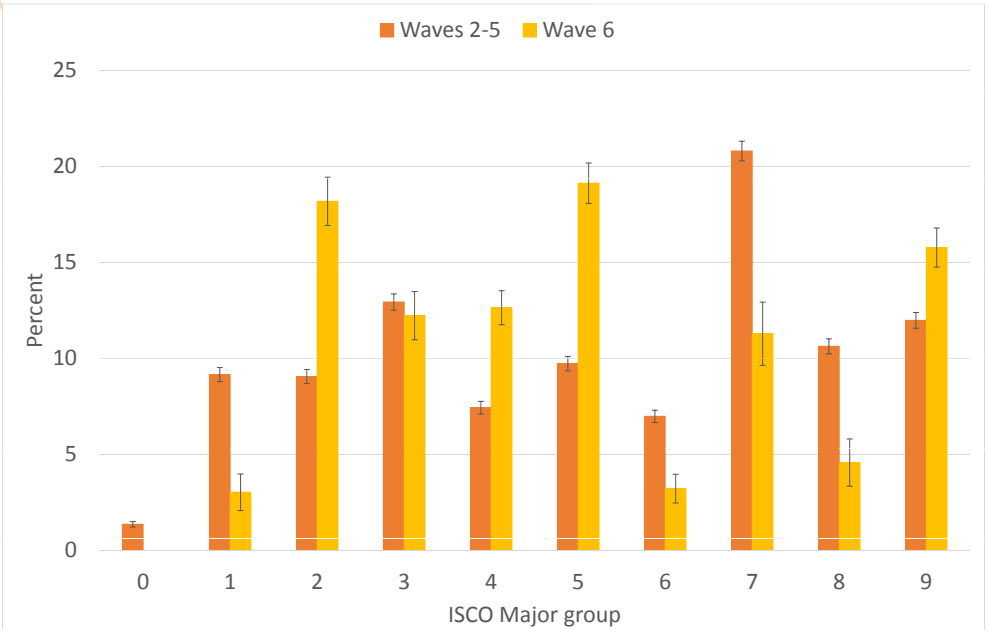

Figure 2.20. Distribution of men's last occupation by ISCO major group (1 digit): SHARE Waves 2 to 5 vs. Wave 6

Legend: see Figure 2.11.

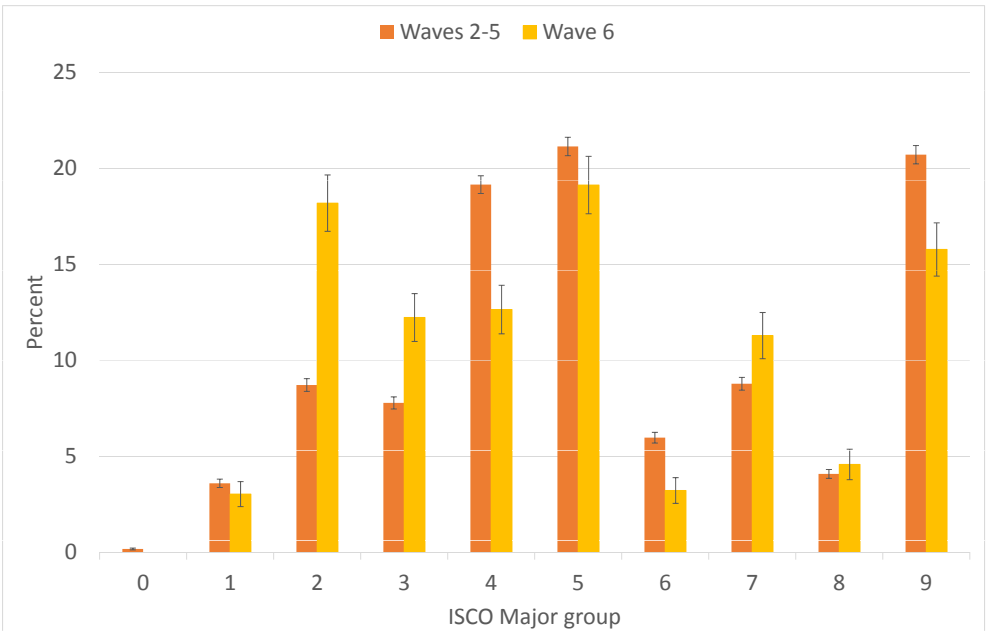

Figure 2.21. Distribution of women's last occupation by ISCO major group (1 digit): SHARE Waves 2 to 5 vs. Wave 6

Legend: see Figure 2.11.

2.3.5 Conclusions

The present analysis shows that, except for Denmark, the overall performance of the Job Coder was good. Portugal and Sweden were the countries where the application worked better (it could code 90 percent of the answers in the EP module). Luxembourg was the country where the Job Coder was less effective still coding about 70 of the cases in the EP module. We observed sensible differences between the Job Coder-coded answers in Wave 6 and the self-classified ones in the previous waves (2-5): the descriptive analysis shows a very clear shift from the low skilled occupations towards high skilled ones in the more recent wave. While the coding method is for sure not neutral to the observed variations, it is not clear how much of these should be attributed to it and which share is due to changes in the occupation types between cohorts and to the diversity in the refreshers' composition by country.

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3 Software innovations in SHARE Wave 6

Iggy van de Wielen, Maurice Martens and Arnaud Wijnant, CentERdata

Software tools are essential for the management of fieldwork for a multi-country, multi-lingual data collection project such as SHARE. Since the beginning of the SHARE project, for-profit survey agencies that are hired to do the fieldwork, have been supplied with harmonized standardized tools that helped them to plan, complete and monitor interviews with respondents. Although most of the software can been reused in the various waves of SHARE, every wave has new challenges that call for changes and updates to the software. Some of the adaptations are due to new user requirements in the data collection instruments, others are driven by the changes in the technical environment; as hardware and operating systems change over time.

The software development process for the first three waves of SHARE focused primarily on providing the functionality needed by the agencies. In Waves 4 and 5 there was some more emphasis on the performance of this software. In Wave 6 the primary technical focus was on adapting the tools to the changing software environment. By the time the fieldwork for Wave 6 started, Windows 8 had become a widely used operating system, therefore the software tools needed to be extended to be compatible with Windows XP, Windows 7 and Windows 8. Supporting these operating systems and the associated security settings were one of our main goals for this wave.

Another challenge for Wave 6 was the need to support multi- or mixed-mode interviewing that integrates various traditional modes of collecting interviews. The functionality to support this was tested in a separate pilot project to explore the possibilities for multi-mode interviewing in SHARE in the future.

The bi-weekly data transfer of completed interviews and contact information between the survey agencies and SHARE during the fieldwork was also addressed in Wave 6. In earlier waves monitoring reports describing the state of the fieldwork were generated on the data collection servers at CentERdata. The contents of these reports were however the responsibility of the SHARE central team in Munich (MEA), which did not have direct access to these servers. In order to streamline this process and to give more control over the contents to MEA and to be able to react more quickly to changes in the requirements for monitoring reports, the generation of reports was moved from these servers. A whole new data delivery procedure was developed using an online tool. Data was generated in a raw data format and delivered to the MEA team for further processing and creation of monitoring reports.

The questionnaire design also presented some new technical challenges in Wave 6. As in earlier waves children were already preloaded, but in addition to that Social Network members were also preloaded in Wave 6. Hence, routing had to be developed to link these preloaded persons to the set of network members found in the current wave. The Translation Management Tool was further improved to include complex translation processes. A coding module for occupations was introduced which allowed for the ISCO coding of occupations during the interview.

3.1 Software components and security levels

The software used to manage the fieldwork in a SHARE country has been developed in JAVA with the use of the Eclipse Rich Client Platform (Eclipse RCP). This platform takes care of different user interface elements used in computer applications like forms, menus dialogs, etc. To make sure that all Windows versions were supported we were forced to upgrade the software components to match the new architecture of the Eclipse RCP. The Eclipse Foundation included in their new architecture a compatibility application programming interface so we could still reuse software components built upon the previous Eclipse RCP version.

The new Eclipse RCP version included a lot of new technologies but also abandoned a lot of the previous ones. As the Information technology techniques change more rapidly we were forced to upgrade the software in conformation with these new standards.

3.2 Data handling & data protection in SHARE

For Wave 6 the data protection standards have been adapted to the latest standards.

All data entered in the data collection software are stored in a password protected database. The database containing the interview data is stored in Blaise files which can only be read by the Blaise interview software.

The transaction files that were used to communicate between laptops in the field and a server at the fieldwork agency contain the database and Blaise files. These files will only be available in an encrypted state at both sides using the SHA-256 and AES encryption. Each laptop uses a personal hash and each transaction uses a unique salt. Without those two parameters the transaction file cannot be decrypted.

When the survey agency exports the collected data from the country server to CentERdata, the communication is also done using the encrypted transaction mechanism. The data is stripped of direct identifiers (last names, addresses, phone numbers, e-mail) before it is sent to the CentERdata server. The direct identifiers are kept strictly separated from the interview data from this point onwards, this information on identifers stays at the survey agency.

The transfer of these files can be automated using a SFTP or FTPS server at the country server side of the communication. The Client has a build-in FTPS/SFTP-client to send the files to an FTPS/SFTP-server. Besides a password login a client side certificate-based login is supported since Wave 6.

3.3 Multi and mixed mode

The SHARE software was in Wave 6 upgraded to support multi and mixed modes. The supported modes are:

CAPI	face-to-face interviewing
CATI	telephone interviewing
CAWI	web-based interviewing
CASI	computer assisted self-interviewing

The software uses a mode identifier to decide to which endpoint the sample data needs to be send. For CAWI and CATI, the data is transferred to an URL from where the web or phone interview can be started. For CAPI and CASI, transaction files are generated, to run on the traditional CAPI interview software.

The software needed to run multiple questionnaires beside the 2 current Blaise interviews (main interview and end of life interview). Therefore the interview layer was included inside the SMS. This allowed for an easier switch between interviews and interview programs.

To better support the CAPI interview, the SMS was adjusted so it could be set in a locked state allowing the respondent to only navigate through their own interview and not close it.

3.4 Data delivery

In SHARE 4 various actors were involved in the process of checking data quality and monitoring fieldwork: The central SHARE coordination team (SHARE Central) at the Munich Center for the Economics of Aging (MEA, Munich, Germany), CentERdata (Tilburg, The Netherlands), the respective Country Team, and the respective survey agency (in all participating countries).

The data collected by the survey agency can be divided in two types of data: The actual interview data and sample information. This includes all data entered in the SMS client by the interviewer, for example the household composition or contact attempts to monitor fieldwork.

From Wave 3 to 5 the data delivery was supported by in-house developed software called BLAISE2SPSS which generated a SPSS file from the proprietary database file of Blaise. To be more transparent and give MEA more control on the desired output this software was replaced with an online version which produces only csv files and a STATA label file. MEA provides STATA .do files to generate exported data files which are compatible with the output from previous waves.

To make sure every variable in the Blaise CAPI questionnaire has the desired variable name in STATA a ruleset was configured using several regular expression functions to make this possible as shown in Figure 3.1.

For each new questionnaire this ruleset needs to be adjusted to support changes in the variable set.

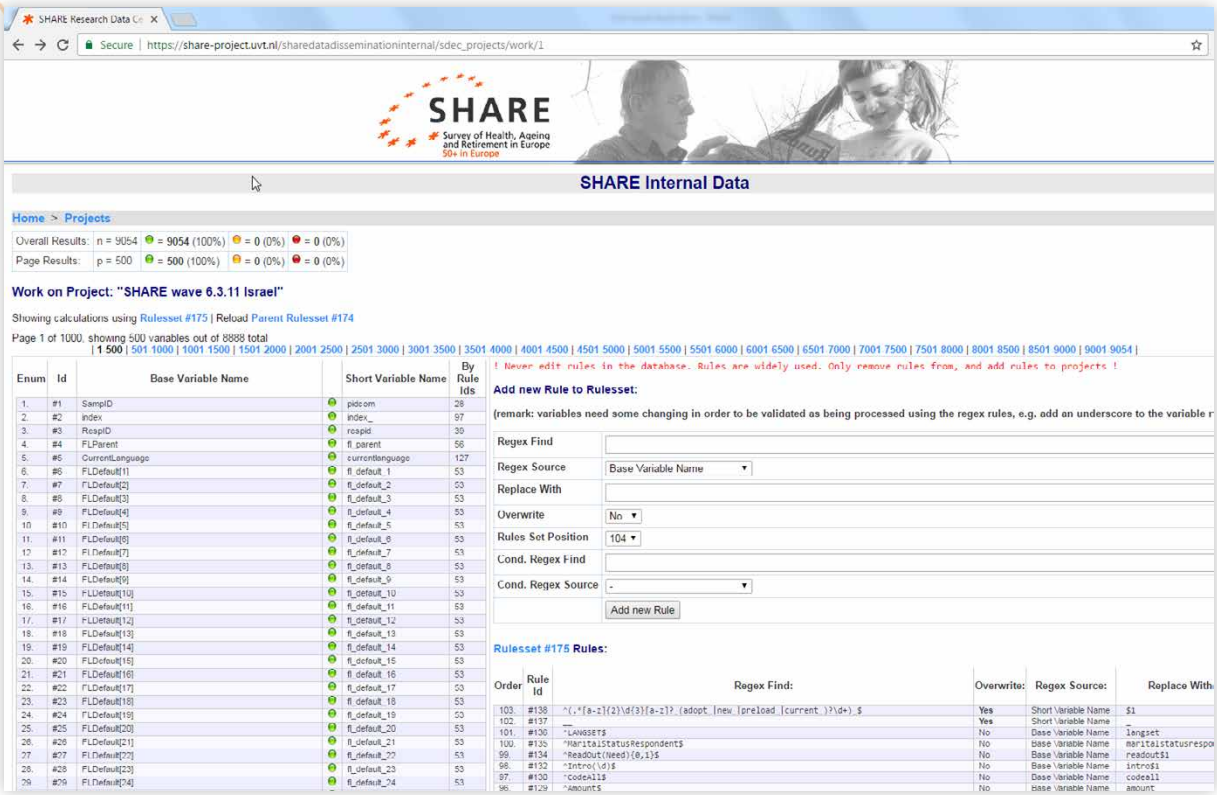

Figure 3.1. Ruleset using several regular expression functions to make variable labels appear properly in STATA

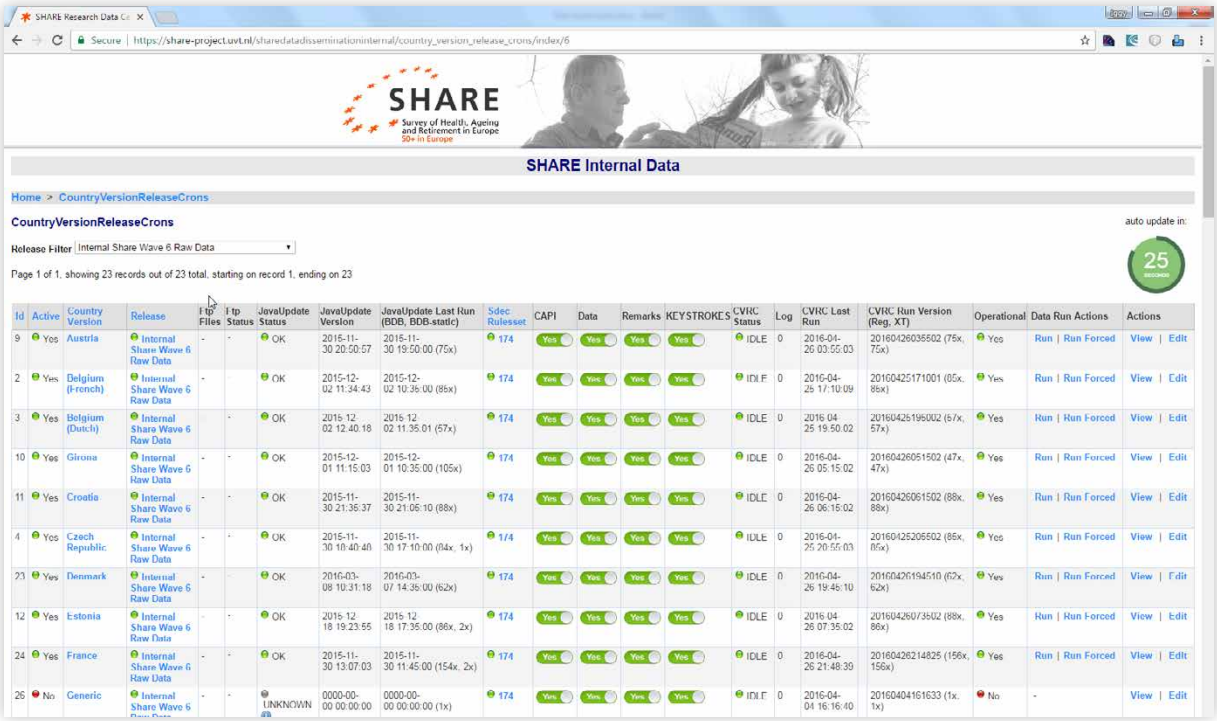

Figure 3.2. Overview of last data export to CentERdata, by country

Another advantage of switching to an online system is that project members with the correct access control can monitor all steps of the data delivery.

Figure 3.2 gives an overview per country about the last time data was uploaded to the servers of CentERdata and in which step the data is processed.

3.5 Questionnaire change: Social Network reintroduced

Many question items were introduced or adapted, but the largest adaptation to the programming of the Wave 6 questionnaire had to do with the re-introduction of the social network module. It introduced extra preloading and complex routing.

In Wave 4 the social network (SN) module was introduced to identify the people who helped or were important to the respondents. Up to 7 people could be mentioned. These people were asked what their relation to the respondent was and how close they were both by physical proximity as well as by relation.

The SN module was already quite complex in Wave 4 because it linked to other modules. The children detected in SN were fed forward to the Children module, and the SN members were provided as answer options in the Financial Transfer module and the Social Support module.

It was decided to reuse this module in Wave 6. To complicate this already complex module even more, it was decided to compare the newly discovered Social Network with the network discovered in Wave 4. This linking could not be done automatically. We could not be sure that the names are written well, or if a nickname was chosen instead, so we had to ask the respondent for confirmation. After the collection of the new Social Network data we walk through each of the old SN members and ask the respondent if there are any of the new persons that were just entered in that group. The question is asked for each of the preloaded SN-members as to which of the current members they link to. The information of the children in SN is again forwarded to the Children module. If children are detected in the Social Network, we ask how close they live to the respondent. For "SN children" this information is fed forward and the question will be skipped.

In the social support and financial transfer modules, a lot of questions are on helping and receiving help. After many questions, a set of relations is presented where the respondent can indicate who they gave or received help from. In earlier waves, this list also included the children named in the Children module. In Wave 4 not the children but the Social Network members were included. In this wave it was decided not to load in these names as answers options, but instead reverse the concept. If the relation of the one who provided or received help was "child", a follow up question would display the children from the Children module, likewise, if a relation was chosen which also occurs in the Social network, a follow up is asked to detect if the respondent refers to one of the SN members with this relation. In section 2.1 a more in depth description of the Social Network module is presented.

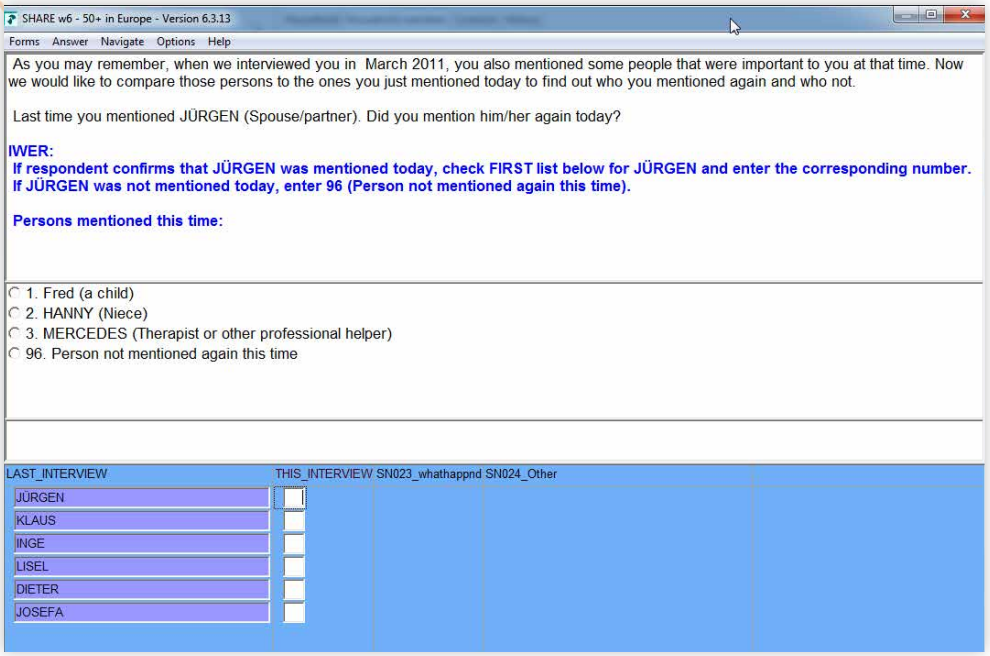

Figure 3.3. Comparison of SN member of Wave 6 with SN members of Wave 4

3.6 Occupation Coding

The largest technical innovation perhaps in Wave 6 was the introduction of the so-called job coder tool (see chapter 2.3 in this volume). Based on locale a database of ISCO coded occupations is attached to the instrument. For the questions that ask for an occupation, the tools would pop-up, and guide the interviewer to choose any of the already coded occupations, thus providing us with coded occupation information. The technology and outcomes of this will be addressed in a separate section.

3.7 TMT changes

The Translation Management Tool is an online environment that is designed to manage the translation of large international surveys. The TMT keeps track of the changes in the source questionnaire and translators can log in to enter translations. In Wave 6 the tool has again been updated to support the latest changes in other programs. A major functional redesign was made to store question elements in the question element tables instead of the question table. This made the database design easier to reuse, but the speed of the TMT was a big problem. A caching mechanism for the status overview and the module overviews was introduced to overcome the speed issue. During this wave an experiment was done together with cApStAn to check the translations of the previous wave and give professional feedback for improvement to the translators. This process was not done within the TMT, but some exports were developed to make this possible.

4 Sampling design and weighting strategies in SHARE Wave 6

Michael Bergmann, Giuseppe De Luca, Annette Scherpenzeel

4.1 Introduction

The aim of the SHARE survey design is to be able to draw inferences about the population of 50 years and older across countries by using probability-based sampling. This is a complex process for all cross-national surveys since the samples in each country must do justice to national specificity but at the same time be internationally comparative. This chapter documents the sampling design and weighting strategies adopted in the sixth wave of SHARE. Starting with a definition of the SHARE target population (section 4.2), we describe the protocol that is followed to harmonize and document the sampling procedures (section 4.3) and present the sampling frames used by the countries that recruited a refreshment or baseline sample in Wave 6 (section 4.4). Next, we discuss some important aspects of the SHARE sampling design, such as stratification, clustering and variation in selection probabilities (section 4.5). We also include an overview of the sample drawing of all countries that ever participated in SHARE across waves (table 4.1). The last part of the chapter describes the weighting strategies adopted by SHARE to handle problems of unit nonresponse in the baseline and refreshment samples and problems of attrition in the panel sample (section 4.6).

4.2 The SHARE target population

The target population of SHARE consists of persons of 50 years or older and persons who are a spouse/partner of a person of 50 years or older at a particular point in time, who have their regular domicile in the respective SHARE country. A person is excluded if she or he is incarcerated, hospitalized or out of the country during the entire survey period, or is unable to speak the country's language(s). Persons living in nursing homes and other institutions for elderly are considered to be part of the target population investigated by SHARE, but may not be equally well represented in all countries, depending on the sampling frame coverage (see Section 4.4). The spouses/partners of people aged 50 and older are included in the target population, regardless of their own age, because the household level is important for many of the variables collected in SHARE. Thus, in the countries participating in the sixth wave of SHARE, the definition of the target population was:

Persons born in 1964 or earlier, and persons who are a spouse/partner of a person born in 1964 or earlier, who speak (one of) the official language(s) of the country (regardless of nationality and citizenship) and who do not live either abroad or in institutions such as prisons and hospitals during the entire fieldwork period.

The target population of SHARE could also be defined in terms of households. This is implicitly defined as all households with at least one member belonging to the target population of individuals. In Section 4.6.3, we shall also define the relevant concept of target population for the purposes of longitudinal analyses.

4.3 The SHARE sampling protocol

The SHARE sampling protocol follows a four-stage process. Each country that draws a baseline or refreshment sample in a wave of the study is initially required to provide a Sample Design Form (SDF) containing a complete description of both the chosen sampling frame and the associated sampling design. In the second stage, the sampling proposal is evaluated and approved by the SHARE Central coordination in Munich. The third stage consists of drawing the sample according to the approved sampling design process, which is carried out by the country team or by the survey agency. Finally, the Country Team provides a Gross Sample File containing the list of selected households, the associated sampling frame information needed for the computation of the selection probabilities (e.g. household-level and population-level information about stratification and clustering), the household-level information about NUTS and LAU codes, and (if any) additional auxiliary variables that could be used for ex-post compensation of non-sampling errors.

4.4 Sampling frames and population coverage

In the ideal case, all countries included in SHARE would have a probability-based sample from an official person register covering the population of interest. The availability of population registers that can be used as sampling frames varies a lot across countries, however, as do the regulations about who can or can't access the registers and what information can be obtained from them. In addition, under-coverage and over-coverage errors in the available registers may introduce non-sampling errors which may jeopardize the standard properties of sample-based inference.

Countries are requested to use the best sampling frame available at each wave, implying that sampling frames can in principle be different between waves and/or between countries. For the target population of SHARE, a key feature any frame has to fulfill is the availability of reliable information on age. If this information is not available from a given sampling frame, then a preliminary screening procedure has to be applied before starting the fieldwork in order to identify sample members aged 50+ years. Most SHARE countries have access to population registers with known information about year of birth. In countries where this is not the case, the sampling process is based on either a random walk procedure or a listing of addresses in combination with a screening procedure. Figure 4.1 shows which countries recruited a refreshment sample or baseline sample in SHARE Wave 6 and on what type of sampling frame these samples were based. Refreshment samples from (central or local) population registers were drawn in Belgium, Denmark, Estonia, Luxembourg, Poland, and Slovenia. In addition, refreshment samples were drawn from different types of registers in France and Italy, where the sampling was based on the rolling population census and an election register, respectively. In Croatia a national health service/

insurance register was used. Finally, Greece recruited a refreshment sample using a combination of the random walk procedure and screening for age eligibility. Several countries in Wave 6 interviewed only their longitudinal samples and did not draw a refreshment sample, as indicated in section 4.5.4.

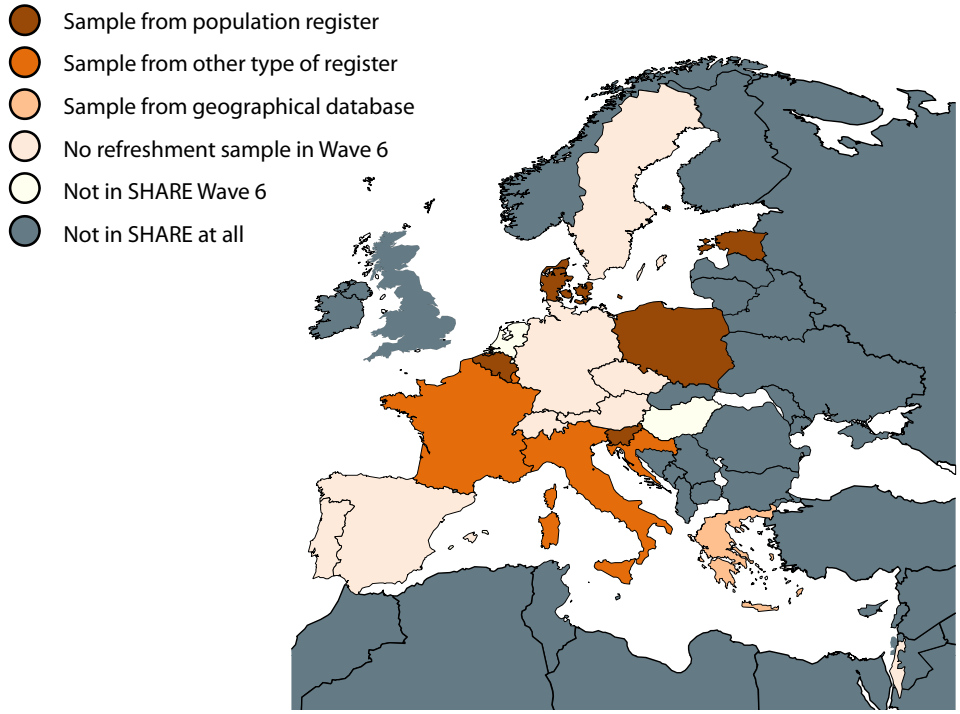

Figure 4.1. Types of sampling frames used in SHARE countries for baseline and refreshment samples in Wave 6

In Europe, 2.7 million people are aged 65 or older and live in a retirement home, nursing home, or a health care institution (Laferrère, Van den Heede, Van den Bosch, & Geerts, 2013). Within the group of the Europeans of age 85 or older, 12.6 percent live in an institution. As described in section 4.2, persons aged 50 years or older who are living in nursing homes and other institutions for the elderly are part of the target population of SHARE. SHARE countries do not use specific sampling methods for these groups but include them as part of the general population sample. Differences in sampling frames used across countries, however, can lead to country-specific undercoverage of the nursing home population. Other sources of errors might be due to either inaccuracies in the sampling frame (persons incorrectly registered as living in a private household) or interviewer mistakes (interviewer entering the code for "private household" instead of "nursing home"). In the longitudinal samples, respondents who lived in a private household before but moved to a nursing home or other institution for the elderly remain in the sample and are contacted and if possible interviewed in the institution.

4.5 Sampling designs

After choosing the best sampling frame available in each country, the next step is the selection of a particular design for the national sampling schemes (i.e. the procedures to draw the national samples from the national sampling frames). The rationale of the SHARE sampling design in Wave 6, as in all foregoing waves, is the same that all advanced population-based survey programs apply at present. Kish (1994, p. 173) provided 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."

Thus, the sampling design is not restricted to be the same in all SHARE countries, but the basic principles of probability sampling with minimal coverage errors guides the choice of the national sampling designs. However, several features of the sampling design may still affect the precision of the estimates. For this reason, a number of general advices on stratification, clustering, variation in selection probabilities and sample size are provided in each wave to all participating countries by means of a "Sampling memo" and bilateral discussions with the SHARE Central Coordination team. We summarize these important aspects of the sampling design in the following subsections.

4.5.1 Stratification

The most frequently used sampling design in SHARE is a multistage stratified sampling design. Regional stratification schemes are recommended in order to ensure a good representation of different geographical areas within the country, improve efficiency of the survey estimates and reduce the costs of the interview process. If other relevant characteristics are available from the sampling frame – such as age and gender in the case of population registers – countries are advised to also use them for stratification.

4.5.2 Clustering

SHARE aims to use sampling schemes which yield a minimum variation of the selection probabilities and a minimum amount of clustering. However, the design of sampling schemes with such characteristics is not always possible due to the lack of suitable sampling frames. Such a scenario applies, for example, if a country only has access to a list of households and an eligible person has then to be selected from all eligible target persons of a sampled household (i.e. screening). In this case, variation in the selection probabilities cannot be avoided and the national sampling scheme necessarily introduces a so-called "design effect due to unequal selection probabilities"

$$\mathrm{Deff}_p = n \frac{\sum_{i=1}^{n} w_i^2}{(\sum_{i=1}^{n} w_i)^2},$$

where n is the sample size and w_i are design weights defined as the inverse of the selection probabilities.

Other studies (e.g. the European Social Survey) have shown that $\mathbf{Deff_p}$ 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. For SHARE, $\mathbf{Deff_p}$ is smaller than this, as it depends only on 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 older or a couple containing at least one person aged 50 or older. In most countries in SHARE, the major part of households does not contain more than one age-eligible unit and very few have more than two.

Fortunately, in Wave 6 nearly all countries (except France and Greece) had access to population registers and sample schemes which yielded equal selection probabilities for all elements could therefore be implemented. In most of them, however, some sort of geographical clustering of the sample was used because of cost efficiency reasons. This is especially true in countries with a large regional spread where the cost efficiency of cluster sampling is relatively high due to the reduction in the travel costs of the interviewers. The most common cluster design was two-stage sampling, with geographical areas (usually municipalities) as primary sampling units (psu), and households or individuals as secondary sampling units. The main drawback of cluster sampling is concerned with statistical efficiency. For any estimator $\hat{\theta}$ parameter θ, the design effect due to clustering can be measured by

$$\mathrm{Deff} = \frac{Var(\hat{\theta})_c}{Var(\hat{\theta})_s},$$

where $\mathbf{Var(\hat{\theta})_c}$ and $\mathbf{Var(\hat{\theta})_s}$ are, respectively, the variances of $\hat{\theta}$ under the actual cluster sampling and a hypothetical simple random sampling. In principle, this indicator can be either smaller or greater than 1, indicating that cluster sampling can yield better or worse results (in terms of precision) than simple random sampling. However, in practice, clusters tend to be internally homogeneous, and this intra-cluster homogeneity increases standard errors and thus decreases the statistical precision of our estimators. Stratification of the population of clusters can help to contrast this efficiency loss and was strongly advised. Further, the countries were instructed to choose the mean cluster size as small as possible and to select as many primary sampling units as possible (see section 4.6.4 for an overview of the sampling design variables included in the dataset).

4.5.3 Selection probabilities

The calculation of the selection probabilities in SHARE is subject to three difficulties. First, these probabilities must take into account the specific features of the various national sampling schemes, as well as possible differences over different waves of the panel. Second, the national sampling frames do not contain the information about marital status, partnership, and age of the spouse/partner that is required to compute the selection probabilities of couples with two age-eligible persons. Third, as the panel goes ahead, many countries attempt to maintain the representation of the younger age-cohorts that were not age-eligible in the previous waves by combining the refreshment subsample drawn in the current wave with the longitudinal subsample drawn in previous waves. The main problem is that, since these two subsamples are drawn from a partly overlapping target population, the elements of the longitudinal subsample may have a nonzero probability of being selected in the refreshment subsamples and the elements of the refreshment subsample may have a nonzero probability of being selected in

the longitudinal sample. Further, the sampling frame information needed to compute these nonzero "cross-selection probabilities" is available only in few countries where sampling is based on a simple design (e.g. Denmark and Sweden). Of course, these issues do not reflect specific limitations in the design of SHARE, but rather objective problems faced in the implementation of longitudinal and cross-national sample surveys involving interviews with the multiple household members at each wave (see, e.g., Lynn, 2009; Smith, Lynn, & Elliot, 2009).

To ensure that the strategy adopted to cope with these issues is harmonized as much as possible across countries and waves, the computation of the selection probabilities is carried out by the SHARE Central coordination team in Munich. More precisely, we deal with the lack of sampling frame information about the spouse/partner of each sample member by using the household composition data collected through the preliminary coverscreen module of the SHARE interview. The main problem is that these data are available only for respondents, not for the whole sample. Thus, we do not compute the selection probabilities for the subsample of non-respondents. Moreover, we account for the contribution of nonzero cross-selection probabilities by applying the 'pooling method' of Watson (2014). For countries using a complex sampling design involving stratification and clustering, this approach requires estimating the unknown cross-selection probabilities by the available sampling frame information such as strata, age, gender, and regional indicators. Although this stage introduces some randomness in the computation of selection probabilities, the results of the Monte Carlo simulations performed by Watson (2014) suggest that the pooling method outperforms many other ad-hoc solutions to the problem of unknown cross-selection probabilities.

4.5.4 Sample composition

Sample composition and size of the national samples are two additional features of the sampling design affecting efficiency of cross-sectional and longitudinal analyses. Table 4.1 gives an overview of all countries that ever participated in SHARE, up to Wave 6, and the composition of their samples in the respective wave(s).

All SHARE respondents who were interviewed in any previous wave are part of the longitudinal sample. Additionally, refreshment samples are drawn regularly to i) maintain the representation of the younger age-cohorts of the target population of Wave 6 (i.e. people born in 1963 and 1964) that were not age-eligible in the previous waves, and ii) compensate the reduction in the size of the panel sample due to attrition. In Wave 6, refreshment samples were recruited in Belgium, Denmark, Estonia, France, Greece, Italy, Luxembourg, Poland and Slovenia. In addition, a baseline sample was recruited in Croatia, joining SHARE for the first time, to build the "first wave" panel sample for the next waves of the study. Only longitudinal samples, without adding refreshment samples, were interviewed in Austria, Czech Republic, Germany, Portugal, Spain, Sweden and Switzerland. For all the countries, no panel rotation method was used in order to maximize the sample size available for longitudinal analyses. In other words, all units in the panel sample were considered eligible for the interview of the sixth wave, including the non-responding partners of peoples who were interviewed in some previous wave. Ireland, Hungary and the Netherlands, which had participated in previous waves, did not participate in SHARE Wave 6. Instead, in the Netherlands, an experiment was carried out using online questionnaires to collect part of the SHARE data (see chapter 5 for a description of this experiment).

Table 4.1. Sample type by wave and country

	Wave 1	Wave 2		Wave 3	Wave 4		Wave 5		Wave 6	
Country	Baseline	Panel	Refreshment/ Baseline	Panel	Panel	Refreshment/ Baseline	Panel	Refreshment/ Baseline	Panel	Refreshment/ Baseline
AT	≤1954	✓		✓	✓	≤1960	✓		✓	
BE_FR	≤1954	✓	≤1956	✓	✓	≤1960	✓	≤1962	✓	≤1964
BE_NL	≤1954	✓		✓	✓	≤1960	✓	≤1962	✓	≤1964
CH	≤1954	✓	≤1956	✓	✓	≤1960	✓		✓	
CZ			≤1956	✓	✓	≤1960	✓	≤1962	✓	
DE	≤1954	✓	≤1956	✓	✓		✓	≤1962	✓	
DK	≤1954	✓	≤1956	✓	✓	[1957-1960]	✓	≤1962	✓	[1963-1964]
EE						≤1960	✓		✓	[1961-1964]
EG								≤1962	✓	
ES	≤1954	✓	≤1956	✓	✓	≤1960	✓		✓	
FR	≤1954	✓	≤1956	✓	✓	≤1960	✓		✓	≤1964
GR	≤1954	✓	≤1956	✓					✓	≤1964
HR										≤1964
HU						≤1960				
IE			≤1956							
IL	≤1954	✓	≤1956				✓	[1953-1962]	✓	
IT	≤1954	✓	≤1956	✓	✓	≤1960	✓	≤1962	✓	≤1964
LU								≤1962	✓	≤1964
NL	≤1954	✓	≤1956	✓	✓	≤1960	✓	≤1962	✓	
PL			≤1956	✓	✓				✓	[1957-1964]
PT						≤1960			✓	
SE	≤1954	✓	≤1956	✓	✓		✓	≤1962	✓	
SI						≤1960	✓	≤1962	✓	≤1964

≤1964	Baseline sample
≤1964	Full range refreshment sample
[1963-1964]	Refreshment sample of youngest cohorts

The choice of conducting a refreshment sample was made by the countries, because they had to apply for their own funding to their national funding agencies. Since funding and sampling resources vary across the participating countries, SHARE did not define a minimum net sample size. Instead, SHARE advised countries to maximize their net sample size with the available budget.

Several countries selected refreshment samples of people born between 1963 and 1964 (e.g. Denmark) to add to their existing sample of people born in 1962 or earlier.[1] The Wave 6 refreshment samples of Estonia included people born between 1961 and 1964 to compensate the lack of a refreshment sample in Wave 5. Similarly, Poland included people born between 1957 and 1964 to compensate the lack of a refreshment sample in Wave 4 and Wave 5. Additionally, many countries deemed it necessary to implement a refreshment sample across the full age range of people born in 1964 or earlier to compensate the effect of panel attrition on all age-cohorts. Where possible, these full-range refreshment samples included an over-sampling of the youngest cohorts that were not age-eligible in the previous refreshment samples to maintain the representation of the younger age-cohorts.

4.6 Corrections for nonresponse and attrition

Under the ideal situation of complete survey response, the availability of design weights that compensate for unequal selection probabilities of the sample units allow us to account for the randomness of probability sampling when estimating the population parameters of interest. Unfortunately, many desirable properties of estimators based on the sampling design weights depend on the assumption of complete survey response, which is hardly ever satisfied in the practical implementation of surveys.

SHARE is not an exception to this common situation. As discussed at length in chapter 5, the baseline and refreshment samples drawn in each wave of the study suffer from not negligible amounts of unit nonresponse. Moreover, the longitudinal samples from previous waves are subject to not negligible amounts of attrition at each follow-up. These sources of non-sampling errors are likely to increase the mean squared error of sample-based estimators through two channels. First, systematic differences between respondents and non-respondents may lead to biased and inconsistent estimators of the population parameters of interest. Second, nonresponse reduces the sample size available for estimation thereby leading to a loss of statistical precision. Although finite-sample precision of our estimators is important, the greater concern on the bias is typically justified by the fact that this component of the mean squared error does not vanish as the sample size increases.

The strategy used by SHARE to cope with the potential selection effects associated with unit nonresponse and attrition relies on the calibration procedure developed by Deville and Särndal (1992), which encompasses as special cases many traditional weighting procedures such as post-stratification, raking, and generalized linear regression. The rationale behind this procedure is that by ensuring consistency

1 Wave 1 baseline samples consisted of people born in 1954 or earlier. The refreshment samples in Waves 2 and 4 contained, respectively, people born between 1955 and 1956 and people born between 1957 and 1960. And the refreshment samples in Waves 5 and 6 contained people between 1961-1962 and 1963-1964. No refreshment samples were added in Wave 3.

between the sample and the population distributions of some benchmark variables, the calibrated weights will also perform well when applied to variables of interest.

In the remaining of this section, we first review the key features of the calibration procedure by focusing – as in its original formulation – on an ideal setting with complete survey response. Next, we discuss the calibration methodology in the more realistic settings with unit nonresponse and attrition to emphasize the key assumptions required for the validity of the calibrated cross-sectional and longitudinal weights available in release 6.0.0.

4.6.1 Calibration under complete response

Consider a finite population $U=\{1,2,...,N\}$ of N elements, from which a probability sample $s=\{1,2,...,n\}$ of size $n \leq N$ is drawn according to the sampling design $p(\cdot)$. Let $\pi_i = Pr(i \in s)$ and $\omega_i = \pi_i^{-1}$ denote, respectively, the selection probability and the design weight of the ith sample unit. Sampling theory based on a complete response setting assumes that the design weights ω_i and the values y_i of a survey variable y are observed for all units $i \in s$. For example, if we wish to estimate the population total $t_y = \sum_{i \in U} y_i$, then the Horvitz-Thompson estimator $\hat{t}_y = \sum_{i \in s} \omega_i y_i$ is known to be design unbiased, that is $E_p(\hat{t}_y) = t_y$, where $E_p(\cdot)$ denotes the expectation with respect to the sampling design.

Consider next the case when additional information is available to construct a class of more efficient estimators. More precisely, let $x_i = (x_{i1}, x_{i2}, ..., x_{iq})'$ be a q-vector of auxiliary variables with known population totals $t_x = \sum_{i \in U} x_i$. This auxiliary information can be obtained from either the sampling frame or other external sources such as census data and administrative archives. We shall refer to the auxiliary variables x_i as calibration variables and to the population totals t_x as calibration margins. The basic idea of calibration is to determine a new set of calibrated weights ω_i^* that are as close as possible, in an average sense with respect to a given distance function, to the design weights ω_i, while also satisfying the constraints $t_x = \sum_{i \in s} \omega_i^* x_i$. Thus, given a distance function $G(\omega_i^*, \omega_i)$, calibration consists of minimizing the overall distance $\sum_{i \in s} G(\omega_i^*, \omega_i)$ with respect to ω_i^* subject to a set of equality constraints. Deville and Särndal (1992) show that, under mild regularity conditions, the solution of this constrained minimization problem gives calibrated weights of the form

$$\omega_i^* = \omega_i F(\eta_i), \tag{1}$$

where $\eta_i = x_i' \lambda$ is a linear combination of the calibration variables x_i, λ is q-vector of Lagrangian multipliers associated with the constraints $t_x = \sum_{i \in s} \omega_i^* x_i$, and $F(\cdot)$ is a monotonic and twice-differentiable calibration function, which is uniquely related to the distance function $G(\cdot,\cdot)$ and satisfies the restriction $F(0) = 1$ and $dF(0) \backslash d\eta = 1$. The ratio between the calibrated weights and the design weights depends in general on the calibration function $F(\cdot)$ (or, equivalently, the distance function $G(\cdot,\cdot)$) and the vector of calibration variables x_i.

A distinguishing feature of this approach is that many traditional re-weighting procedures such as post-stratification, raking, and generalized linear regression (GREG) correspond to special cases of calibration estimator

$$\hat{t}_y^* = \sum_{i \in s} \omega_i^* y_i \tag{2}$$

for particular choices of $F(\cdot)$ and x_i. Popular specifications of the calibration function are the linear form $F(\eta)=1+\eta$, the exponential form $F(\eta)=\exp(\eta)$, the truncated linear form $F(\eta; M, L)=\min\{M, \max\{L,1+\eta\}\}$, and the logit form

$$F(\eta; M, L) = \frac{L(M-1) + M(1-L)\exp(A\eta)}{M - 1 + (1-L)\exp(A\eta)}$$

where L and M denote predefined lower and upper bounds, and $A=(M-L)/((1-L)(M-1))$. The linear specification, which derives from a chi-square distance function and leads to the widely used GREG estimator, has the advantage of ensuring a closed form solution for the calibrated weights ω_i^*. Depending on the chosen set of calibration variables, the resulting weights can however be negative or extremely large because the chi-square distance function is unbounded. The other specifications of the calibration function avoid these issues, but a solution for the calibration problem may not exist and the computation of the underlying Lagrangian multipliers usually requires iterative techniques. Specifically, the exponential specification avoids the problem of negative weights, but it may still give calibrated weights with a large variability. The truncated-linear and logit specifications are usually preferred because they restrict in advance the range of feasible values for the calibrated weights by suitable choices of the lower and upper bounds.

As pointed out by Deville and Särndal (1992), effectiveness of the calibrated weights depends on the correlation between the study variable y and the vector of calibration variables x. In the extreme case when y can be expressed as a linear combination of x, the calibration estimator $\hat{t}_y^*$ gives an exact estimate of t_y for every realized sample s. Further, under suitable regularity conditions, the whole class of calibration estimators is asymptotically equivalent to the GREG estimator resulting from a linear specification of the calibration function. Thus, in large samples, the calibrated weights are robust to alternative choices of $F(\cdot)$. Unfortunately, this property does not extend to the more realistic setting where survey data are affected by nonresponse errors (see, e.g., Haziza & Lesage, 2016). We shall expand on this issue in the following section.

4.6.2 Calibrated cross-sectional weights

In this section, we extend the calibration approach to relax the unrealistic conditions of a complete response setting. Following Lundström and Särndal (1999) and Särndal and Lundström (2005), we shall refer to this generalization as nonresponse calibration.

We first account for unit nonresponse in a single cross-section of SHARE by assuming that only a subsample $s_r \in s$ of $n_r \leq n$ units agree to participate in the survey. Under this setting, the standard justification for calibration treats survey response as an additional phase of the sampling design (see, e.g., Hartley, 1946; Oh & Scheuren, 1983; Politz & Simmons, 1949). Survey response is treated as a random outcome and we shall denote by ϕ_i the response propensity of the ith sample unit.

As before, calibration consists of finding a set of nonresponse calibrated weights $\tilde{\omega}_i^*, i=1, ..., n_r$, that are as close as possible to the design weights ω_i, while also respecting the calibration equations $t_x=\sum_{i\in s} \tilde{\omega}_i^* x_i$. The solution of this constrained minimization problem gives nonresponse calibrated weights of the form

$$\tilde{\omega}_i^* = \omega_i F(x_i'\lambda), \tag{3}$$

for many alternative specifications of the calibration function $F(\cdot)$ and different choices of calibration variables x_i. A nonresponse calibrated estimators of the population totals t_y is given by

$$\tilde{t}_y^* = \sum_{i\in s_r} \tilde{\omega}_i^* y_i, \tag{4}$$

At first glance, there are few differences with respect to the complete response setting discussed in the previous section. The calibration procedure is now restricted to the complete-case data $\{(y_i, x_i, \omega_i): i \in s_r\}$ rather than to the complete data $\{(y_i, x_i, \omega_i): i \in s\}$, but its key features are essentially the same. However, upon reflection, we realize that the statistical properties of the calibration estimators in (2) and (4) can be substantially different because of the additional randomness and possible selection effects generated by the nonresponse mechanism.

Lundström and Särndal (1999) provide expressions for the bias, the variance and the mean squared error of the GREG estimator which is a special case of the nonresponse calibration estimator $\tilde{t}_y^*$ when $F(\cdot)$ has a linear specification. A more general expression for the bias of the whole class of nonresponse calibrated estimators can be found in Haziza and Lesage (2016). These studies show that, in contrast to the complete response setting, there exists two set of conditions under which $\tilde{t}_y^*$ is an (approximately) unbiased estimator of t_y: (i) the nonresponse mechanism is missing at random (MAR; Rubin, 1976) and $y_i=x_i'\beta+\epsilon_i$, with $E(\epsilon_i|x_i)=0$; and (ii) $F_i=\phi_i^{-1}$. Condition (i) is a natural extension of the unbiasedness property when survey data suffer from unit nonresponse errors. Condition (ii) is more interesting and perhaps surprising as it shows that, even though the calibration approach does not require an explicit model for the nonresponse mechanism, alternative specifications of $F(\cdot)$ correspond in practice to different parametric models for the relationship between the response propensity ϕ_i and the calibration variables x_i. Assumptions about the nonresponse mechanism are therefore implicit in the specification of the calibration function $F(\cdot)$ and the misspecification of this functional form may lead to biased and inconsistent estimators.

As discussed in Brick (2013) and Haziza and Lesage (2016), more robust weighting methods could be obtained either by a propensity score approach (Rosenbaum and Rubin 1983), which involves some explicit model for the nonresponse mechanism, or by a two-step weighting procedure that involves a propensity score adjustment in the first step and a calibration adjustment in the second step. The main problem in applying these more robust weighting methods in SHARE is that they require special effort in modelling the nonresponse mechanisms associated with the national subsamples of different waves and countries. Moreover, these methods require the knowledge of selection probabilities and auxiliary information on both respondents and nonrespondents, which is not available for all countries participating in SHARE. For these reasons, the nonresponse correction method employed in SHARE is based on a standard calibration approach that avoids specifying an explicit model for the nonresponse mechanism.

Calibrated cross-sectional weights are defined for the pooled subsample (i.e. longitudinal plus refreshment) of 50+ respondents in each wave of the study. Since the basic units of analysis can be either individuals or households, we provide two sets of cross-sectional calibrated weights: one at the individual level and one at the household level. At the individual level, each eligible 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 an identical calibrated weight that depends on the household design weight and the vectors of calibration variables for all 50+ respondents in that household. Both types of cross-sectional calibrated weights are computed separately by country to match the size of national target populations in any specific wave. For the calibration function $\mathbf{F}(\cdot)$, we use a logit specification with country and wave-specific bounds. The set of calibration variables consists in general of eight indicators for gender-age group (i.e. males and females in the age groups [50-59], [60-69], [70-79], [80+]), plus a set of indicators for NUTS1 regional areas. For countries involved in the wave-specific oversampling of particular age-cohorts, we use additional calibration indicators for a finer partition of the [50-59] age group. For example, in Wave 2, we specify separate calibration margins for male and female respondents with age in the intervals [50-51] and [52-59]. In Wave 4, we specify instead separate calibration margins for male and female respondents with age in the intervals [50-53] and [54-59]. Calibration margins are taken from the EUROSTAT regional database. Table 4.2 shows the eight gender-age calibration margins used for the cross-sectional calibrated weights of Wave 6.

Notice that calibrated cross-sectional weights are missing for respondents younger than 50 years (i.e. age-ineligible partners of an age-eligible respondent), those with missing information on the 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). These weights only compensate for unit nonresponse in the main CAPI interview by ignoring additional problems of unit nonresponse in the drop-off questionnaires.

4.6.3 Calibrated longitudinal weights

In addition to cross-sectional calibrated weights, release 6.0.0 also includes calibrated longitudinal weights for the purposes of panel data analyses. The theoretical setup for these weights is similar to the cross-sectional setup described in the previous section, but there are two important differences. First, calibrated longitudinal weights are defined for the balanced subsample of respondents who participated in at least two waves of the study. Second, since mortality is a source of attrition that affects both the sample and the population, calibrated longitudinal weights account for mortality of the original target population across waves. The target population for panel data analyses is then defined as the target population at the beginning of a time reference period that survives up to the end of the period considered (see, e.g., Lynn, 2009).

Since the SHARE panel now consists of 6 waves, one can currently compute $(2^6 - 1)*2 = 126$ different types of calibrated longitudinal weights depending on the selected combination of waves and the basic unit of analysis (either individuals or households). Furthermore, the number of possible calibrated longitudinal weights will increase exponentially as the panel goes ahead and additional waves will be available. To simplify the structure of the public release of the data, SHARE provides calibrated longitudinal weights only for selected wave combinations of its panel. The wave combinations considered in release 6.0.0 are: 1-2, 2-3, 3-4, 4-5, 5-6, and 1-2-3-4-5-6.

Table 4.2. National calibration margins of Wave 6 by gender and cohort group

Country	Men				Women				Total
	[-1934]	[1935-44]	[1945-54]	[1955-64]	[-1934]	[1935-44]	[1945-54]	[1955-64]	
AT	144,562	317,970	424,766	612,023	281,611	392,122	465,838	619,498	**3,258,390**
BE	210,937	367,905	601,907	774,398	386,986	450,262	631,604	774,143	**4,198,142**
CH	143,224	276,070	433,408	580,233	255,497	330,530	452,732	568,388	**3,040,082**
CZ	134,233	316,515	649,328	673,326	277,816	439,724	736,930	678,461	**3,906,333**
DE	1,489,209	3,876,508	4,360,957	6,202,843	2,877,151	4,685,547	4,658,388	6,194,907	**34,345,510**
DK	87,080	203,855	342,306	369,730	147,811	231,676	351,988	367,812	**2,102,258**
EE	15,923	39,018	61,395	84,590	48,246	73,975	85,358	96,322	**504,827**
ES	966,894	1,553,067	2,318,114	3,077,383	1,683,497	1,909,130	2,501,212	3,133,791	**17,143,088**
FR	1,305,663	2,062,586	3,613,115	4,202,122	2,455,023	2,565,183	3,950,226	4,423,866	**24,577,784**
GR	266,396	441,963	585,572	689,464	389,059	544,067	645,731	751,191	**4,313,443**
HR	59,370	153,344	231,595	306,519	130,553	225,677	267,260	318,085	**1,692,403**
IL	90,600	154,800	314,300	371,800	141,000	192,600	350,500	399,300	**2,014,900**
IT	1,367,911	2.558.265	3,394,880	4,113,512	2,509,515	3,131,460	3,683,950	4,321,876	**25,081,369**
LU	7,763	15.063	25,320	38,306	13,924	18,175	25,035	36,336	**179,922**
PL	450,386	936.113	1,998,298	2,666,801	1,030,068	1,458,751	2,394,138	2,816,887	**13,751,442**
PT	204,315	392.600	563,230	685,291	373,424	523,579	656,567	751,872	**4,150,878**
SE	188,344	367.252	584,050	593,874	309,373	403,882	591,201	582,736	**3,620,712**
SI	28,916	70.509	116,397	154,443	67,292	94,656	121,585	149,909	**803,707**

The calibrated longitudinal weights associated with the wave combination $(\mathbf{t}, \mathbf{h})$ are computed separately by country to represent the national populations of Wave $\mathbf{t}$ that survives up to the time reference period of Wave $\mathbf{h}$. For example, in several countries, the weights of wave combination (1,2) allow to represent the national population of people aged 50+ in 2004 that survived up to 2006. The weights of wave combination 1-2-3-4-5-6 (the fully balanced panel) allow instead to represent the national population of people aged 50+ in 2004 that survived up to 2014. The calibration function $\mathbf{F}(\cdot)$ is specified according to a logit form, while the set of calibration variables includes only eight indicators for gender-age groups (i.e. males and females with age at the beginning of a time reference period in the intervals [50-59], [60-69], [70-79], [80+]). Notice that, compared to calibrated cross-sectional weights, we do not use calibration indicators for NUTS1 regional codes and for finer partitioning of the [50-59] age interval due to the relatively lower sample size. To account for mortality of the target population we subtract from each population margin the corresponding number of deaths that, according to EUROSTAT, occurred in the time reference period under consideration.

As for calibrated cross-sectional weights, calibrated longitudinal weights are available at both the individual and the household levels. For the individual weights, we require that each individual is interviewed in each wave of the chosen wave combination. For the household weights, we require instead that there is at least one household member interviewed in each wave of the chosen wave combination. These definitions imply that the balanced sample of households is larger than the balanced sample of individuals. For example, households consisting of one partner participating in Wave 5 and the other partner participating in Wave 6 belong to the balanced sample of households for the wave combination 5-6, even if neither partner belongs to the corresponding balanced sample of individuals.

For longitudinal analyses based on other possible combinations of waves, users are required to control for attrition either by computing their own calibrated longitudinal weights or by some alternative correction method. To support users in the methodological task of computing calibrated weights, SHARE provides a Stata command called "cweight.ado" which implements the calibration procedure by Deville and Särndal (1992), a Stata do-file called "weighting.do" which illustrates step-by-step how to compute calibrated weights at the individual and the household level, and tables of country specific information for the population calibration margins. We also notice that, in contrast to the problem of unit nonresponse where little auxiliary information is available, corrections for attrition could in general exploit additional information collected in previous waves. This information can be used to apply propensity score adjustments based on parametric or semiparametric estimation of explicit models for the attrition process. Depending on the purpose of the analysis under investigation, users should decide whether the set of SHARE calibrated weights provides appropriate compensations for the potential selection bias due to unit nonresponse and panel attrition. To our experience, comparing the results from different approaches may give important hints on this difficult research question.

4.6.4 Structure of the SHARE weights in release 6.0.0

Release 6.0.0 includes six datasets for the cross-sectional weights of Waves 1 to 6 **(sharew#_rel6-0-0_gv_weights)**. These datasets come together with the other modules of each wave. Moreover, six datasets with longitudinal weights are included in a separate download file. The first five refer to the wave combinations 1-2, 2-3, 3-4, 4-5, and 5-6. These datasets are named e.g. sharewX_rel6-0-0_gv_longitudinal_weights_w1w2 for wave combination 1-2. The others are named accordingly. Finally, the dataset named sharewX_rel6-0-0_gv_longitudinal_weights_w1-w6 contains the longitudinal weights of the fully balanced panel (i.e. wave combination 1-2-3-4-5-6).

Table 4.3 and 4.4 provide, respectively, a description of the variables contained in the five cross-sectional and the five longitudinal datasets.

In addition to the individual, household and country identifiers, the cross-sectional weights include:

- one variable for the sampling design weights (variable name **dw_w#**) of the cross-sectional sample of Wave # (both household and individual levels),
- two variables for the corresponding calibrated cross-sectional household weights (variable name **cchw_w#**) and the calibrated cross-sectional individual weights (variable name **cciw_w#**),
- one indicator (variable name subsample) which identifies the various subsamples drawn in any specific country and wave of the SHARE panel,

Table 4.3. Sampling design and calibrated cross-sectional weights

Variable	Description	Unit of analysis
dw_w#	Design weight – Wave #	Household & individual
cchw_w#	Calibrated cross-sectional household weight – Wave #	Household
cciw_w#	Calibrated cross-sectional individual weight – Wave #	Individual
subsample	Subsamples within country	Household & individual
stratum1	First stratum	Household & individual
stratum2	Second stratum	Household & individual
psu	Primary sampling unit	Household & individual
ssu	Secondary sampling unit	Household & individual

Table 4.4. Sampling design and calibrated longitudinal weights

Variable	Description	Unit of analysis
dw_w#	Design weight – Wave #	Household & individual
panel_resp	Respondent participation in the selected panel	Individual
clhw_a	Cal. long. household weight – panel: 1-2-3-4-5-6	Household
cliw_a	Cal. long. individual weight – panel: 1-2-3-4-5-6	Individual
clhw_b	Cal. long. household weight – panel: 1-2	Household
cliw_b	Cal. long. individual weight – panel: 1-2	Individual
clhw_c	Cal. long. household weight – panel: 2-3	Household
cliw_c	Cal. long. individual weight – panel: 2-3	Individual
clhw_d	Cal. long. household weight – panel: 3-4	Household
cliw_d	Cal. long. individual weight – panel: 3-4	Individual
clhw_e	Cal. long. household weight – panel: 4-5	Household
cliw_e	Cal. long. individual weight – panel: 4-5	Individual
clhw_f	Cal. long. household weight – panel: 5-6	Household
cliw_f	Cal. long. individual weight – panel: 5-6	Individual
subsample	Subsamples within country	Household & individual
stratum1	First stratum	Household & individual
stratum2	Second stratum	Household & individual
psu	Primary sampling unit	Household & individual
ssu	Secondary sampling unit	Household & individual

- four indicators (variables names **stratum1**, **stratum2**, **psu**, and **ssu**) for the information about stratification and clustering in each subsample.

Similarly, the longitudinal weights include:

- a binary indicator (variable name **panel_resp**) which is equal to 1 for the balanced panel of individuals (i.e. the respondents participated to all waves of the selected wave combination) and equal to 0 otherwise,
- one variable for the sampling design weights (variable name **dw_w#**) of the starting Wave #,
- two variables for the calibrated longitudinal household weights (e.g. variable name **clhw_a**) and the calibrated longitudinal individual weights (e.g. variable name **cliw_a**),
- one indicator (variable name subsample) which identifies the various subsamples drawn in any specific country and wave of the SHARE panel,
- four indicators (variables names **stratum1**, **stratum2**, **psu**, and **ssu**) for the information about stratification and clustering in each subsample,

Notice that the longitudinal databases contain one observation for each respondent belonging to the balanced sample of households in the selected wave combination. Within each dataset, one can use the binary indicator, **panel_resp**' to identify the balanced sample of individuals.

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5 Fieldwork monitoring and survey participation in sixth wave of SHARE

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5.1 Introduction

This chapter is essentially an update of our efforts to monitor and manage the fieldwork of the sixth wave of SHARE on the conceptual basis developed in the run-up to Wave 5 and outlined in Malter and Börsch-Supan (2015). Like in Wave 5, all indicators were again conceptualized strictly in accordance with the 9th edition of standards set by the American Association of Public Opinion Research (AAPOR, 2016)[1]. Through this approach we could report at any point in time what the response and retention rates would be if fieldwork would be terminated at that given moment.

We are convinced that ensuring data quality should be a key concern of any population-level survey study and put the emphasis on all the major components of the Total Sampling Error, as described in Malter and Börsch-Supan (2015).

Identical as in Wave 5, most representational indicators (i.e. those on unit nonresponse) were set out as quality targets in the specifications of the model contract of SHARE Wave 6, itself an updated version of the contractual documents used for Wave 5. As in previous waves, we followed the newest edition of AAPOR guidelines and used data from the SHARE Sample Management System (SMS) to classify the longitudinal and baseline/refreshment gross samples of each country into exhaustive and mutually exclusive categories reflecting the survey outcomes for each sample type. All contact information entered by interviewers into the SMS was continuously converted into a so-called "household state".

Table 5.1 shows how contact events recorded in the SMS translated into a household state and all codes in this table remained unchanged over Wave 5. The algorithm which created the household state divided the sample into three mutually exclusive categories: (i) ineligible households, (ii) eligible households, and (iii) households of unknown eligibility[2]. This was done in a hierarchical way: Once the eligibility status was determined, a new contact code could not revert the eligibility status into "unknown" anymore. For the sake of completeness, we repeat the some basic concepts laid out in our methodology volume of Wave 5 (Malter & Boersch-Supan, 2015): if a household was classified as ineligible, this was a "final state" which would permanently close a case (i.e., no more actions could be done by interviewers). The same applied to sorting households into subcategories of the household state.

1 The American Association for Public Opinion Research. 2016. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 9th edition. AAPOR.

2 For details on SHARE's target population and eligibility criteria see Kneip 2013.

Table 5.1. Detailed list of SMS entries and fieldwork outcomes at the HH level

SMS Contact Protocol Entry	Household State
Ineligible	**NE**
Deceased[3] In hospital[3] In old-age home[4] In prison Moved abroad Language barriers Moved, new address unknown[3] Address non-existent, house vacant[3] No eligible persons after CV Household screened as ineligible[5]	
Eligible	**E**
Completed interview (incl. end-of-life interview)	CI
Partial interview	PI
Interrupted interview	II
Refusal[1] Too busy, no time Too old, bad health conditions No interest, against surveys Other reasons	R
Other non-interview	O
Contact, no appointment Contact, appointment for another contact Contact, appointment for interview Deceased[3] In hospital[3] In old-age home[4] Moved, new address known Moved, new address unknown[3] Address non-existent, house vacant[3] Household screened as eligible	
Non-contact[2]	NC
Unknown Eligibility	**UE**
Screening refusal	UER
Other screening non-cooperation	UEO
Screening non-contact	UENC
No contact attempted	UENCA

Notes:
1 For each category, interviewers could distinguish between a "soft" and a "hard" refusal, the latter one calling upon intervention from the agency. Neither of the refusal codes set by the interviewer closed a case.
2 Non-contact for the eligible part of the sample does not apply to the baseline/refreshment sample in the Czech Republic.
3 This led to ineligibility only in the baseline/refreshment sample, but not in the longitudinal sample.
4 Whether this led to ineligibility in the baseline/refreshment sample depended on a country's sampling frame. In the longitudinal sample, institutionalized cases were always considered eligible.
5 Subcategories are: age ineligible household, problems with phone, address non-existent, language barriers.

A new contact only resulted in a change of the household state if it involved new information that would conceptually trump the previous information.

For example, a household formerly classified as "non-contact" (NC) switched to "refusal" (R) if the interviewer established contact, but the respondent refused to participate. However, if the interviewer did not reach anyone ("non-contact") in an attempt to convert a previous refusal, the household state remained "R". The hierarchical order of the nexus contact code-household state is shown in Table 5.1 above.

Figure 5.1 shows the size and composition of the longitudinal sample per country. At the household level, the size of the longitudinal gross sample was defined by the number of households with at least one age-eligible respondent interviewed in any previous SHARE Wave. For the purpose of fieldwork monitoring, the gross sample was determined by the number of households pre-loaded into the SMS. Households that could not be attempted again for legal reasons were dropped. Overall, the longitudinal gross samples contained almost exclusively eligible cases (98 percent).

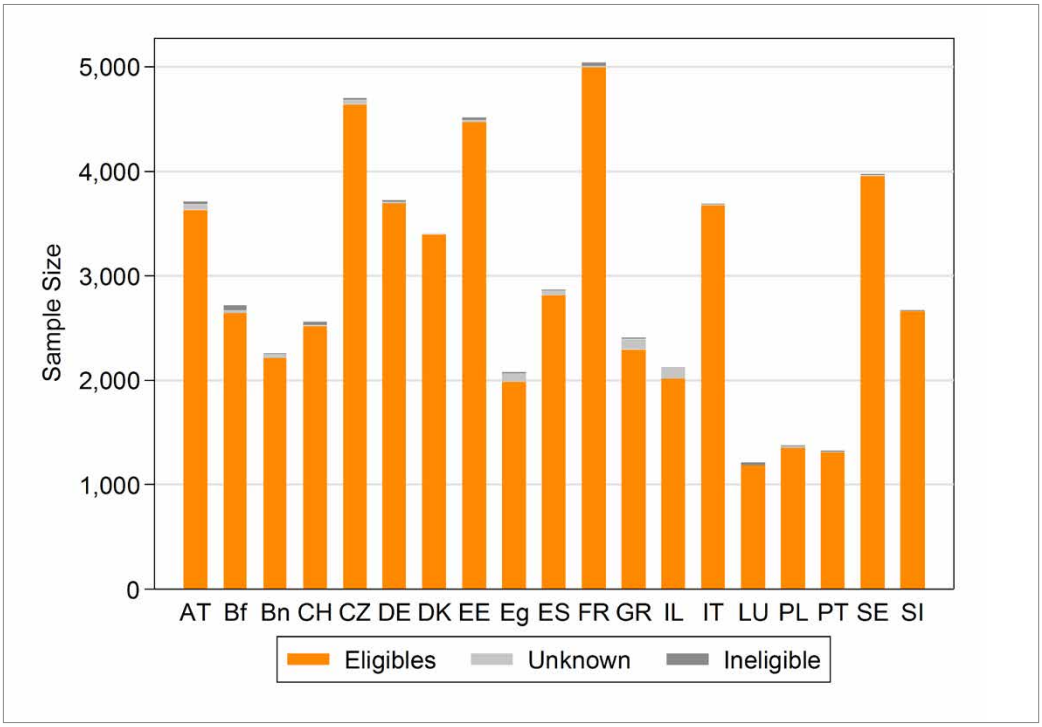

Figure 5.1. Panel samples by classification of sample units

Households in the longitudinal sample could only turn ineligible for the following reasons: incarceration, moving abroad, language barriers. On average, ineligibility applied to 0.6 percent of all households in the longitudinal samples. Death did not lead to ineligibility. Instead, a proxy respondent was supposed to respond to an end-of-life interview about the deceased person. Households without any contact attempts were considered to be of unknown eligibility. On average and according to what was documented in the SMS, the eligibility of 1.1 percent of all longitudinal households was unknown.

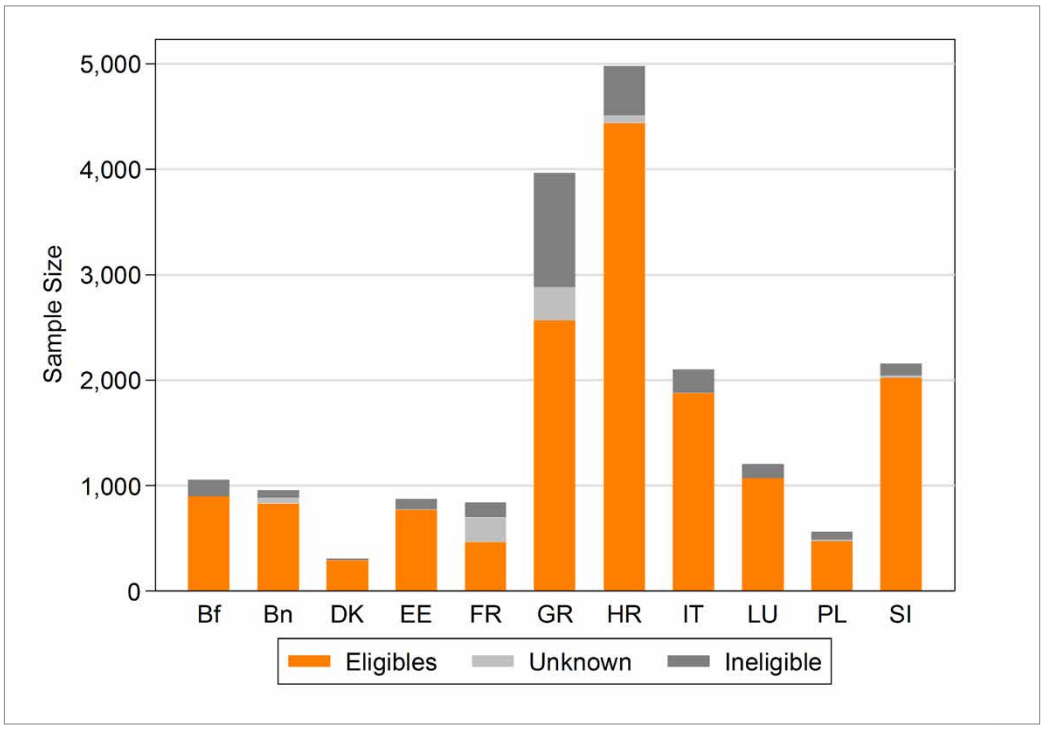

Figure 5.2. Baseline and refreshment samples by classification of sample units

Figure 5.2 shows the size of the refreshment sample or in the case of Croatia, which entered SHARE in Wave 6, the size of the baseline sample. Apart from the reasons leading to ineligibility in the longitudinal sample, baseline households were also considered ineligible in the following cases: death of the drawn respondent, in-patient treatment during the entire field time, unknown or invalid addresses, and if the coverscreen interview yielded no eligible persons in the household. In Greece and Croatia, the sample had to be screened for age eligibility first. Hence, ineligibility could also be an outcome of a screening contact. The fraction of ineligible households was highest in Greece and Croatia, which reflected the availability and quality of sample frame information on which sampling was based. Households were classified as having "unknown eligibility" after any form of screening non-response (non-contact, refusal, other non-response). This fraction was largest in Greece, which was mostly due to its sample frame. The highest fraction of non-attempted households (i.e., cases with unknown eligibility) was observed in France.

5.2 Formulas to compute survey outcomes of SHARE Wave 6

Apart from eligibility, the household state variable provided information about a household's contact and cooperation status. Table 5.2 reports which fieldwork indicators were used and how they were computed based on the household state. As the current state could be determined by the SMS for every household at any time, we were able to report the state of fieldwork any time as if it was over.

Table 5.2. Outcome rate formulas

Estimated proportion of eligible households	$p=\frac{E}{E+NE}$
Percentage of households attempted	$\frac{(CI+PI+R+II+O+NC)+(UE_R+UE_O+UE_{NC})+NE}{GS}$
Household contact rate (AAPOR CON2)	$\frac{(CI+PI+R+II+O)+p(UE_R+UE_O)}{E+p\cdot UE}$
Household cooperation rate (cf. AAPOR COOP2)[1]	$\frac{(CI+PI)}{(CI+PI+R+II+O)+p(UE_R+UE_O)}$
Household response rate (AAPOR RR4)	$\frac{(CI+PI)}{E+p\cdot UE}$
Household refusal rate (AAPOR REF2)	$\frac{R+II+p(UE_R)}{E+p\cdot UE}$
Household other non-interview rate (AAPOR ONI2)	$\frac{O+p(UE_O)}{E+p\cdot UE}$
Individual response rate[2]	$\frac{(CI_r+PI_r)}{\bar{n}(E+p\cdot UE)}$
Individual response rate in subsample i[3]	$\frac{(CI_i+PI_i)}{\bar{n}_i(E+p\cdot UE)}$

Notes:
1 $p(UER+UEO)$ is not part of the denominator in AAPOR COOP2. The calculation method was adapted for equation $RR=CON\times COOP$ to hold.
2 $\bar{n}$ is the average number of eligible persons per household. For baseline/refreshment sample $\bar{n}$ is estimated based on households with completed coverscreen. For the longitudinal sample, information on household composition is available for all households from the previous wave. CI_r and PI_r refer to the number of completed and partially completed interviews, respectively.
3 $\bar{n}_i$ is the average number of eligible persons from subsample i per household, where $i = \{A,B,C,D\}$.

In terms of household cooperation, households were considered as participating if at least one eligible household member was successfully interviewed. When looking at individual cooperation, several definitions of individual response rates were possible depending on how households with unknown eligibility were treated and how the number of eligible households with unknown composition was determined. These households may or may not have contained eligible individuals. Different assumptions about their number directly affected the denominator of the response rate. We assumed that only a fraction p of the households with unknown eligibility were in fact eligible and estimated this fraction by $\frac{E}{E+NE}$. Over the course of fieldwork, this estimate improved in precision as the non-attempted part of the sample became smaller.

The number of eligible persons was only known for households with a completed coverscreen interview (CV). Based on the assumption that, in each country, the average number of eligible persons in households without CV did not systematically differ from that in households with CV, we took the latter as an estimate for the baseline or refreshment samples. For households in the longitudinal sample without CV, we could use preload information on the household composition to assess the number of eligible respondents. Here, the assumption was that this number did not change since the last interview. By estimating the average number of eligible respondents $\bar{n}$ in a specific sample, the total number of eligible respondents – and thus the denominator of the individual response rate – was $\bar{n}(E+pUE)$.

In general, longitudinal samples can be divided into four subsamples at the individual level according to SHARE's eligibility rules. In Wave 6, a rather ample definition of subsample A was applied: All respondents who participated in the previous wave were assigned to subsample A, which does not exclude participation in additional waves before. However, depending on the difficulty to regain respondents' cooperation, it was decided to distinguish between two groups of respondents after the completion of Wave 6: While subsample A1 included all respondents who participated in the previous wave and any other wave of the SHARE survey, subsample A2 consisted of respondents who live in households that participated for the first time in the previous wave (i.e., baseline or refreshment sample). They are usually the ones that take more time and effort to recuperate. Subsample B consists of respondents who have participated in SHARE, but not in the previous wave, and live in a household where at least one household member participated in the previous wave. Respondents who have participated in any wave, but not in the previous wave, and do not live in a household where at least one household member participated in the previous wave are subsumed under subsample C. Finally, subsample D comprises all missing and new partners who have not participated in SHARE so far.

Response rates were reported separately for these subsamples during fieldwork. Individual-level retention was defined by the proportion of respondents in subsample A (and A1 and A2 respectively). Additionally, response in subsamples B and C depended on how well SHARE managed to bring respondents back who had already dropped out of the study for at least one wave. Finally, response in subsample D related to eligible persons in longitudinal households never interviewed before (i.e., either new sample members or eligible sample members who finally participated after refusals in previous waves).

5.3 Fieldwork periods and survey agencies

In the methodology report of Wave 5 (Malter & Börsch-Supan, 2015) we pointed out three reasons why the synchronized execution of fieldwork in all participating countries is a crucial requirement for an ex-ante harmonized survey like SHARE (seminal events should be experienced by all respondents, limited resources for monitoring, processing of data requires all data to be available at the same point in time). There is a forth reason: The tender process for the next wave can only start if fieldwork of the current wave is terminated. The figure below shows that Wave 6 happened largely synchronous across countries. Most countries had their first interviews in late January or early February of 2015, with two exceptions: Estonia and Croatia. Both countries had delays in obtaining national funding, which is the biggest threat to starting fieldwork on time.

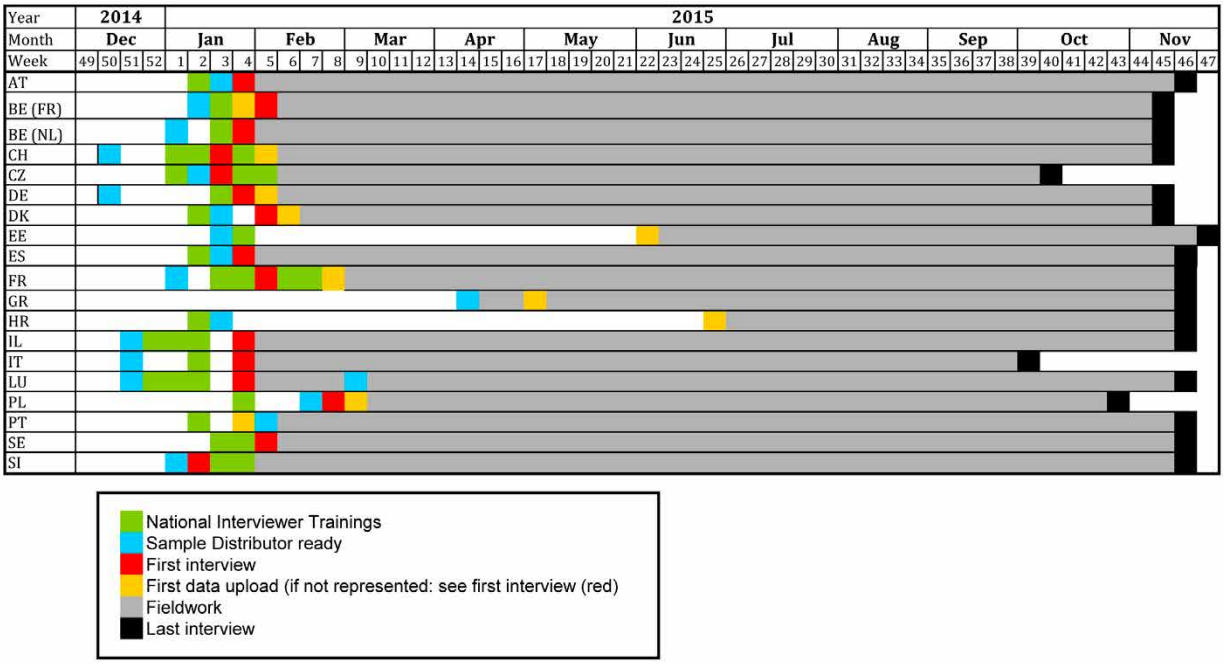

Figure 5.3. Fieldwork periods of SHARE Wave 6

Fieldwork was terminated for all countries by the strict deadline of 30 November 2015 (see Figure 5.3). No new interview data could be accepted after that date. The organizations in Table 5.3 below conducted the fieldwork in each wave. There has been high stability of contracted survey agencies over time in most countries.

Table 5.3. Survey agencies from Wave 1 to 6 of countries participating in Wave 6

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
AT	IMAS	same	IFES	same	same	same
BE-FR	PSBH, Liège Univ.	same	same	same	CELLO – Antwerp Univ.	same
BE-NL	PSBH Antwerp Univ.	Same	CELLO – Antwerp Univ.	same	same	same
CH	MIS Trend	LINK	same	same	same	same
CZ	–	SC&C	same	same	same	same
DE	infas GmbH	same	same	same	TNS Infratest	same
DK	SFI-Survey	same	same	same	same	same
EE	–	–	–	Statistics Estonia	GfK	Statistics Estonia
ES	TNS Demoscopia	same	same	same	same	same
FR	INSEE	same	same	INSEE (panel)/ GFK-ISL (refresh.)	GFK-ISL	GFK-ISL
GR	Kapa Research	same	same	–	–	Kapa Research
HR	–	–	–	–	–	GfK
IL	Cohen Institute, Tel Aviv Univ.	same	–	–	Cohen Institute, Tel Aviv Univ.	same
IT	DOXA S.p.A.	same	same	same	IPSOS	same
LU	–	–	–	–	CEPS	CEPS/INSTEAD
PL		TNS-OBOP	same	same	TNS Polska	Same
PT				GfK Metris	CECS, University of Minho	same
SE	Intervjubolaget IMRI	same	same	same	same	IPSOS Observer Sweden
SI	–	–	–	CJMMK	same	IPSOS

5.4 Reported indicators

Like in the previous wave, this chapter includes all final rates and figures of Wave 6 based on the last data export at the end of November 2015. All numbers and figures reported during fieldwork were based on information from the SHARE sample management system (SMS). As of Wave 6, all SMS data were cross-checked against data gathered during the CAPI interview routinely already during fieldwork. The separation between panel samples and refreshment/baseline samples known from the monitoring reports were applied to this chapter, as well. All indicators were graphed over calendar weeks to visualize each country's progress of fieldwork over time. Final rates and interview numbers are then provided again in final summary graph without trajectories to allow for easier comparison between countries.

5.4.1 Panel samples

5.4.1.1 Contacting households

Figure 5.4 shows the fraction of households in the longitudinal gross sample where a contact was attempted (i.e., all households where either an interviewer reported a contact attempt but was unable to actually contact anybody or where a contact was successful). By definition, this includes households with one or more conducted interviews.

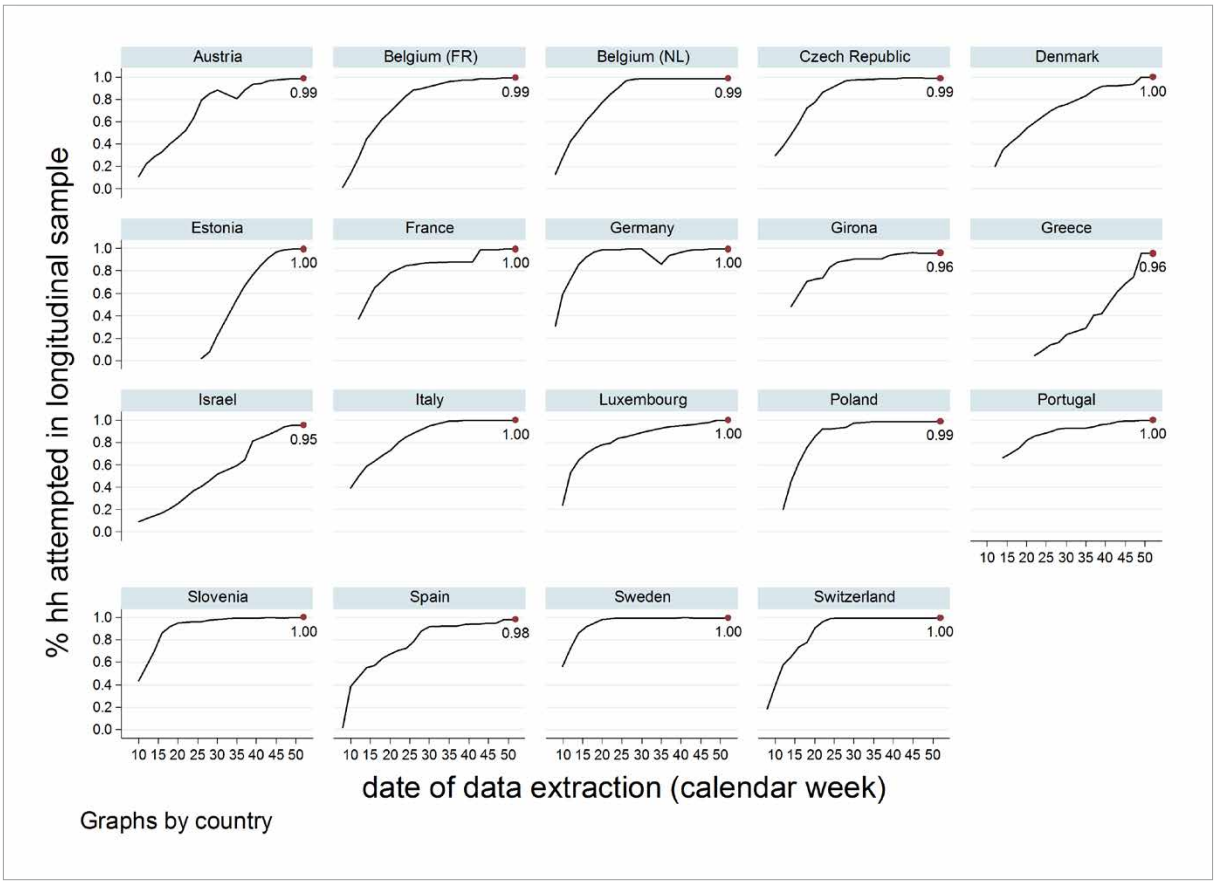

Figure 5.4. Fraction of panel households with contact attempts by country over time

In Wave 6, all countries except Greece, Israel, and the province of Girona managed at least a contact attempt in every panel household. It can be seen that most countries had a steep increase that leveled out over time (i.e., interviewers were quick at attempting the majority of all households for contact). Especially Germany and Sweden deployed all their interviewer personnel from the very beginning. Countries such as Austria, Denmark, Estonia, Greece, and Israel had a rather linear trend, possibly due to a different contact strategy. The dips in Austria and Germany were due to opening a new sample replicate (so-called "batch"), a strategy used to balance retention rates and limited funding.

Figure 5.5 shows country break-downs of household contact rates over time. This contains contact attempts which resulted in an actual contact (i.e., at least one household member was reached). By definition, this may also include households with at least one complete interview.

The trajectories of contact rates were similar to the rates on attempted households reported above. With contact attempt rates being the logical ceiling to contact rates, Girona, Greece, and Israel had the "lowest" contact rates.

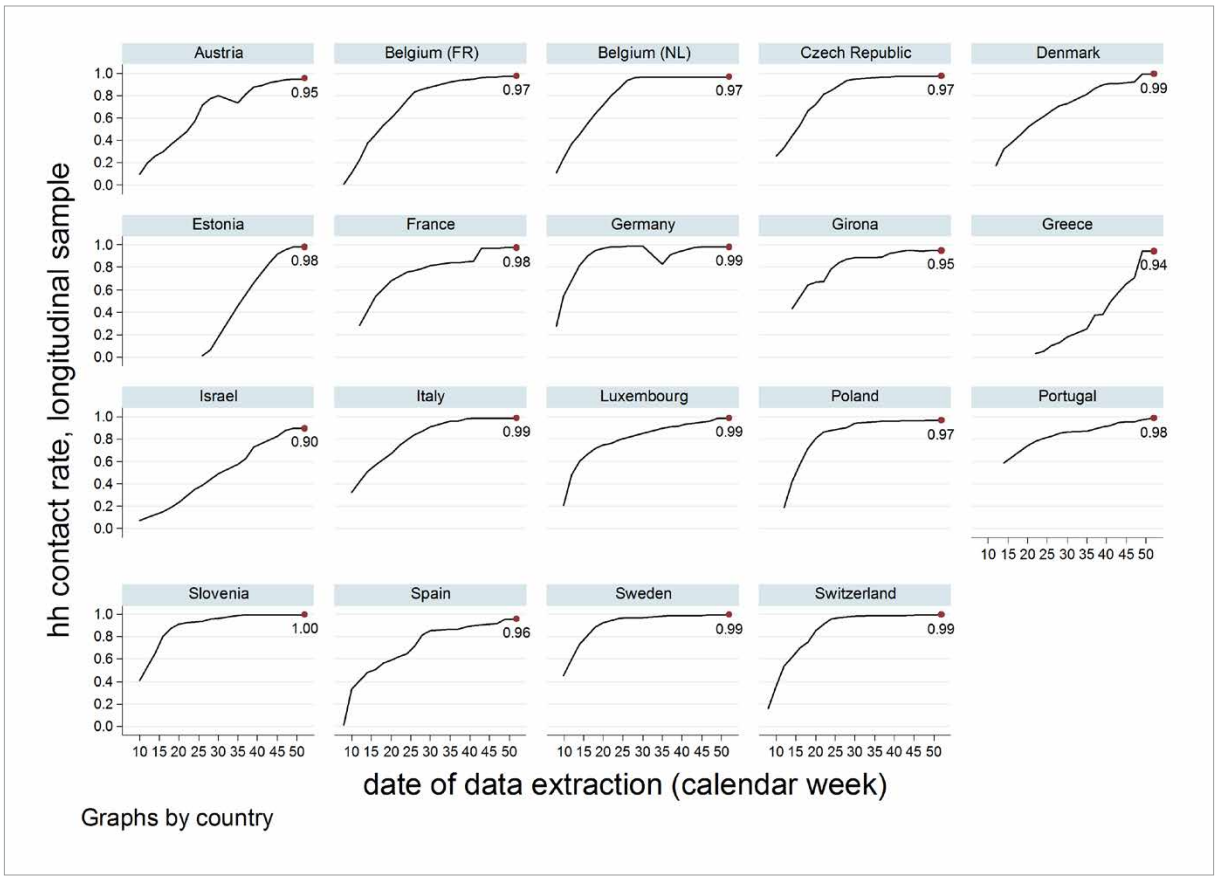

Figure 5.5. Contact rate of panel households by country over time

5.4.1.2 Household cooperation and response rate

Figure 5.6 shows the cooperation rate of panel samples by country (i.e., the rate of all contacted households that had at least one completed interview).

Similar to Wave 5, France was among the countries with the largest gross sample and ended up with the lowest cooperation rate (54 percent). The very high contact rate of 98 percent did not go together with gaining households' cooperation. However, it should be mentioned that France had the additional challenge of a new agency taking over the sample, which might have resulted in an interviewer change for the panel households. This could explain at least part of the low cooperation rate. Austria remained at a cooperation rate of about 70 percent from the start, meaning that most household contacts resulted in at least one interview per household. In all other countries, cooperation rates kept increasing at different slopes until hitting a plateau, largely below 80 percent.

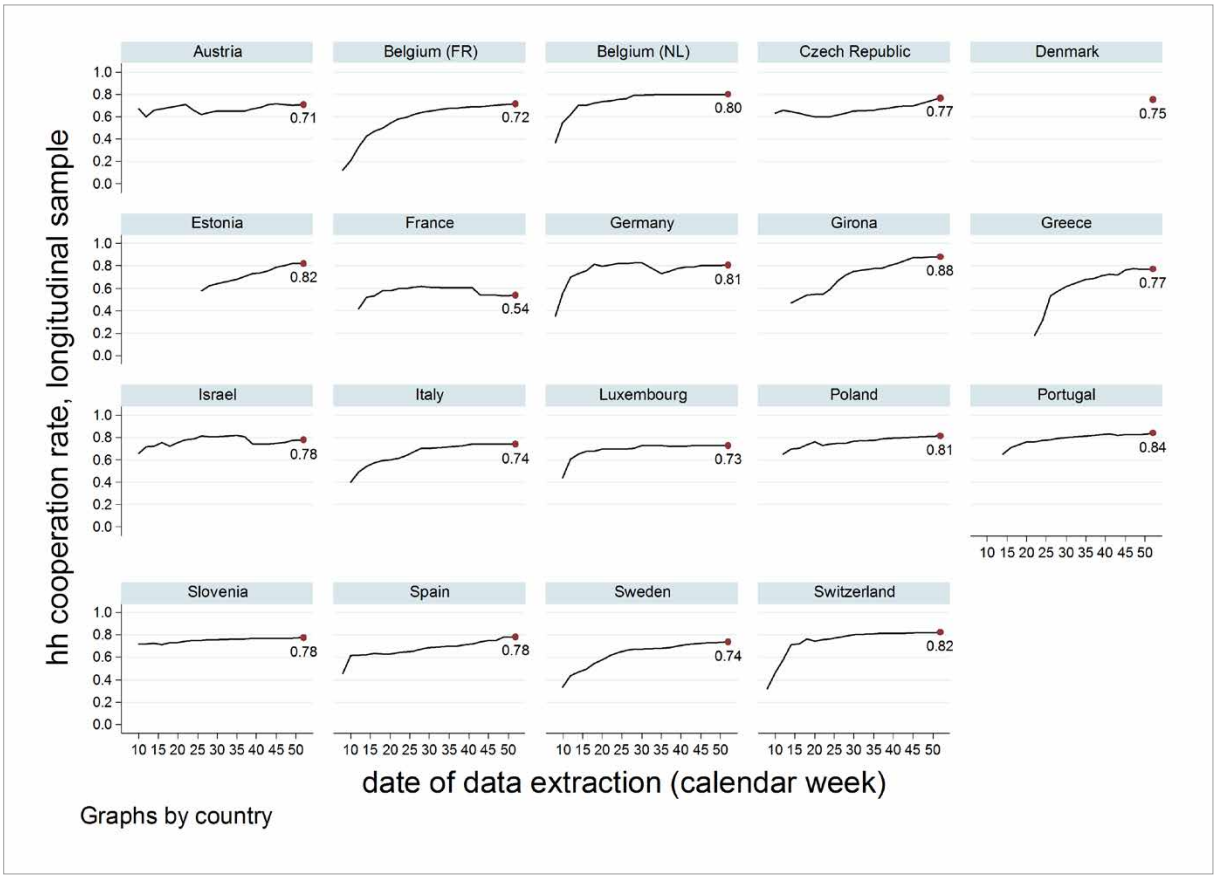

Figure 5.6. Cooperation rate of panel households by country over time

Figure 5.7 shows panel household retention rates (i.e., the number of panel households with at least one complete interview divided by the total number of (estimated) eligible panel households).

It can be seen that most countries had a steadily increasing trajectory that leveled out over time. Due to its low cooperation rate, France had the lowest household retention rate (keeping in mind that cooperation and contact rates represented the logical ceiling to the final retention rate).

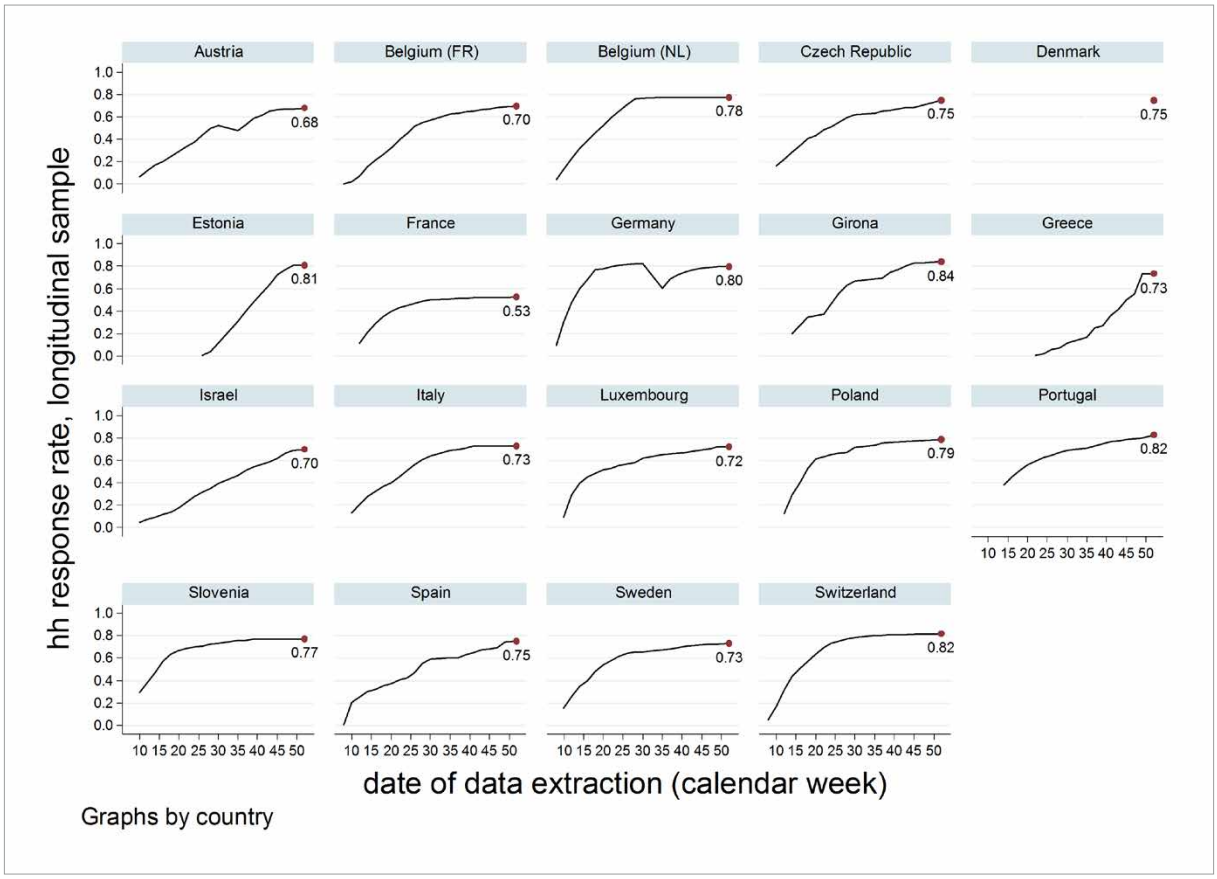

Figure 5.7. Rentention rate of panel households by country over time

5.4.1.3 Individual participation of panel samples

Figure 5.8 shows the individual retention rate of subsamples A and B. As pointed out before, subsample A included all respondents who participated in Wave 5; subsample B included all respondents who participated in any previous SHARE Wave, but not in Wave 5, and live in a household where at least one household member participated in Wave 5. SHARE stipulates at least 83 percent of respondents in these combined two subsamples be brought back in the current wave. Survey agencies were incentivized for rates exceeding 83 percent.

With a final rate of 86 percent, Spain was the frontrunner of Wave 6 in terms of individual retention, followed by Estonia and Switzerland (85 percent each). The French part of Belgium, France, Germany, Greece, Israel, Luxembourg, and Sweden did not reach the expected minimum retention rate of 80 percent in subsamples A and B. In France, the individual-level retention rate was higher than the household retention rate suggesting that a significant number of known eligible spouses or partners could be convinced to cooperate.

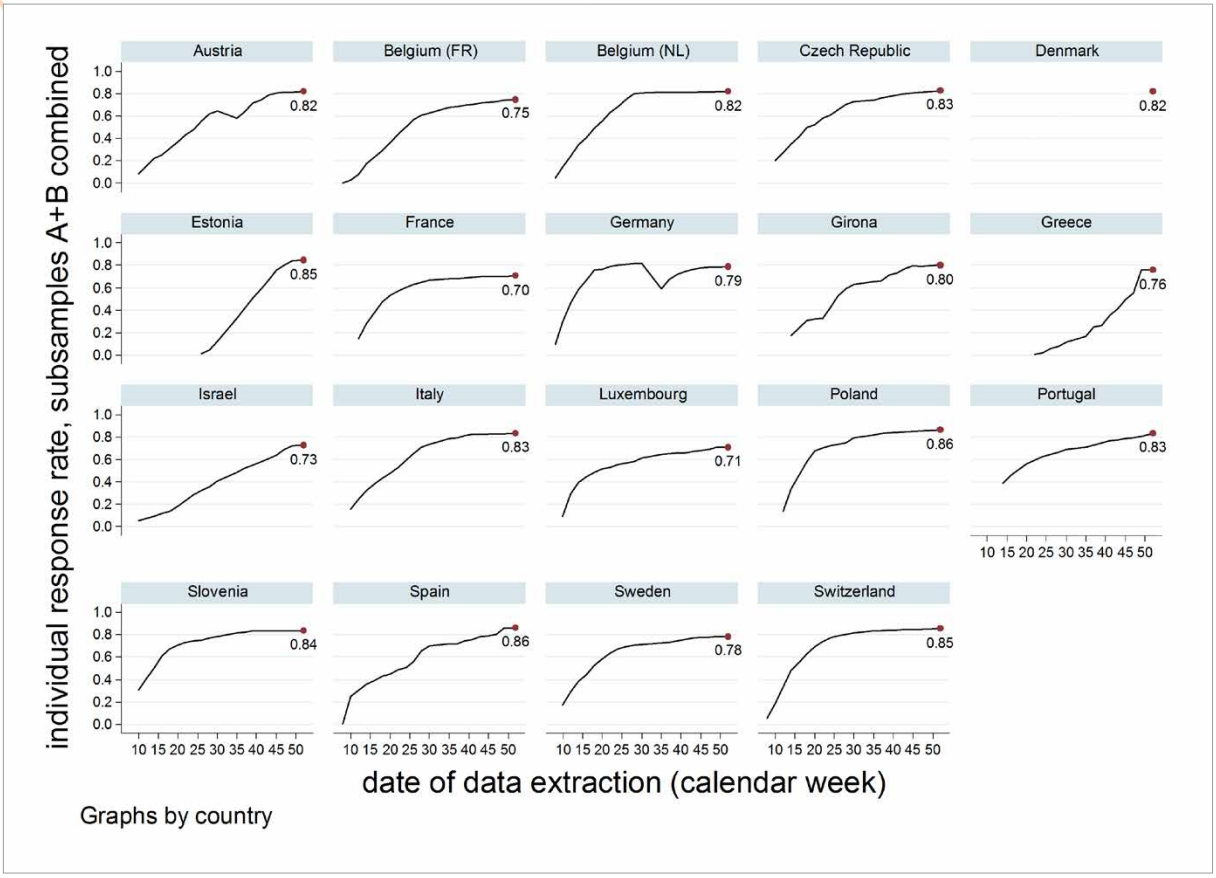

Figure 5.8. Individual retention rates in subsamples A and B by country

Figure 5.9 shows the individual retention rate (or, more precisely, the "recovery rate") of subsample C (i.e., the percentage of panel respondents that did not participate in Wave 5 and any combination of [non-] participation in previous waves, but that were brought back in Wave 6). Since Luxembourg joined SHARE in Wave 5 and Portugal was only part of Wave 4, the classification into subsample C was not applicable yet.

At the end of fieldwork, Estonia and Greece focused on recovering respondents. However, compared to Greece, Estonia had a fairly high number of respondents in subsample C (about 850) and turned out to show the best performance in recuperating as many "lost" respondents as possible.

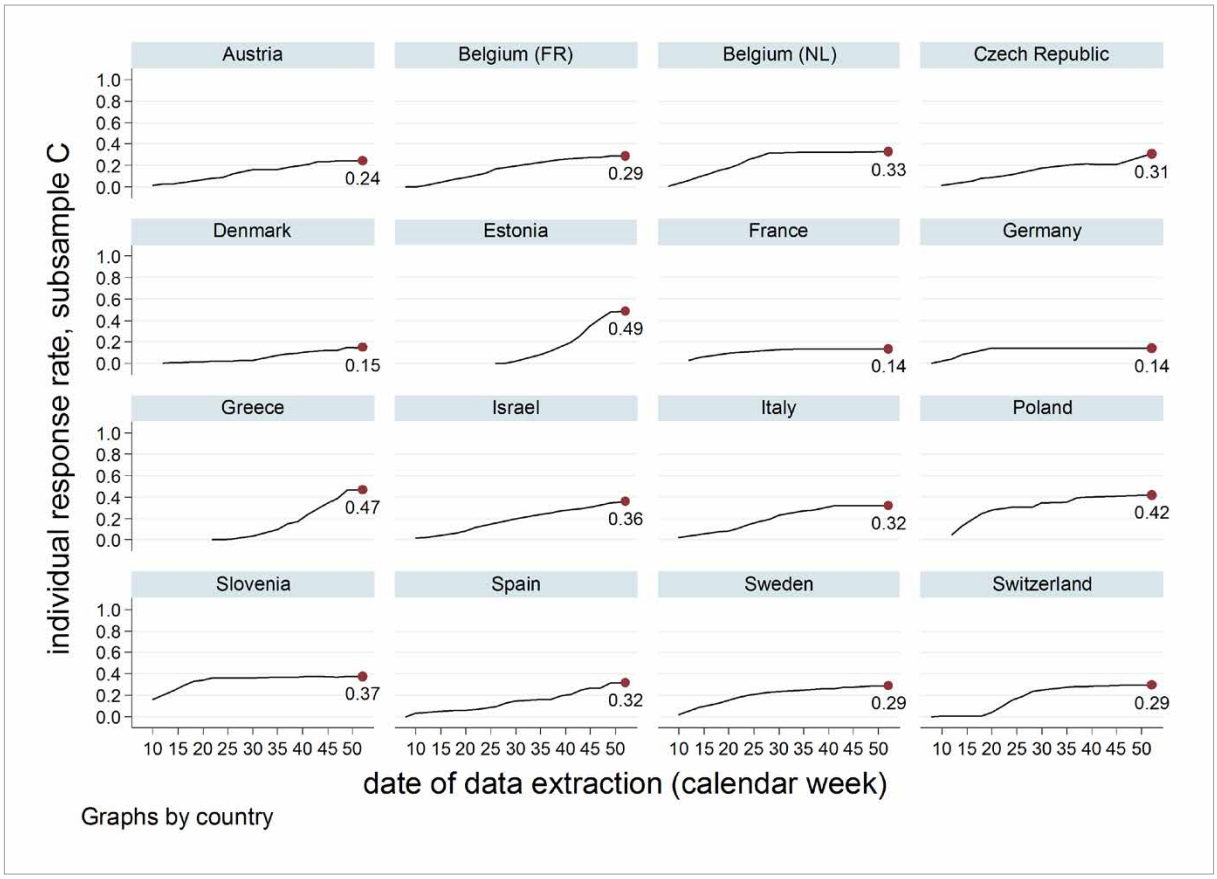

Figure 5.9. Individual retention (recovery) rates in subsample C by country

5.4.1.4 Final outcomes of panel samples

Figure 5.10 shows the final household-level contact, cooperation, and retention rates of the panel samples at the end of fieldwork wave.

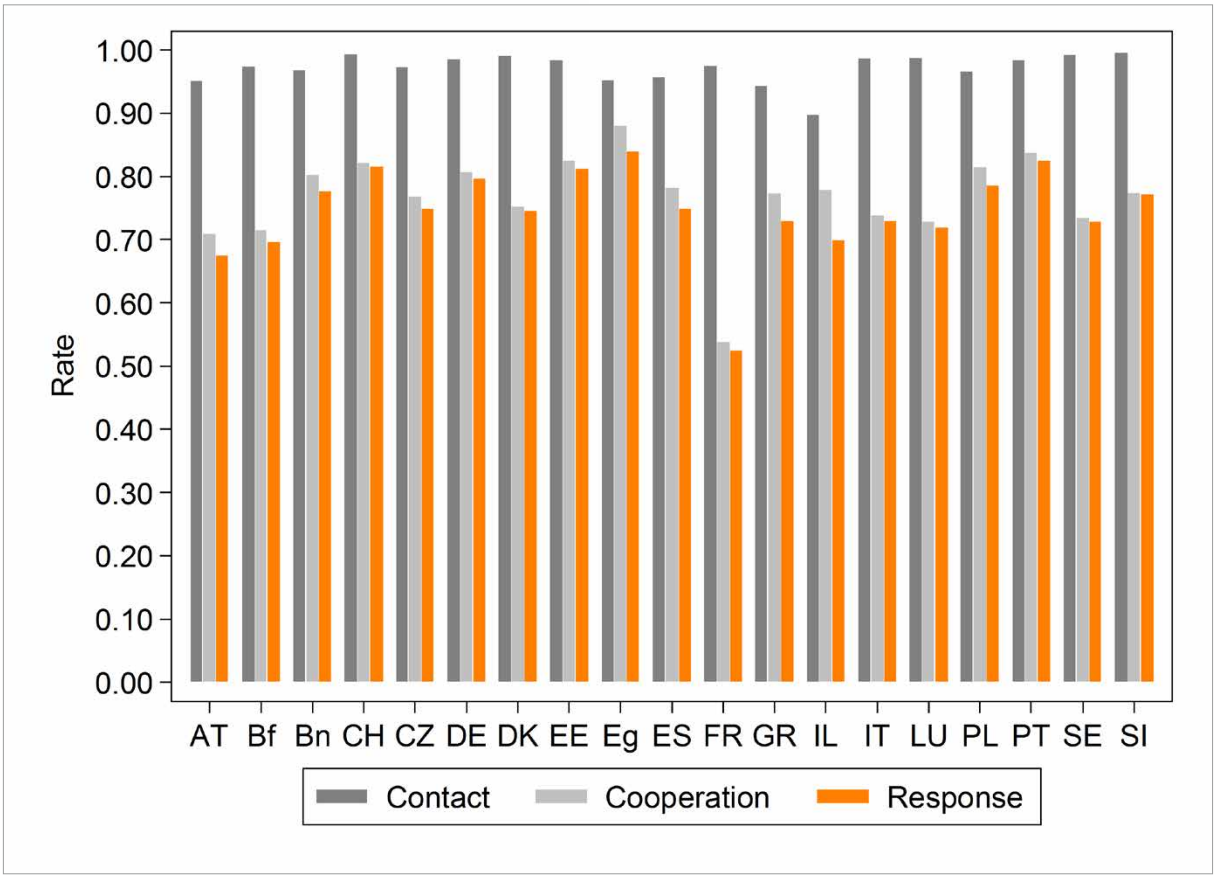

Figure 5.10. Contact, cooperation and retention rates for panel households

Figure 5.11 shows the final individual retention rates by subsample. Apart from the above-defined subsamples A, B, and C, subsample D includes all non-responding spouses or partners and new spouses or partners that have not participated in any previous SHARE Wave so far. For countries that joined SHARE in Wave 5 (Luxembourg and the Spanish province of Girona) and Portugal, that was only part of Wave 4, the classification into subsamples B and C was not applicable yet.

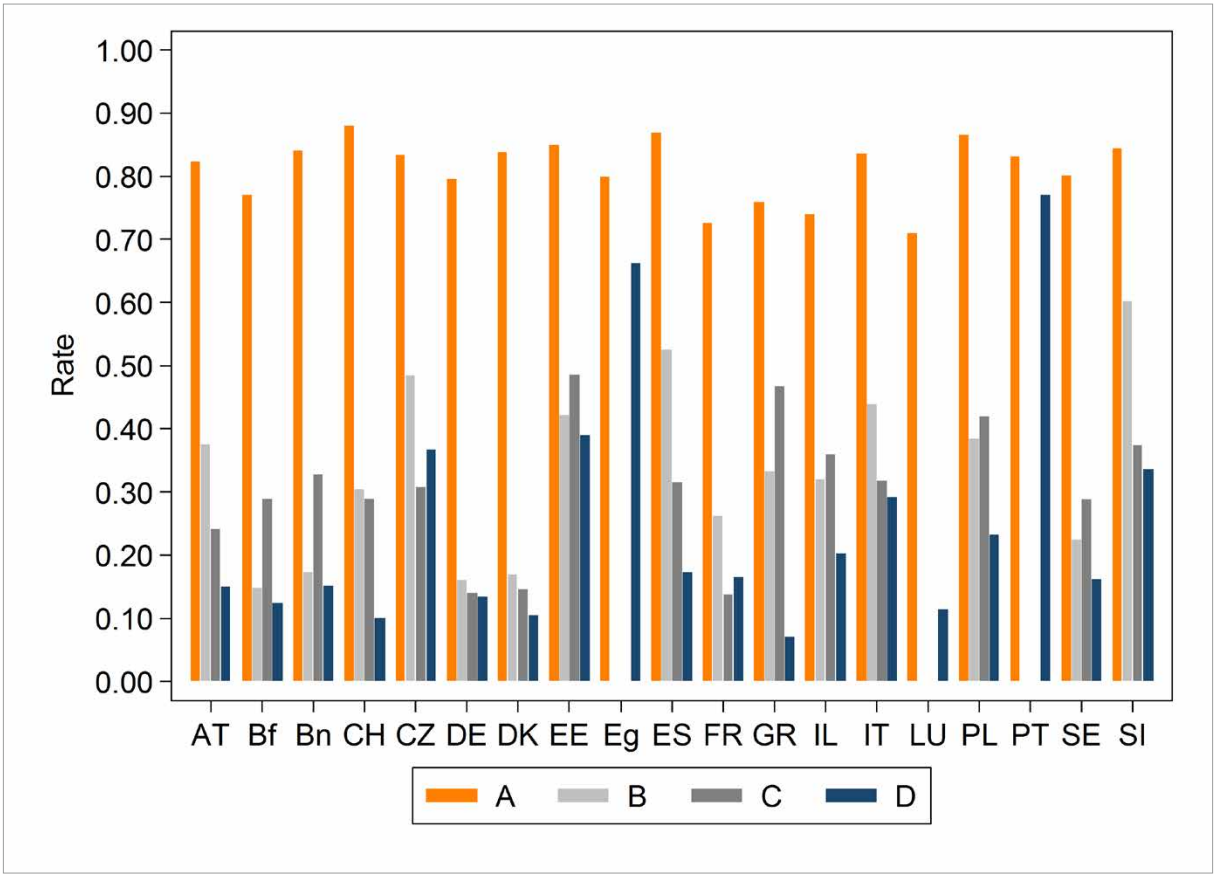

Figure 5.11. Respondent-level retention and recovery

Figure 5.12 displays individual retention by subsample A1 and A2. These rates were compiled after the end of fieldwork of Wave 6. While subsample A1 included all respondents who participated in the previous wave and any other wave of the SHARE survey, subsample A2 consisted of respondents who live in households that participated for the first time in the previous wave (i.e., baseline or refreshment sample). All countries missing the bar for subsample A2 did not have a refreshment sample in Wave 5.

In general, it can be seen that A1 retention was always higher than A2, mostly because it is usually more difficult to win back households that have participated just once. While A1 rates varied between about 70 and 90 percent, A2 rates ranged from about 60 to 80 percent.

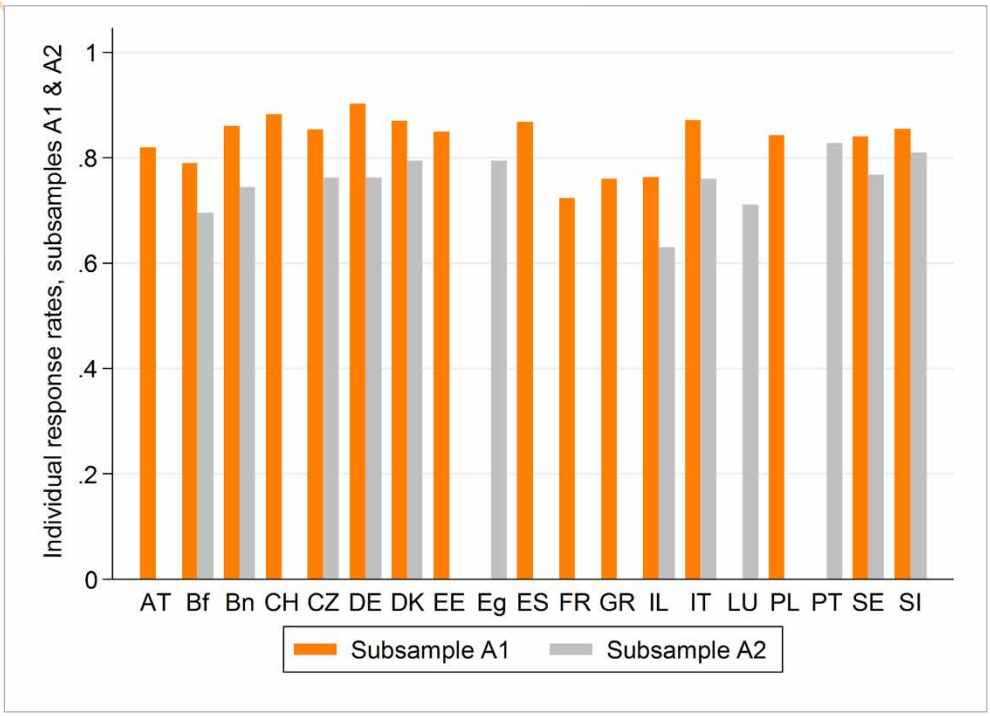

Figure 5.12. Respondent-level retention and recovery subsamples A1 and A2

Figure 5.13 shows the absolute number of panel interviews per country at the end of fieldwork Wave 6. Detailed breakdowns can be found in the appendix of this chapter.

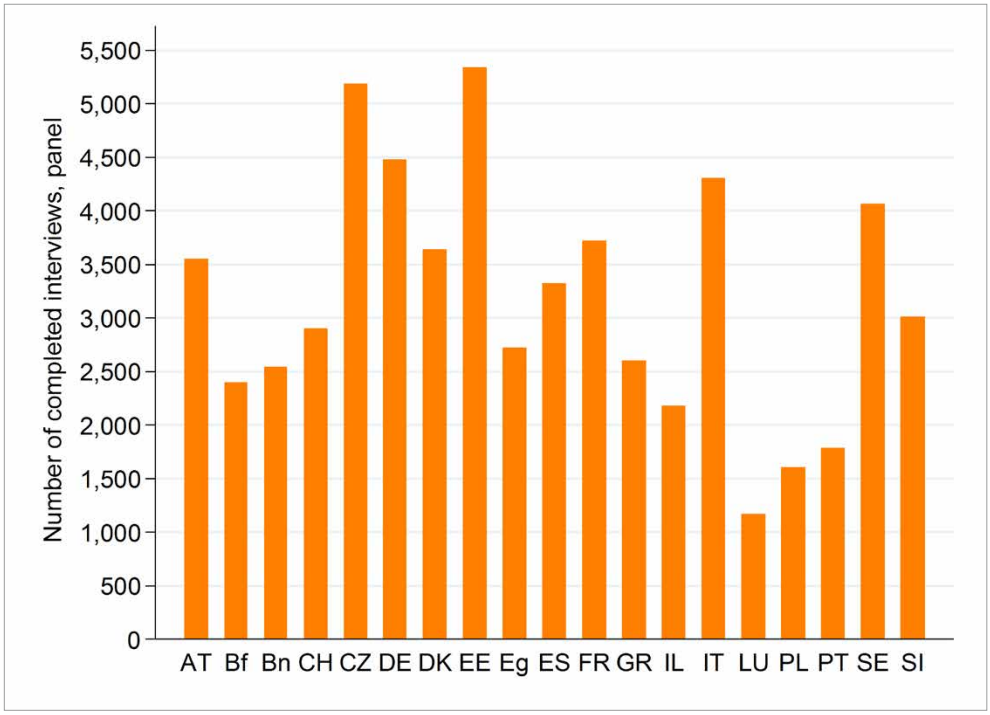

Figure 5.13. Absolute numbers of interviews in panel samples

5.4.2 Refreshment samples

5.4.2.1 Contacting households

Figure 5.14 shows the fraction of households of refreshment/baseline samples where a contact was attempted (i.e., all households where either an interviewer reported a contact attempt but was unable to actually contact anybody or where a contact was successful). By definition, this includes households with one or more conducted interviews.

In Wave 6, only the Dutch-speaking part of Belgium did not completely exhaust its refreshment sample in terms of contact attempts. Similar to the panel samples, most countries had a steep increase that leveled out over time. Denmark joined fieldwork with a small baseline sample in the second half of Wave 6 and put great effort into catching up and finishing fieldwork on time. Due to a now-fixed program bug in France, there is a strong difference in the present and the following graphs after week 26.

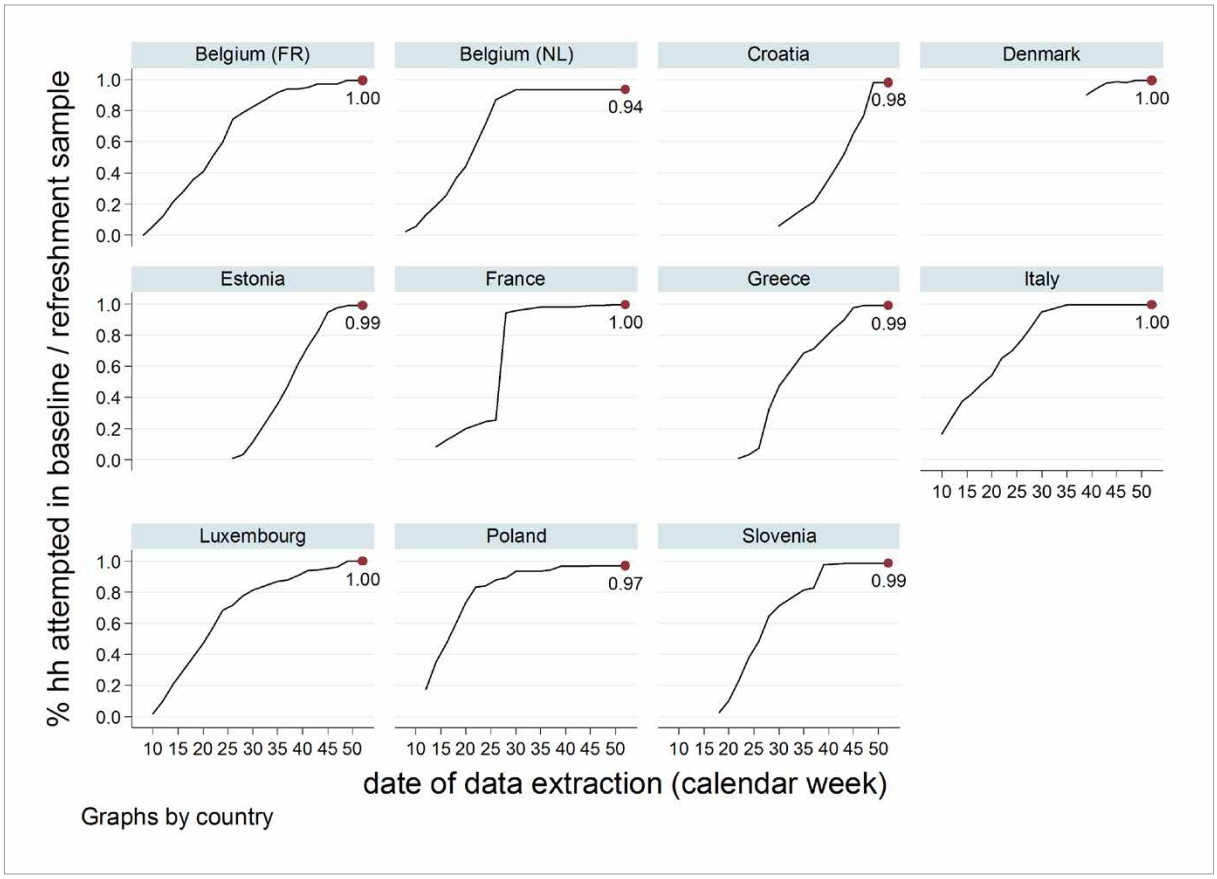

Figure 5.14. Fraction of refreshment/baseline households with contact attempts by country

Figure 5.15 shows household contact rates broken down for countries. This contains contact attempts which resulted in an actual contact. By definition, this may also include households with at least one completed interview.

A similar picture emerged as above. While Luxembourg was close to reaching the entire sample (97 percent), France left about one fifth of its refreshment sample uncontacted. The low contact rate results from the comparably low quality of addresses of refreshment households.

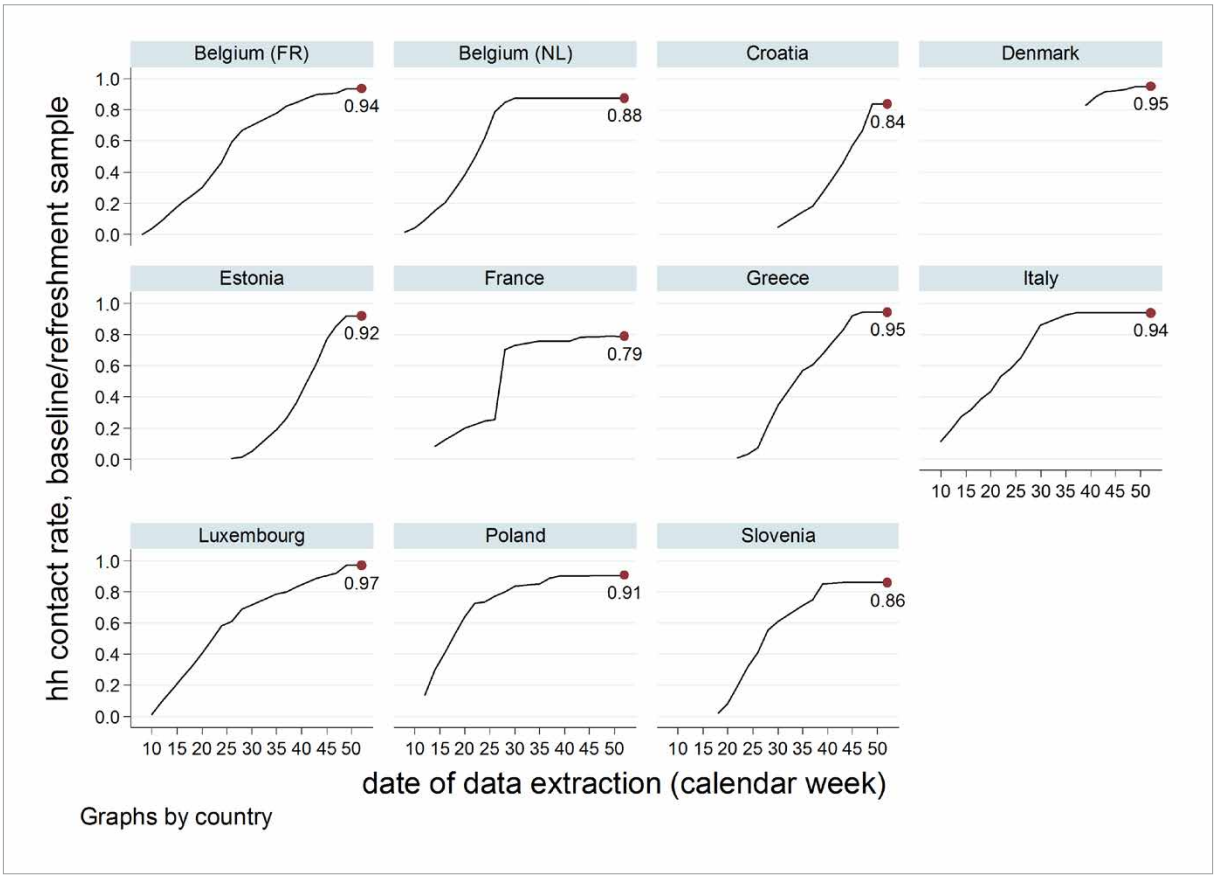

Figure 5.15. Contact rate of refreshment/baseline households by country

5.4.2.2 Household cooperation and response rate

Figure 5.16 shows the cooperation rate of refreshment/baseline samples by country (i.e., the rate of all contacted households that have at least one completed interview).

Cooperation rates are based only on sample units with a previous contact. The interpretation of cooperation rates becomes more meaningful as contact rates increase. This is accompanied by a stabilization of cooperation rates over the fieldwork period. Indeed, in most countries, the cooperation rates leveled out after finishing the contact phase. A now-fixed program bug in France and Greece caused an overestimation of the respective cooperation rates before week 26. In the end Greece attained the highest cooperation rate in the refreshment sample. Cooperation was lowest in Luxembourg because it was among the countries with the highest number of refusals.

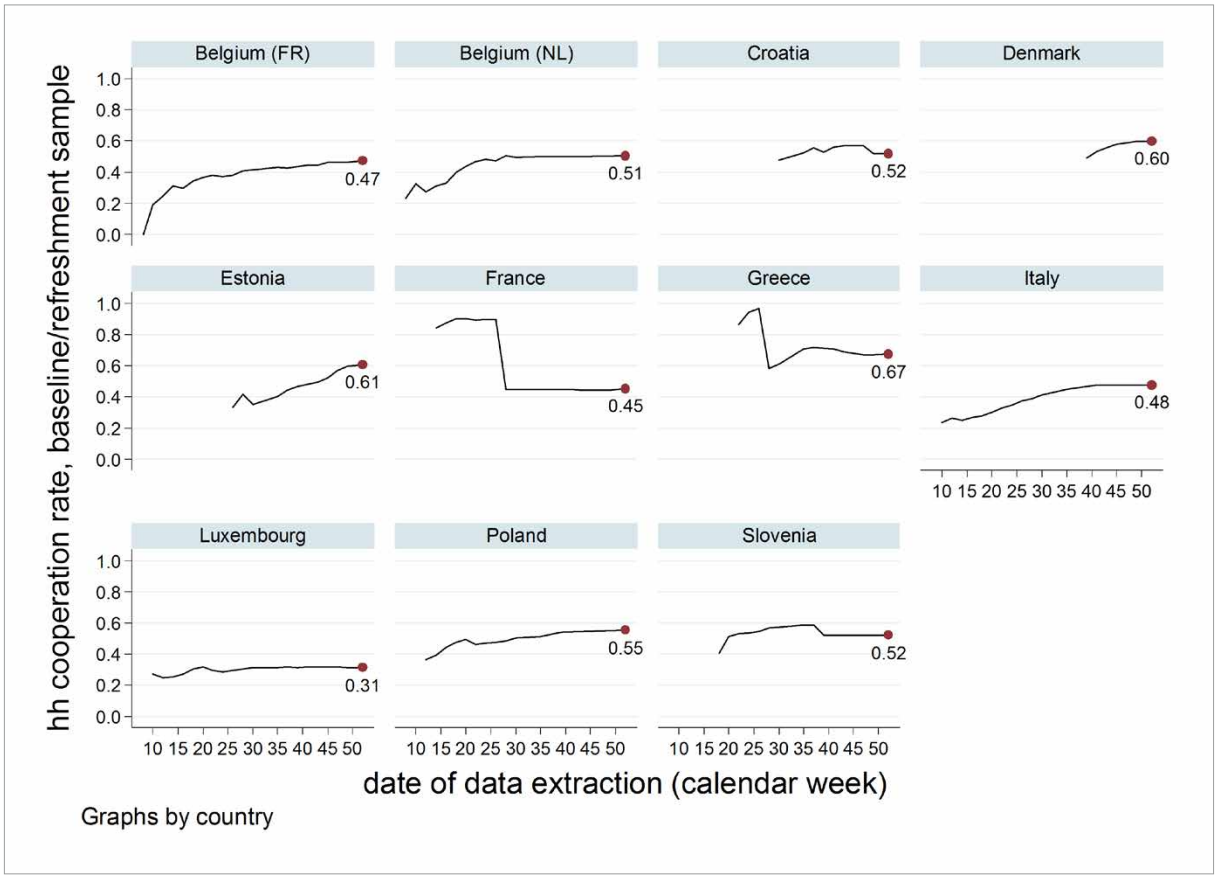

Figure 5.16. Cooperation rate of refreshment/baseline household by country

Figure 5.17 shows the household response rate (i.e., the number of refreshment/baseline households with at least one complete interview divided by the total number of (estimated) eligible refreshment/baseline households).

Many countries had steadily increasing trajectories. Greece was the frontrunner with 64 percent. Apart from that, Denmark, Estonia, and Poland achieved successful cooperation in 50 percent or more of the households of their refreshment samples. The low cooperation in Luxembourg, but also in France, translated into the lowest household response of in both countries.

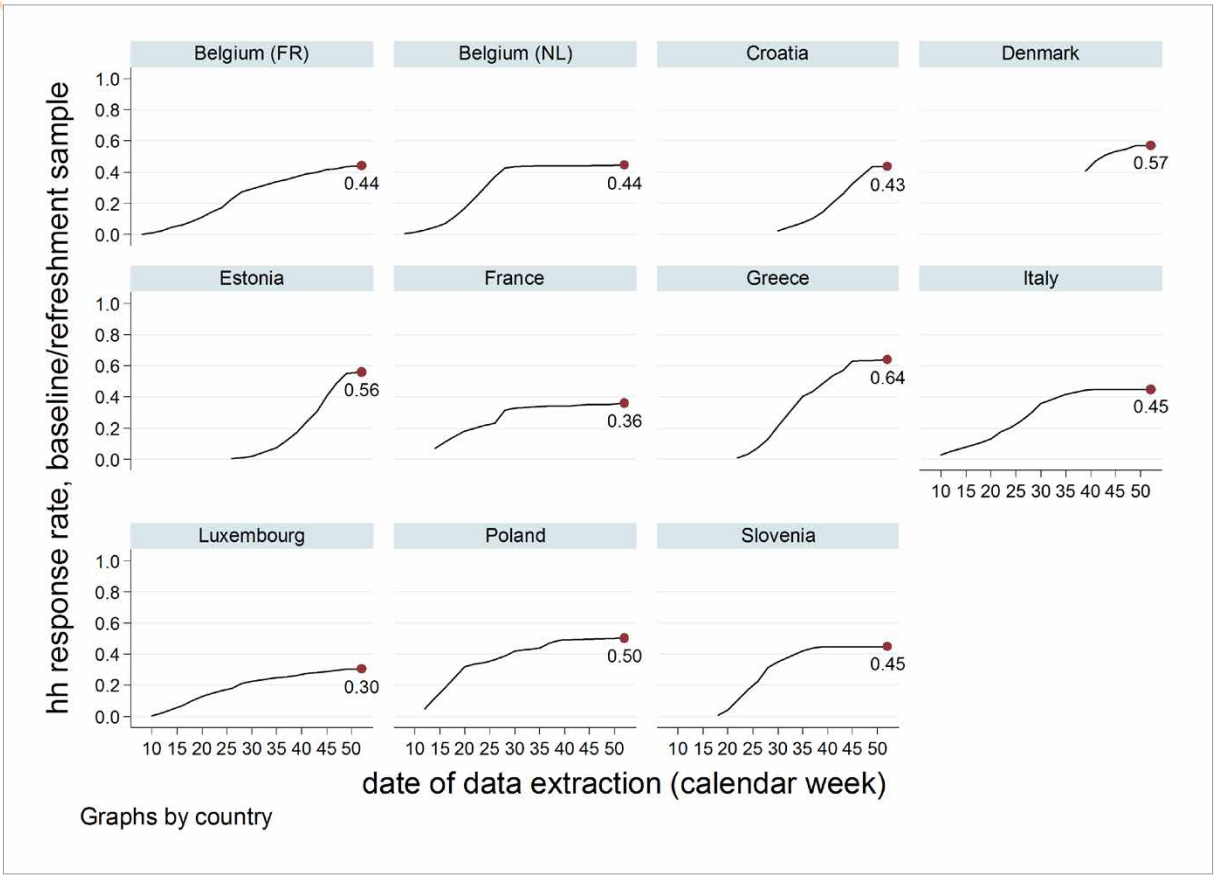

Figure 5.17. Response rate of refreshment/baseline households by country

5.4.2.3 Individual participation of baseline/refreshment samples

Figure 5.18 shows the individual response rate of refreshment/baseline samples in Wave 6.

The trajectories of the individual response rates in all countries were fairly similar to the household response rates, again with the Greece having the highest individual response rate (59 percent). Individual participation was consistently lower than household response because spouses or partners could not always be convinced to cooperate. While France touched the benchmark, Luxemburg did not reach the desired minimum individual response rate of 30 percent.

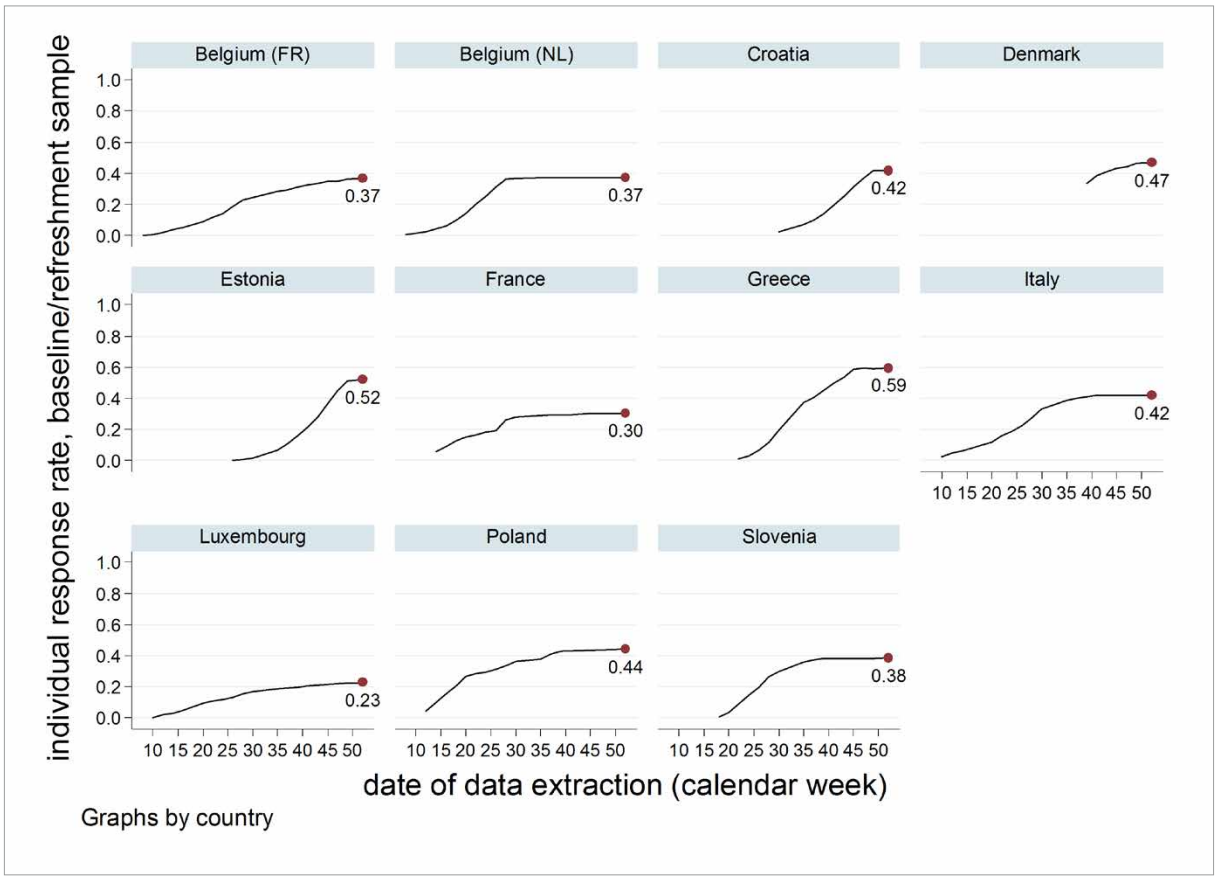

Figure 5.18. Individual response rate of refreshment/baseline respondents by country

5.4.2.4 Final outcomes of baseline/refreshment samples

Figure 5.19 shows the final household contact, cooperation, and response rates at the end of fieldwork Wave 5.

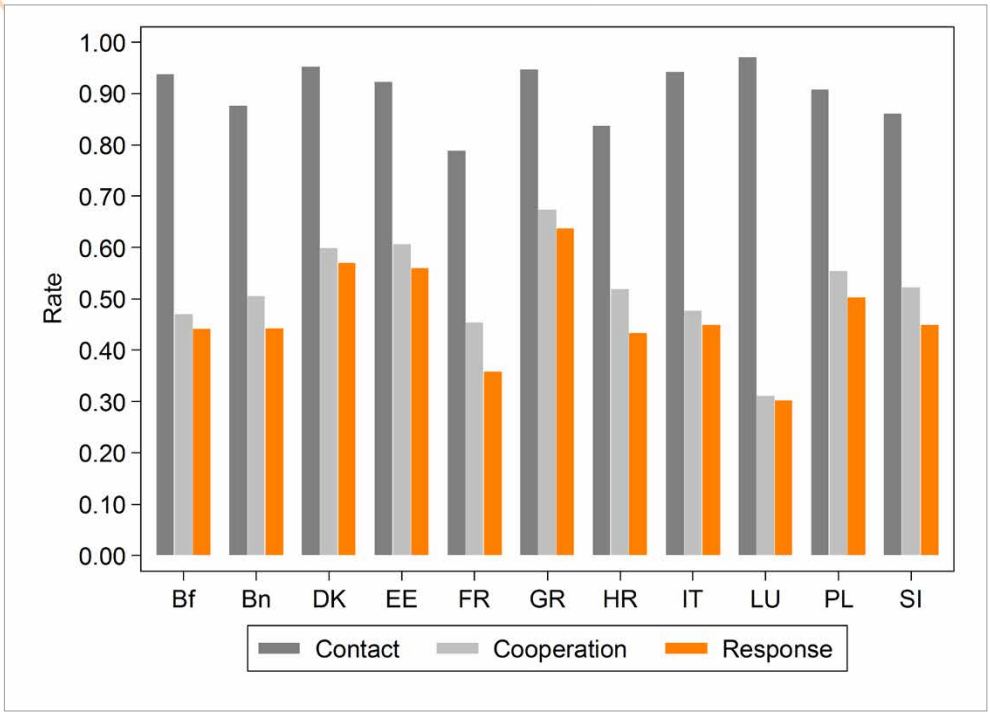

Figure 5.19. Contact, cooperation and response rates for baseline/refreshment samples

Figure 5.20 shows the final household and respondent-level response rates.

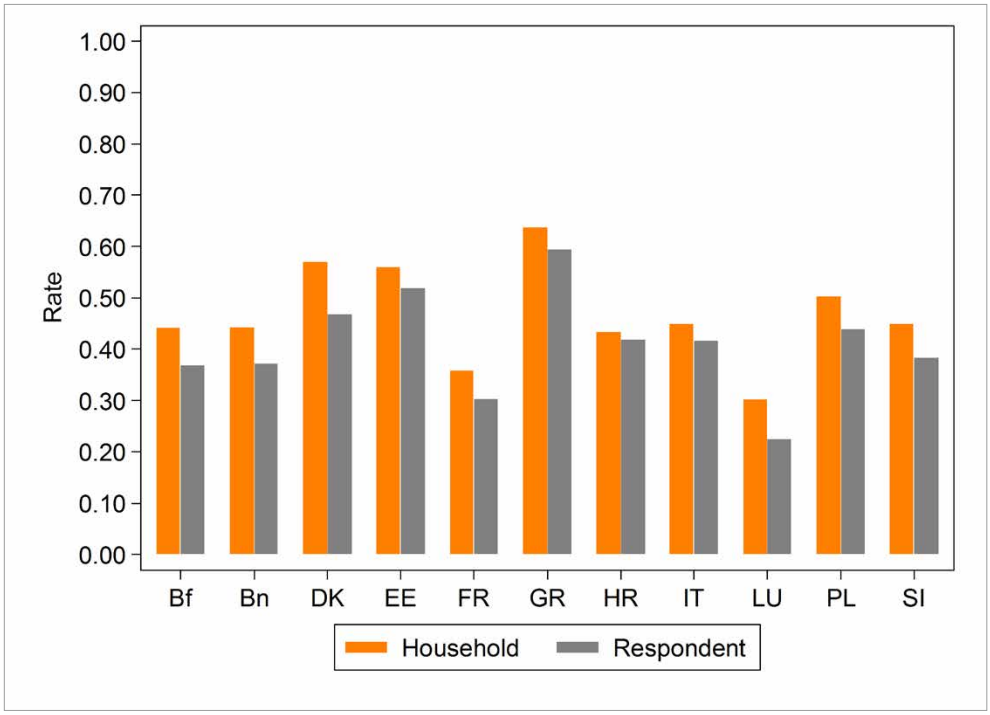

Figure 5.20. Household and respondent-level survey participation in baseline/refreshment samples

Figure 5.21 shows the absolute number of interviews per country in the refreshment/baseline samples at the end of fieldwork.

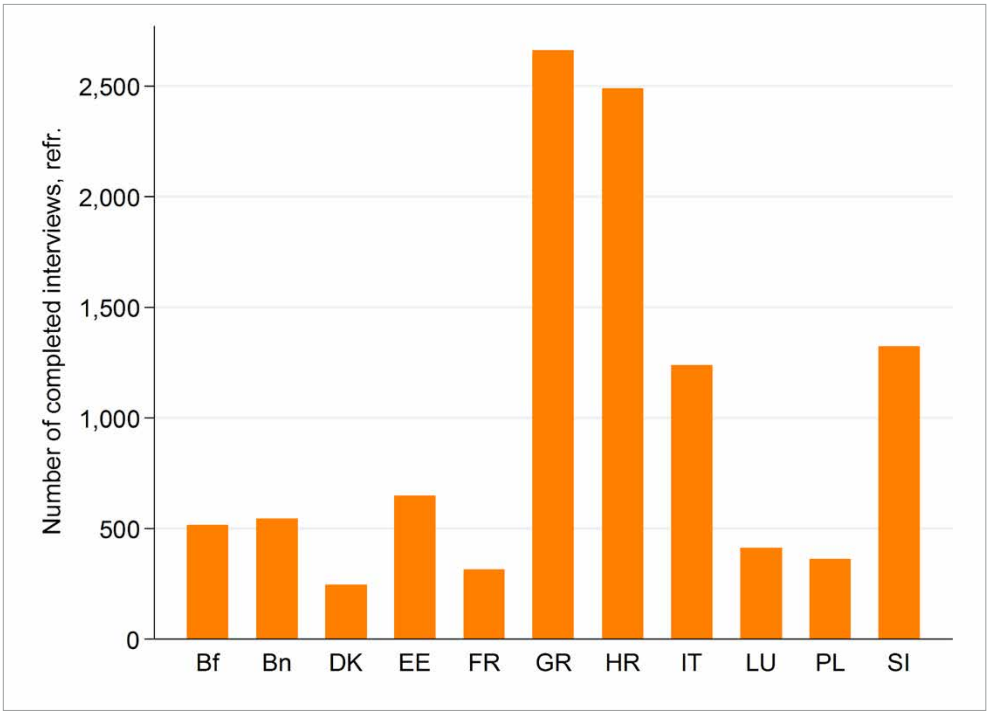

Figure 5.21. Absolute number of interviews in baseline/refreshment samples

5.5 Monitoring of interviewer activity and interventions by SHARE Central

We introduced another innovation regarding our attempts to be more actively involved in managing the fieldwork of Wave 6: we created interviewer-level statistics and distributed them in the form of excel sheets to the survey agencies. This was done with an explicit request to get in touch with under-performing interviewers. We focused on two sets of indicators: statistics on sample representation (contact rate, cooperation rate, response/retention rate) and a set of indicators on consent and quality of the Dried Blood Spots (for details see chapter 6.3 of this volume). A brief description of the interviewer-level statistics has to suffice at this point as the details of our procedure have been published elsewhere (Mneimneh et al, 2017).

Interviewers with survey outcomes not meeting pre-defined cut-off scores were flagged (shown in Table 5.4 in red color). In the table below it can be seen that interviewers with laptops xxxx and yyyy show good performance on the four indicators we reported. Interviewer with laptop zzzz, however, shows underperformance on obtaining cooperation from panel households, also reflected in the fairly

high level of households refusing. In this case, the fieldwork management of the survey agency was requested to get in touch with this respective interviewer and provide assistance to improve these rates while fieldwork was still ongoing.

Table 5.4. Example of interviewer-level statistics sent to survey agencies to stipulate managerial action

laptopid	Reached Panel HH	Panel HH cooperation rate	Panel HH refusal rate	Rate of attempted panel HH
xxxx	75%	74%	5%	86%
yyyy	78%	96%	3%	78%
zzzz	82%	33%	36%	100%

There was no systematic feedback channel implemented with survey agencies on what exactly they did after we sent these statistics. We have, however, received sporadic feedback from several survey agencies which obtained feedback from interviewers. At a later point in time, survey agencies mitigated the suboptimal performance of some interviewers by re-assigning households to more productive interviewers, a state-of-the-art procedure to improve outcomes at the end of fieldwork.

5.6 Conclusions and Outlook

The experience of monitoring and managing the fieldwork of SHARE Wave 6 can be summarized as follows. From an operational point of view, we had quite large gains in efficiency by building on the conceptual framework established before Wave 5: streamlining reported indicators along the conceptual backdrop of AAPOR outcome rates was the right decision. Adapting our extensive and highly complex data processing scripts required comparably little effort when adapting them to the new data output of Wave 6, especially when compared to the substantial manpower spent on revamping concepts and statistical programming before Wave 5.

Regarding the actual outcomes of fieldwork, all findings are summarized in the "traffic-light table" below.

Table 5.5. "Traffic light" summary of fieldwork outcomes of countries of SHARE Wave 6

	Panel sample				Baseline/refreshment sample		
Indicator	**HH attempt rate**	**HH contact rate**	**Median # of contact attempts in HH without interview**	**Retention rate in subsample A&B**	**HH attempt rate**	**HH contact rate**	**Individual response rate**
Cut-off	99 percent	95 percent	6	83 percent	95 percent	85 percent	30 percent
AT – Austria	🟢	🟢	🔴	🔴	—	—	—
BE – Belgium (FR)	🟢	🟢	🟢	🔴	🟢	🟢	🟢
BE – Belgium (NL)	🟢	🟢	🔴	🔴	🔴	🟢	🟢
CH – Switzerland	🟢	🟢	🟢	🟢	—	—	—
CZ – Czech Republic	🟢	🟢	🔴	🟢	—	—	—
DE – Germany	🟢	🟢	🔴	🔴	—	—	—
DK – Denmark	🟢	🟢	🔴	🔴	🟢	🟢	🟢
EE – Estonia	🟢	🟢	🔴	🟢	🟢	🟢	🟢
ES – Spain	🔴	🟢	🔴	🟢	🟢	🟢	🟢
ES-gi – Spain (Girona)	🔴	🟢	🔴	🔴	—	—	—
FR – France	🟢	🟢	🟢	🔴	🟢	🔴	🟢
GR – Greece	🔴	🔴	🔴	🔴	🟢	🟢	🟢
HR – Croatia	—	—	—	—	🟢	🔴	🟢
IL – Israel	🔴	🔴	🔴	🔴	—	—	—
IT – Italy	🟢	🟢	🟢	🟢	🟢	🟢	🟢
LU – Luxembourg	🟢	🟢	🔴	🔴	🟢	🟢	🔴
PL – Poland	🟢	🟢	🔴	🟢	🟢	🟢	🟢
PT – Portugal	🟢	🟢	🔴	🟢	—	—	—
SE – Sweden	🟢	🟢	🟢	🔴	—	—	—
SI – Slovenia	🟢	🟢	🟢	🟢	🟢	🟢	🟢

As can be seen in Table 5.5 almost all countries managed to obtain very high rates of measures reflecting fieldwork intensity: we found very high rates of attemtipng households for a contact (most countries score 99 percent and higher) and high contact rates (≥95 percent), both for panel and baseline/refreshment samples. Unfortunately, the majority of countries did not reach our goal of approaching non-reached panel households six or more times. Only about a quarter of countries managed to reach (or exceed) the contractually stipulated retention rate of 83 percent or more. In contrast most countries managed to reach the 30 percent minimum individual-level response rate demanded for baseline & refreshment samples.

As for an evaluation of our efforts around monitoring and managing fieldwork of Wave 6, we will quote ourselves (Mneimneh et al, 2017):

> *"It is important to note that legally all corrective managerial actions are left to the fieldwork departments of the survey agencies. At the time of writing, no empirical investigation on the effectiveness of any performed interventions was completed. However, written feedback on explanations, actions taken, and their results is solicited from all countries during fieldwork. For example, in one situation, the high refusal rate for one of the interviewers was deemed to be the result of a difficult PSU that has inner urban multiunit dwellings. In another situation, a number of initially underperforming interviewers were flagged, and after questioning their work, either left the study voluntarily or were suspended because they were judged to be unqualified for a complex study such as SHARE. Other instances resulted in improvement in the DBS consent rate after a number of underperforming interviewers on this indicator were retrained.*
>
> *Finally, after fieldwork, all survey agencies are asked to participate in an online survey about the agency's procedures regarding recruiting and managing interviewers, interviewer payment structure, and experiences with conducting the specific wave of SHARE. Ideas for improving SHARE are also solicited. Of the 18 countries (survey agencies) in Wave 6, 15 (83 percent) reported that the interviewer-level statistics were useful for their fieldwork management. The three less satisfied countries found such statistics less useful for various reasons: one found them "too oppressive with only pointing out the negative [. . .]," one agency reported that various interviewers share the same laptop so statistics on the laptop level were not strictly attributable to one-and-the-same interviewer, and finally one country complained about the information requested being an 'overkill'.*
>
> *Several insights were gained from implementing the proactive interviewer-level monitoring in Wave 6 of SHARE. These insights include recognizing the challenges of implementing an interviewer-level intervention when interviewers are not hired by the coordinating center (i.e., SHARE Central in Munich) and when they are part-time employees of the survey agency. First, any intervention requires a mediated communication through the local survey agency as these agencies are legally independent contractors to SHARE. Second, almost all survey agencies working for SHARE hire their interviewers on a self-employed, part-time basis, and give the interviewers the freedom to manage their availability on the different projects they are assigned to. This affects the productivity of interviewers on SHARE as they tend to choose to spend more time on other (perhaps more profitable and less demanding) projects. Third, it is important to handle the initial reaction of the survey agencies to the tight and frequent management approach practiced by SHARE Central. This quality control approach was initially seen as threatening to the agencies' autonomy. This challenge was, however, mitigated by creating a mindset of 'shared problem-solving for better outcomes.' Overall the proactive interviewer-level monitoring approach implemented in Wave 6 was successful and is a step in the right direction. One of the strengths of this approach is that the indicators used are not solely based on data provided by the interviewers. Some are generated from process data (such as timestamps) produced automatically by the interview software. However, several improvements are warranted. First, more human resources are needed at SHARE Central to prepare and explain to survey agencies the interviewer-level*

statistics and interventions needed. Second, a more systematic follow-up procedure regarding interviewer-level interventions implemented by the survey agency would enhance the effectiveness of such a proactive quality control approach. Third, streamlined procedures and guidelines are needed to integrate interviewer-level statistics into the selection of cases for verification. In Wave 6, most households are randomly chosen for verification, albeit late during the fieldwork. SHARE's experience is that this strategy delivers too little too late and lacks efficiency and timeliness. Finally, the quality control plan for Wave 7 will also identify top performing interviewers and reward them with badges after fieldwork. All these measures combined would make this interviewer-level approach more successful and effective at reducing interviewer error."

Finally, there are plans to increase the minimum individual-level response rate of panel samples and that of baseline/refreshment samples as our experience during Wave 6 show that it is possible to reach these goals.

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Appendix: Final outcomes of SHARE Wave 6 by country

Austria

Longitudinal sample	
Gross sample:	3712
Households attempted:	3659
Households contacted:	3532
Households estimated to be eligible:	3682.58
Households with completed coverscreen interview:	2455
Households with at least one complete interview:	2486
Percentage of Households attempted:	98.57 %
Contact rate:	95.12 %
Cooperation rate:	70.97 %
Household response rate:	67.51 %
Refusal rate:	22.46 %
Other non-interview rate:	5.16 %
Individual interviews:	3571
Sample A:	3190
Sample B:	18
Sample C:	320
Sample D:	43
Estimated average number of eligibles in hh:	1.50
Individual response rate:	64.54 %
Sample A:	82.32 %
Sample B:	37.50 %
Samples A+B combined:	81.77 %
Sample C:	24.24 %
Sample D:	15.03 %
Median number of attempts for non-contacted hh:	4

Belgium (FR)

Baseline / refreshment sample	
Gross sample:	1056
Households attempted:	1052
Households contacted:	999
Households estimated to be eligible:	902.42
Households with completed coverscreen interview:	401
Households with at least one complete interview:	398
Percentage of Households attempted:	99.62 %
Contact rate:	93.75 %
Cooperation rate:	47.04 %
Household response rate:	44.10 %
Refusal rate:	42.44 %
Other non-interview rate:	7.20 %
Individual interviews:	520
Estimated average number of eligibles in hh:	1.57
Individual response rate:	36.81 %
Median number of attempts for non-contacted hh:	8

Belgium (FR)

Longitudinal sample	
Gross sample:	2714
Households attempted:	2688
Households contacted:	2644
Households estimated to be eligible:	2666.55
Households with completed coverscreen interview:	1817
Households with at least one complete interview:	1859
Percentage of Households attempted:	99.04 %
Contact rate:	97.39 %
Cooperation rate:	71.58 %
Household response rate:	69.72 %
Refusal rate:	22.76 %
Other non-interview Internet:	4.91 %
Individual interviews:	2432
Sample A:	2150
Sample B:	14
Sample C:	212
Sample D:	56
Estimated average number of eligibles in hh:	1.52
Individual response rate:	59.82 %
Sample A:	77.09 %
Sample B:	14.89 %
Samples A+B combined:	75.06 %
Sample C:	29.04 %
Sample D:	12.44 %
Median number of attempts for non-contacted hh:	8

Belgium (NL)

Baseline / refreshment sample	
Gross sample:	958
Households attempted:	898
Households contacted:	844
Households estimated to be eligible:	882.26
Households with completed coverscreen interview:	389
Households with at least one complete interview:	391
Percentage of Households attempted:	93.74 %
Contact rate:	87.62 %
Cooperation rate:	50.58 %
Household response rate:	44.32 %
Refusal rate:	39.33 %
Other non-interview rate:	3.97 %
Individual interviews:	547
Estimated average number of eligibles in hh:	1.66
Individual response rate:	37.24 %
Median number of attempts for non-contacted hh:	6

Belgium (NL)

Longitudinal sample	
Gross sample:	2257
Households attempted:	2224
Households contacted:	2185
Households estimated to be eligible:	2244.82
Households with completed coverscreen interview:	1711
Households with at least one complete interview:	1745
Percentage of Households attempted:	98.54 %
Contact rate:	96.80 %
Cooperation rate:	80.30 %
Household response rate:	77.73 %
Refusal rate:	14.21 %
Other non-interview rate:	4.86 %
Individual interviews:	2556
Sample A:	2339
Sample B:	17
Sample C:	161
Sample D:	39
Estimated average number of eligibles in hh:	1.62
Individual response rate:	70.43 %
Sample A:	84.05 %
Sample B:	17.35 %
Samples A+B combined:	81.78 %
Sample C:	32.86 %
Sample D:	15.18 %
Median number of attempts for non-contacted hh:	5

Switzerland

Longitudinal sample	
Gross sample:	2557
Households attempted:	2550
Households contacted:	2540
Households estimated to be eligible:	2522.91
Households with completed coverscreen interview:	2021
Households with at least one complete interview:	2058
Percentage of Households attempted:	99.73 %
Contact rate:	99.33 %
Cooperation rate:	82.12 %
Household response rate:	81.57 %
Refusal rate:	16.33 %
Other non-interview rate:	1.43 %
Individual interviews:	2895
Sample A:	2646
Sample B:	49
Sample C:	157
Sample D:	43
Estimated average number of eligibles in hh:	1.64
Individual response rate:	70.05 %
Sample A:	88.11 %
Sample B:	30.43 %
Samples A+B combined:	85.18 %
Sample C:	29.02 %
Sample D:	10.09 %
Median number of attempts for non-contacted hh:	7

Czech Republic

Longitudinal sample	
Gross sample:	4698
Households attempted:	4648
Households contacted:	4574
Households estimated to be eligible:	4684.86
Households with completed coverscreen interview:	3428
Households with at least one complete interview:	3509
Percentage of Households attempted:	98.94 %
Contact rate:	97.36 %
Cooperation rate:	76.93 %
Household response rate:	74.90 %
Refusal rate:	15.94 %
Other non-interview rate:	6.51 %
Individual interviews:	5199
Sample A:	4665
Sample B:	48
Sample C:	370
Sample D:	116
Estimated average number of eligibles in hh:	1.54
Individual response rate:	71.87 %
Sample A:	83.36 %
Sample B:	48.48 %
Samples A+B combined:	82.76 %
Sample C:	30.81 %
Sample D:	36.71 %
Median number of attempts for non-contacted hh:	3

Germany

Longitudinal sample	
Gross sample:	3729
Households attempted:	3712
Households contacted:	3677
Households estimated to be eligible:	3711.94
Households with completed coverscreen interview:	2951
Households with at least one complete interview:	2958
Percentage of Households attempted:	99.54 %
Contact rate:	98.60 %
Cooperation rate:	80.82 %
Household response rate:	79.69 %
Refusal rate:	15.54 %
Other non-interview rate:	3.37 %
Individual interviews:	4501
Sample A:	4406
Sample B:	10
Sample C:	7
Sample D:	78
Estimated average number of eligibles in hh:	1.68
Individual response rate:	72.36 %
Sample A:	79.57 %
Sample B:	16.13 %
Samples A+B combined:	78.87 %
Sample C:	14.00 %
Sample D:	13.49 %
Median number of attempts for non-contacted hh:	5

Denmark

Baseline / refreshment sample	
Gross sample:	303
Households attempted:	302
Households contacted:	289
Households estimated to be eligible:	290.96
Households with completed coverscreen interview:	166
Households with at least one complete interview:	166
Percentage of Households attempted:	99.67 %
Contact rate:	95.20 %
Cooperation rate:	59.93 %
Household response rate:	57.05 %
Refusal rate:	37.46 %
Other non-interview rate:	0.69 %
Individual interviews:	246
Estimated average number of eligibles in hh:	1.81
Individual response rate:	46.78 %
Median number of attempts for non-contacted hh:	5

Denmark

Longitudinal sample	
Gross sample:	3409
Households attempted:	3404
Households contacted:	3380
Households estimated to be eligible:	3397.00
Households with completed coverscreen interview:	2532
Households with at least one complete interview:	2535
Percentage of Households attempted:	99.85 %
Contact rate:	99.15 %
Cooperation rate:	75.27 %
Household response rate:	74.62 %
Refusal rate:	21.73 %
Other non-interview rate:	2.80 %
Individual interviews:	3657
Sample A:	3462
Sample B:	23
Sample C:	119
Sample D:	53
Estimated average number of eligibles in hh:	1.64
Individual response rate:	65.63 %
Sample A:	83.81 %
Sample B:	17.04 %
Samples A+B combined:	81.69 %
Sample C:	14.57 %
Sample D:	10.56 %
Median number of attempts for non-contacted hh:	4

Spain – Region of Girona

Longitudinal sample	
Gross sample:	2082
Households attempted:	2000
Households contacted:	1984
Households estimated to be eligible:	2065.51
Households with completed coverscreen interview:	1728
Households with at least one complete interview:	1734
Percentage of Households attempted:	96.06 %
Contact rate:	95.28 %
Cooperation rate:	88.11 %
Household response rate:	83.95 %
Refusal rate:	9.20 %
Other non-interview rate:	2.13 %
Individual interviews:	2758
Sample A:	2599
Sample B:	0
Sample C:	0
Sample D:	159
Estimated average number of eligibles in hh:	1.69
Individual response rate:	79.05 %
Sample A:	80.02 %
Sample B:	.
Samples A+B combined:	80.02 %
Sample C:	.
Sample D:	66.25 %
Median number of attempts for non-contacted hh:	3

Baseline / refreshment sample	
Gross sample:	875
Households attempted:	868
Households contacted:	814
Households estimated to be eligible:	777.23
Households with completed coverscreen interview:	436
Households with at least one complete interview:	435
Percentage of Households attempted:	99.20 %
Contact rate:	92.25 %
Cooperation rate:	60.67 %
Household response rate:	55.97 %
Refusal rate:	31.91 %
Other non-interview rate:	4.37 %
Individual interviews:	643
Estimated average number of eligibles in hh:	1.60
Individual response rate:	51.85 %
Median number of attempts for non-contacted hh:	6

Longitudinal sample	
Gross sample:	4520
Households attempted:	4506
Households contacted:	4450
Households estimated to be eligible:	4483.91
Households with completed coverscreen interview:	3610
Households with at least one complete interview:	3641
Percentage of Households attempted:	99.69 %
Contact rate:	98.44 %
Cooperation rate:	82.49 %
Household response rate:	81.20 %
Refusal rate:	14.38 %
Other non-interview rate:	2.85 %
Individual interviews:	5350
Sample A:	4854
Sample B:	27
Sample C:	419
Sample D:	50
Estimated average number of eligibles in hh:	1.51
Individual response rate:	79.21 %
Sample A:	84.99 %
Sample B:	42.19 %
Samples A+B combined:	84.52 %
Sample C:	48.61 %
Sample D:	39.06 %
Median number of attempts for non-contacted hh:	6

Spain

Longitudinal sample	
Gross sample:	2870
Households attempted:	2823
Households contacted:	2747
Households estimated to be eligible:	2859.87
Households with completed coverscreen interview:	2118
Households with at least one complete interview:	2142
Percentage of Households attempted:	98.36 %
Contact rate:	95.70 %
Cooperation rate:	78.26 %
Household response rate:	74.90 %
Refusal rate:	13.67 %
Other non-interview rate:	7.13 %
Individual interviews:	3342
Sample A:	2940
Sample B:	41
Sample C:	332
Sample D:	29
Estimated average number of eligibles in hh:	1.63
Individual response rate:	71.50 %
Sample A:	86.96 %
Sample B:	52.56 %
Samples A+B combined:	86.18 %
Sample C:	31.62 %
Sample D:	17.37 %
Median number of attempts for non-contacted hh:	3

France

Longitudinal sample	
Gross sample:	5045
Households attempted:	5024
Households contacted:	4921
Households estimated to be eligible:	5011.89
Households with completed coverscreen interview:	2645
Households with at least one complete interview:	2632
Percentage of Households attempted:	99.58 %
Contact rate:	97.53 %
Cooperation rate:	53.85 %
Household response rate:	52.52 %
Refusal rate:	31.78 %
Other non-interview rate:	13.23 %
Individual interviews:	3743
Sample A:	3244
Sample B:	58
Sample C:	372
Sample D:	69
Estimated average number of eligibles in hh:	1.56
Individual response rate:	48.00 %
Sample A:	72.62 %
Sample B:	26.24 %
Samples A+B combined:	70.44 %
Sample C:	13.80 %
Sample D:	16.51 %
Median number of attempts for non-contacted hh:	6

Greece

Baseline / refreshment sample	
Gross sample:	3981
Households attempted:	3948
Households contacted:	3770
Households estimated to be eligible:	2790.97
Households with completed coverscreen interview:	1868
Households with at least one complete interview:	1780
Percentage of Households attempted:	99.17 %
Contact rate:	94.63 %
Cooperation rate:	67.40 %
Household response rate:	63.78 %
Refusal rate:	27.91 %
Other non-interview rate:	2.95 %
Individual interviews:	2663
Estimated average number of eligibles in hh:	1.61
Individual response rate:	59.44 %
Median number of attempts for non-contacted hh:	4

Greece

Longitudinal sample	
Gross sample:	2410
Households attempted:	2310
Households contacted:	2275
Households estimated to be eligible:	2389.18
Households with completed coverscreen interview:	1592
Households with at least one complete interview:	1743
Percentage of Households attempted:	95.85 %
Contact rate:	94.38 %
Cooperation rate:	77.29 %
Household response rate:	72.95 %
Refusal rate:	17.62 %
Other non-interview rate:	3.81 %
Individual interviews:	2607
Sample A:	2330
Sample B:	8
Sample C:	259
Sample D:	10
Estimated average number of eligibles in hh:	1.58
Individual response rate:	68.95 %
Sample A:	76.02 %
Sample B:	33.33 %
Samples A+B combined:	75.69 %
Sample C:	46.84 %
Sample D:	7.04 %
Median number of attempts for non-contacted hh:	3

Croatia

Baseline / refreshment sample	
Gross sample:	4990
Households attempted:	4914
Households contacted:	4248
Households estimated to be eligible:	4503.76
Households with completed coverscreen interview:	1975
Households with at least one complete interview:	1955
Percentage of Households attempted:	98.48 %
Contact rate:	83.69 %
Cooperation rate:	51.87 %
Household response rate:	43.41 %
Refusal rate:	34.55 %
Other non-interview rate:	5.73 %
Individual interviews:	3168
Estimated average number of eligibles in hh:	1.68
Individual response rate:	41.84 %
Median number of attempts for non-contacted hh:	1

Israel

Longitudinal sample	
Gross sample:	2122
Households attempted:	2019
Households contacted:	1905
Households estimated to be eligible:	2118.85
Households with completed coverscreen interview:	1483
Households with at least one complete interview:	1481
Percentage of Households attempted:	95.15 %
Contact rate:	89.77 %
Cooperation rate:	77.87 %
Household response rate:	69.90 %
Refusal rate:	12.27 %
Other non-interview rate:	7.60 %
Individual interviews:	2207
Sample A:	1914
Sample B:	26
Sample C:	223
Sample D:	44
Estimated average number of eligibles in hh:	1.65
Individual response rate:	63.01 %
Sample A:	74.04 %
Sample B:	32.10 %
Samples A+B combined:	72.77 %
Sample C:	35.91 %
Sample D:	20.37 %
Median number of attempts for non-contacted hh:	1

Italy

Baseline / refreshment sample	
Gross sample:	2100
Households attempted:	2097
Households contacted:	1991
Households estimated to be eligible:	1880.69
Households with completed coverscreen interview:	852
Households with at least one complete interview:	845
Percentage of Households attempted:	99.86 %
Contact rate:	94.22 %
Cooperation rate:	47.69 %
Household response rate:	44.93 %
Refusal rate:	43.97 %
Other non-interview rate:	5.32 %
Individual interviews:	1238
Estimated average number of eligibles in hh:	1.58
Individual response rate:	41.69 %
Median number of attempts for non-contacted hh:	4

Italy

Longitudinal sample	
Gross sample:	3692
Households attempted:	3685
Households contacted:	3643
Households estimated to be eligible:	3678.98
Households with completed coverscreen interview:	2666
Households with at least one complete interview:	2685
Percentage of Households attempted:	99.81 %
Contact rate:	98.67 %
Cooperation rate:	73.97 %
Household response rate:	72.98 %
Refusal rate:	19.71 %
Other non-interview rate:	5.98 %
Individual interviews:	4323
Sample A:	3816
Sample B:	29
Sample C:	375
Sample D:	103
Estimated average number of eligibles in hh:	1.68
Individual response rate:	70.14 %
Sample A:	83.65 %
Sample B:	43.94 %
Samples A+B combined:	83.08 %
Sample C:	31.89 %
Sample D:	29.18 %
Median number of attempts for non-contacted hh:	8

Luxembourg

Baseline / refreshment sample	
Gross sample:	1207
Households attempted:	1206
Households contacted:	1176
Households estimated to be eligible:	1072.89
Households with completed coverscreen interview:	327
Households with at least one complete interview:	325
Percentage of Households attempted:	99.92 %
Contact rate:	97.12 %
Cooperation rate:	31.19 %
Household response rate:	30.29 %
Refusal rate:	64.69 %
Other non-interview rate:	2.14 %
Individual interviews:	413
Estimated average number of eligibles in hh:	1.71
Individual response rate:	22.52 %
Median number of attempts for non-contacted hh:	3

Luxembourg

Longitudinal sample	
Gross sample:	1216
Households attempted:	1214
Households contacted:	1202
Households estimated to be eligible:	1188.96
Households with completed coverscreen interview:	862
Households with at least one complete interview:	856
Percentage of Households attempted:	99.84 %
Contact rate:	98.83 %
Cooperation rate:	72.85 %
Household response rate:	72.00 %
Refusal rate:	23.21 %
Other non-interview rate:	3.62 %
Individual interviews:	1169
Sample A:	1120
Sample B:	0
Sample C:	0
Sample D:	49
Estimated average number of eligibles in hh:	1.69
Individual response rate:	58.32 %
Sample A:	71.11 %
Sample B:	.
Samples A+B combined:	71.11 %
Sample C:	.
Sample D:	11.45 %
Median number of attempts for non-contacted hh:	2

Poland

Baseline / refreshment sample	
Gross sample:	562
Households attempted:	546
Households contacted:	515
Households estimated to be eligible:	488.92
Households with completed coverscreen interview:	244
Households with at least one complete interview:	246
Percentage of Households attempted:	97.15 %
Contact rate:	90.81 %
Cooperation rate:	55.41 %
Household response rate:	50.32 %
Refusal rate:	33.34 %
Other non-interview rate:	7.16 %
Individual interviews:	365
Estimated average number of eligibles in hh:	1.70
Individual response rate:	43.93 %
Median number of attempts for non-contacted hh:	2

Poland

Longitudinal sample	
Gross sample:	1375
Households attempted:	1359
Households contacted:	1328
Households estimated to be eligible:	1368.93
Households with completed coverscreen interview:	1039
Households with at least one complete interview:	1076
Percentage of Households attempted:	98.84 %
Contact rate:	96.57 %
Cooperation rate:	81.39 %
Household response rate:	78.60 %
Refusal rate:	13.37 %
Other non-interview rate:	4.60 %
Individual interviews:	1660
Sample A:	1485
Sample B:	5
Sample C:	153
Sample D:	17
Estimated average number of eligibles in hh:	1.58
Individual response rate:	76.59 %
Sample A:	86.54 %
Sample B:	38.46 %
Samples A+B combined:	86.18 %
Sample C:	42.03 %
Sample D:	23.29 %
Median number of attempts for non-contacted hh:	2

Portugal

Longitudinal sample	
Gross sample:	1334
Households attempted:	1332
Households contacted:	1314
Households estimated to be eligible:	1310.97
Households with completed coverscreen interview:	1076
Households with at least one complete interview:	1081
Percentage of Households attempted:	99.85 %
Contact rate:	98.48 %
Cooperation rate:	83.73 %
Household response rate:	82.46 %
Refusal rate:	10.60 %
Other non-interview rate:	5.42 %
Individual interviews:	1794
Sample A:	1622
Sample B:	0
Sample C:	0
Sample D:	172
Estimated average number of eligibles in hh:	1.66
Individual response rate:	82.21 %
Sample A:	83.14 %
Sample B:	.
Samples A+B combined:	83.14 %
Sample C:	.
Sample D:	77.13 %
Median number of attempts for non-contacted hh:	5

Sweden

Longitudinal sample	
Gross sample:	3975
Households attempted:	3968
Households contacted:	3944
Households estimated to be eligible:	3958.98
Households with completed coverscreen interview:	2863
Households with at least one complete interview:	2888
Percentage of Households attempted:	99.82 %
Contact rate:	99.22 %
Cooperation rate:	73.52 %
Household response rate:	72.95 %
Refusal rate:	23.92 %
Other non-interview rate:	2.35 %
Individual interviews:	4087
Sample A:	3631
Sample B:	33
Sample C:	304
Sample D:	119
Estimated average number of eligibles in hh:	1.63
Individual response rate:	63.27 %
Sample A:	80.15 %
Sample B:	22.45 %
Samples A+B combined:	78.34 %
Sample C:	28.84 %
Sample D:	16.26 %
Median number of attempts for non-contacted hh:	7

Slovenia

Baseline / refreshment sample	
Gross sample:	2160
Households attempted:	2135
Households contacted:	1874
Households estimated to be eligible:	2045.72
Households with completed coverscreen interview:	925
Households with at least one complete interview:	920
Percentage of Households attempted:	98.84 %
Contact rate:	86.08 %
Cooperation rate:	52.24 %
Household response rate:	44.97 %
Refusal rate:	37.15 %
Other non-interview rate:	3.96 %
Individual interviews:	1317
Estimated average number of eligibles in hh:	1.68
Individual response rate:	38.38 %
Median number of attempts for non-contacted hh:	1

Slovenia

Longitudinal sample	
Gross sample:	2672
Households attempted:	2668
Households contacted:	2661
Households estimated to be eligible:	2660.99
Households with completed coverscreen interview:	2048
Households with at least one complete interview:	2054
Percentage of Households attempted:	99.85 %
Contact rate:	99.59 %
Cooperation rate:	77.51 %
Household response rate:	77.19 %
Refusal rate:	20.67 %
Other non-interview rate:	1.73 %
Individual interviews:	3017
Sample A:	2491
Sample B:	65
Sample C:	227
Sample D:	234
Estimated average number of eligibles in hh:	1.64
Individual response rate:	69.28 %
Sample A:	84.47 %
Sample B:	60.19 %
Samples A+B combined:	83.61 %
Sample C:	37.40 %
Sample D:	33.72 %
Median number of attempts for non-contacted hh:	8

5.7 Experiment: Internet interviewing in the sixth wave of SHARE in the Netherlands

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5.7.1 Introduction

Since the first wave, interviews of the Survey of Health and Retirement in Europe (SHARE) have been conducted face-to-face (Computer Assisted Personal Interviewing; CAPI), including in the Netherlands. The Netherlands could not participate in the sixth wave of the harmonized SHARE survey, i.e. using the CAPI mode, due to insufficient funding. It was, therefore, decided to use the CAWI (Computer Assisted Web Interviewing) and CATI (Computer Assisted Telephone Interviewing) modes as these made it possible to conduct the survey in the Netherlands at significantly lower costs. The major part of the Dutch SHARE Wave 6 was conducted via the Internet and a small fraction of individuals were interviewed by telephone. This reduced costs by approximately 60 percent.

There are obvious reasons to use CAPI as interview mode, instead of interviewing via telephone (CATI) or the Internet. Two drawbacks of using CAWI instead of CAPI for SHARE are that a substantial part of the SHARE respondents does not have access to the Internet and that the SHARE survey also contains physical measurements which are carried out by the interviewer. However, although it may take a while to have full Internet coverage of people aged 50 and over, i.e. the target population of SHARE, the Internet is already used by a clear majority of the target group in the Netherlands. Among the Wave 5 Dutch SHARE sample, the Internet usage rate was about 75 percent. Also, more and more physical measurements can be done in a self-administered way.

The longitudinal sample has been supplemented with a refreshment sample to increase sample size and to keep the sample representative for the 50+ population. New respondents were selected from the 50+ part of the Dutch LISS panel. The Longitudinal Internet Studies for the Social sciences (LISS) panel, administered by CentERdata (Tilburg University, The Netherlands), is a representative panel of about 8,000 individuals. The panel is based on a probability sample drawn by Statistics Netherlands from population registers. Respondents answer questionnaires over the Internet monthly. Households that could not otherwise participate are given a computer and broadband Internet access. More information about the LISS panel, including the setup, can be found in Scherpenzeel and Das (2011).

The alternative approach for the Dutch SHARE Wave 6 has a number of advantages: the fieldwork costs were substantially lower (and thereby safeguarded the continuity of SHARE in the Netherlands), the effective sample size has been increased by adding the LISS respondents, and it served as an experiment for the entire SHARE community.

There are also limitations to the proposed approach. One of the powerful features of SHARE is the ex-ante harmonized set-up; not only in terms of the questionnaire but also in terms of interview mode and software tools. The alternative approach lacked the benefits of this harmonization. Furthermore, using the Internet excludes those who do not have the equipment or abilities to participate via this mode.

This may introduce a selective sample as, for instance, the oldest old are less likely to use the Internet. To a certain extent this was corrected by using the LISS panel which includes elderly without prior Internet access and who have been provided access. In addition, the option to interview the non-Internet SHARE participants by phone (CATI) was included. Lastly, the CAWI mode does not allow for physical measurements. There are self-administered devices to make physical measurements possible in CAWI mode but we had no resources to implement these.

This chapter reports on the details of the CAWI and CATI set-up of SHARE Netherlands. Section 5.7.2 describes the preparation of the fieldwork including the necessary changes in the questionnaire, the way to recruit and contact the (potential) respondents, and the technical infrastructure supporting the survey, all with the overarching aim to stay as close as possible to the harmonized set-up of the survey as in place in the other SHARE countries. Section 5.7.3 presents details of the fieldwork and section 5.7.4 presents the response overview. Section 5.7.5 concludes. An appendix is added with the lessons learned from changing the interview mode of the Dutch SHARE survey from CAPI to CAWI.

5.7.2 Fieldwork preparations

Fieldwork preparations commenced in spring 2015 with making the coverscreen and main questionnaire suitable for CAWI and CATI involving adaptions of the contents and the programming of the questions. At the same time, a Panel Management System was developed to support the fieldwork operations. Additionally, rules for sample selection were defined. Details on all these aspects are presented below.

5.7.2.1 Questionnaire development

CAWI questionnaire

The CAPI Wave 6 generic version was used as the starting point for the Dutch CAWI questionnaire. The general rule was to change as little as possible but the absence of an interviewer required slight changes in the wording of questions. For example, instead of saying 'I will now read out the following…' in CAPI, the CAWI questionnaire was phrased as 'Below, you can find…'. Detailed changes per question were documented in an Excel file which is available upon request. A less detailed summary of the adaptations is given.

All generic questionnaire modules were included in the Dutch CAWI questionnaire, except the modules Dried Blood Spots (BS), Grip Strength (GS), and Peak Flow (PF) which all involve physical measurements.[1] In addition, the Linkage module (LI) was not included.

The Cognitive Function (CF) module needed to be revised. In the CF section "Immediate and delayed word recall" (CF007_Learn1Intro through CF907_Learn1Tot; CF613_Learn4Intro through CF916_Learn4Tot) the list of words was visually presented to the respondent. Every word was displayed for 1.5 seconds. Between the words there was a pause of two seconds. The respondent had two minutes to recall the list. In the CF section "Verbal Fluency Test (MMSE, TICS)" (CF009_VerbFluIntro through CF010_Animals) the time interval in which the respondent had the opportunity to name as many animal names as possible was set at two

1 The abbreviations for the respective SHARE questionnaire modules are given between parentheses.

minutes as well. In the entire CF module the 'Previous' button was disabled, so that the respondents could not go back to change their answers in this module.

A few questions were not asked in the CAWI questionnaire. For technical reasons, the questions about non-natural children (CH102 through CH108) in the Children (CH) module were dropped from the CAWI questionnaire. In the CAPI version respondents who gave a non-codable response (for the interviewer) to the questions MH008_Interest "In the last month, what is your interest in things?" and MH011_Appetite "What has your appetite been like in the last month?" received the follow-up questions MH009_KeepUpInt and MH012_EatMoreLess from the Mental Health. In the CAWI questionnaire the answer options for MH008 and MH011 were rephrased as such that the CAWI respondent was able to answer these questions and this made these two follow-up questions redundant, hence were dropped from the CAWI questionnaire. The question EX106 that refers to when the interviewer hands out the drop-off questionnaire was redundant (as there was no drop-off) and not included. The proxy questions about the partner (EX600, EX101, EX602, EX103, EX603, EX603_jc, EX104, and EX105) were not in the CAWI questionnaire either.

Questions in the Interviewer Observation module (IV) were rephrased so they could be presented to the CAWI respondent directly (instead of through the interviewer). Question IV017 (the 'Thank you' text for the interviewer) was replaced by EX024 (the 'Thank you' text for the respondent).

At the end of every module in the CAPI questionnaire the interviewer has to answer whether the respondent answered the questions in that module by him/herself or whether he/she was helped by a proxy (IntCheck questions). These questions were maintained in the CAWI survey but rephrased. There were 383 completed proxy interviews.

The 'Continue' radio buttons in the CAPI instrument were removed at introduction screens in the CAWI instrument. The respondent could simply continue by clicking the 'Next' button. The soft checks in the CAPI instrument were presented on a follow-up screen in the CAWI instrument. A remark option for the respondent was added to every soft check. The error messages in the CAPI instrument, meant for the interviewer to use in communication with the respondent, were rephrased into error messages for the respondent.

In CAPI, it is possible to answer 'Don't know' or 'Refusal', but for most questions these options are hidden on screen and not spoken out loud. The interviewer uses them only if the respondent spontaneously offers them. In practice, they are rarely used. In CAWI – a self-reported visual mode – we needed to choose whether or not to present these options on screen. We decided to follow the active presentation as in CAPI, to avoid a mode-based increase of item non-response. When questions had an explicit Don't Know or Refusal option in the CAPI questionnaire, we also showed them to the respondent. When they were hidden in CAPI, we did not, with some exceptions of where we expected them to be necessary. This design was tested during the pilot study. Based on the results of the pilot study, we added a Don't Know or Refusal option to a few questions. In total, for the following questions a Don't Know or Refusal option were added while they were hidden in CAPI:

- questions that needed a Don't Know or Refusal option based on pilot results;
- follow-up questions as a result of a Don't Know or Refusal (for example in the unfolding brackets sections);

- the entire End of Life module (XT): Don't Know and Refusal options were added to all questions concerning the deceased person, except for the gender of the deceased person (since this information was necessary for the follow-up questions).

After the development of the generic (English) CAWI questionnaire, the questionnaire was translated into Dutch. The questionnaire for the CAPI Wave 6 pre-test, which was already available in Dutch, was used as the basis for the translation of the CAWI questionnaire for the main instrument for Wave 6. This existing translation was edited to match the abovementioned mode-related textual changes. In order to simultaneously check the new generic CAWI texts and edit the existing Dutch translation, a new interface for the Translation Management Tool with parallel views was developed.

CATI questionnaire

The SHARE panel respondents who did not have a computer and/or Internet were asked if they would be willing to participate in a telephone interview. This was not necessary for the LISS panel respondents, since they all have a computer and Internet access (by design, see section above).

Questions that were not asked in the CAWI mode were also not asked in the CATI mode. Questions that were adapted from CAPI into the CAWI questionnaire only to take the self-administered mode into account, remained unchanged in the CATI mode.

Navigation through the CATI instrument worked similar to the CAWI instrument. However, the CATI interviewer had the option to select a Don't Know or Refusal for every question.

5.7.2.2 Survey instrument and survey management systems

The CAPI instrument was modified such that the questionnaire could be accessed via an Internet browser. The CAPI survey code has always been programmed in Blaise. To develop a web version, this code was used as a starting point and then edited to run in BlaiseIS (a Blaise version for online surveys). Reprogramming was also required to develop a visual friendly presentation of the questionnaire when offered via the web.

In the regular (CAPI mode) SHARE Wave 6 the Sample Management System (SMS) and the Sample Distributor (SD) tools were used to manage the sample. These instruments run on the interviewers' laptops. For the web survey (CAWI mode) an online Panel Management System (PMS) was developed, based on CentERdata's existing PMS for the LISS panel. The CAWI instrument was offered to the respondents through this system. In addition, the PMS enabled live monitoring of the response rate, supported sending reminder emails and registration of telephone and email contact with the respondents, and the registration of the (payment of the) incentives.

After the software tools were ready, an internal test was run by CentERdata staff members (including those that were not involved in the SHARE project). Since the original Dutch SHARE pre-test sample had already been used for the original CAPI pre-test for Wave 6, a pre-test was held among a small group (a gross sample of 116 persons) of participants of the CentERpanel, another online panel run by CentERdata.

5.7.2.3 Sample selection

Longitudinal sample

The longitudinal sample consisted of respondents of the Dutch SHARE Wave 5 (in CAPI mode) and possible new partners. As in previous Waves 1-5 of SHARE in the Netherlands (in CAPI mode), the selected member of the household received the invitation letter prior to the fieldwork. Because no prior notice of an interviewer visit was necessary, the advance letter was transformed into an invitation letter and was sent together with a leaflet with more information about SHARE.

In the regular SHARE CAPI survey, the coverscreen needs to be completed before one can turn to the main survey. In CAWI, the questionnaire flow was therefore designed as follows: one person per household was sent an invitation letter with a link and login information for the web survey. When the respondent logged in, he or she should first complete the coverscreen. At the end of the coverscreen, an email address of the partner was asked (also an email address for the coverscreen respondent was asked, for possible reminders for the main survey). The coverscreen respondent was also requested to personally ask the partner to participate. After this, the coverscreen respondent could immediately continue to complete the main survey.

Once the coverscreen respondent completed the main survey an email invitation was sent to the partner. In this way, the (technical) flow logic of the CAPI instrument remained the same which was important for preloading the answers of the coverscreen respondent in the partner survey.

The preload dataset including the variable eligibility (eligiblefollow=1) was used to select the coverscreen respondent (to whom the invitation was sent). The selection was done as follows:

1. select only respondents who are alive;
2. in case of only one person (alive) in the household for whom eligiblefollow=1, select this person;
3. in case of two or more persons (alive) for whom eligiblefollow=1, check what the last wave was in which at least one of these persons participated. Then apply the following choices:
   a) has only one person completed the main survey? If yes, select this person. If not, continue to step b.
   b) select the person who was the household respondent; (Note: for Wave 3 these data were not available.)
4. for households for which a person cannot be selected based on the aforementioned criteria, select the respondent with household member number 01 (originally sampled/targeted). (Note: in earlier waves, this was usually the person to whom the advance letter was sent.)

Regarding the eligibility rules for defining who in the household should be asked to complete the main survey (after the coverscreen), the rules as defined in the CAPI coverscreen/SMS were followed.

Refreshment sample

The respondents aged 50 and over of the LISS panel were used to form a refreshment sample.[2] The target sample was one person per household aged 50 years or older, and his/her partner (living in the same household). Like in the longitudinal sample, it was necessary to select one person per household to first complete the coverscreen. The coverscreen respondent was selected as follows:

1. first, among active households, select the households in which there is at least one person aged 50 years or older, irrespective of whether this person participates in the LISS panel or not.
   Then:
2. in case there is only one person aged 50 years or older in the household, select this person. If not:
3. does one and only one of the persons aged 50 years or older participate in the LISS panel? If yes, select this person. If not:
4. do more than one person aged 50 years or older participate in the LISS panel? If yes, randomly select one of these persons to complete the coverscreen. If not:
5. randomly select one of the household members aged 50 years or older to complete the coverscreen.

The selected coverscreen respondent was sent the invitation letter and information leaflet. The email invitation to a possible partner was sent according to the same procedure as used for the longitudinal sample.

5.7.3 Carrying out the fieldwork

The fieldwork for the CAWI survey was conducted over the period September to December 2015. The fieldwork for the additional CATI survey was conducted in February and March 2016. The invitations for the CAWI survey were sent in batches. First, a small batch of 100 refreshment respondents and 100 longitudinal respondents were invited. This first batch was small in case problems would emerge. As it turned out, no problems of any kind emerged and the next (larger) batches were gradually released. Table 5.6 shows the time schedule of the invitations. By sending the invitations in batches the server load and the workload for the staff at the panel management unit was better distributed over time.

2 It was checked whether LISS panel members were already included in the SHARE longitudinal sample (by chance). Two households were excluded from the refreshment sample for this reason.

Table 5.6. Time schedule for sending letters and leaflet to households (selected coverscreen respondent)

	#	Sent
Longitudinal households		
Batch 0	100	September 22, 2015
Batch 1	1,968	October 14, 2015
Batch 2	1,687	October 20, 2015
LISS households		
Batch 0	100	September 22, 2015
Batch 3	1,500	October 22, 2015
Batch 4	1,090	October 26, 2015
Total	**6,445**	

Preload data of SHARE and LISS respondents were used for the coverscreen. Consent for preloading data was asked at the start of the coverscreen to all respondents (similar to the regular CAPI survey for longitudinal respondents). For SHARE respondents, the previous fieldwork agency (TNS NIPO) provided the contact database and SHARE Central provided the preload database. For LISS respondents, the LISS Panel Management System was used to extract data that matched the preload data for the SHARE respondents. Since the LISS panel was used as a refreshment sample, no other data than those needed for the coverscreen were preloaded.

Two weeks after the invitation letter had been sent to respondents, an email reminder was sent to those who had not yet started the CAWI survey and for whom an email address was available (mainly LISS respondents). At the same time, telephone calls were made to SHARE respondents for whom no email addresses were available. At all times, priority was given to the longitudinal respondents as they were not familiar with the web survey mode, whereas the LISS respondents were familiar with completing web surveys. These telephone calls continued until the end of fieldwork period. Calls were made in daytime and evening hours during weekdays. The aim was to contact each respondent at least six times, in the event of non-response and/or non-completion. Closer to the end of the fieldwork, the focus changed to those respondents who had started the survey but not yet completed it. In addition, one reminder letter was sent to non-respondents during the course of the fieldwork.

Lists of which respondents to call were generated through the PMS taking into account an interval period of one week since the last contact, independent of whether this contact was done by email, letter or telephone. Priority was given to having both partners complete the survey.

The CAWI survey was divided into five segments. This was not visualized to the respondents, but in this way staff at the panel management unit could monitor the progress for each respondent.

Respondents who completed the CAWI survey received a financial incentive. In previous waves a gift voucher of 15 euro per completed CAPI survey was provided. For the CAWI survey in Wave 6 the incen-

tive was increased to 20 euro as it could provide an incentive for the SHARE respondents to make the switch from CAPI to CAWI or CATI. This amount was also used for the LISS respondents. For completing an End of Life interview, an additional 10 euro was paid. At the end of the survey, the respondents were asked to fill out their bank account number to enable payment of the incentive via a bank transfer. This is the usual practice for the LISS panel. The incentives were paid out once a month during the fieldwork period, so that participants had to wait a maximum of one month at most to receive their payment. Those respondents who felt uncomfortable with providing their bank account number where offered the opportunity to receive a gift voucher by postal mail. In total, 48 respondents opted for this possibility. A thank-you letter was sent to all participants.

5.7.4 Response overview

Table 5.7 presents the response rates for the Dutch SHARE Wave 6 (CAWI and CATI combined). The response rates are presented for the longitudinal (existing SHARE) sample and refreshment sample (LISS) separately, as well as combined.

Table 5.7. Overview of the response rates

Longitudinal sample (SHARE)	**#**	**%**
Invited respondents (letter or email, incl. partners):	4,791	100
Non-response:	2,719	57
Response*:	2,072	43
-Complete:	1,950	41
-Non-complete:	122	3
Refreshment sample (LISS)	**#**	**%**
Invited respondents (letter or email, incl. partners):	3,769	100
Non-response:	1,259	33
Response*:	2,510	67
-Complete:	2,389	63
-Non-complete:	121	3
Total	**#**	**%**
Invited respondents (letter or email, incl. partners):	8,560	100
Non-response:	3,978	46
Response*:	4,582	54
-Complete**:	4,339	51
-Non-complete:	243	3

* The responses are divided into completed and non-completed surveys based on a variable (iv008), which was presented to all respondents at the end of the questionnaire.

** Including 130 CATI interviews.

Letters and leaflets were sent to 6,445 households (see Table 5.6). Including the additional partners 8,560 respondents were invited to participate in the CAWI survey. Note that the invitation was sent to all respondents in the longitudinal (SHARE) sample, including those who do not have access to the Internet. Respondents who declined the invitation to participate were approached by telephone and were offered the possibility to participate in a CATI interview. The CATI option was not presented in the initial invitation.

In total, 173 respondents were initially willing to participate using the CATI mode. Prior to the telephone interviews, the respondents received an announcement letter that the CATI mode would start. Of the initial 173 respondents, five contacted the panel management unit after having received the announcement letter, indicating that they did not want to participate after all. At the end of February 2016, the fieldwork agency (TNS NIPO) began contacting the remaining 168 respondents for a CATI interview. Based on the interviews with the coverscreen respondent, 26 partners became eligible for interviewing. Thus, in total 194 respondents were contacted by the fieldwork agency. Eventually, 130 respondents completed the interview in the CATI mode. This net sample included 10 couples.

The End of Life interview is conducted among eligible respondents who have participated in an earlier wave. Thus, the interview was only relevant for the longitudinal SHARE sample and not for the refreshment (LISS) sample. In the End of Life interview questions are asked about a deceased person; the survey is completed by someone who knew this deceased person well. In the CAPI mode, this proxy-respondent is not necessarily a household member. In the CAWI mode, it is difficult to reach someone outside the household to complete the End of Life interview. This interview was therefore offered to the person who completed the main survey as an additional online survey. A total of 21 End of Life interviews were completed in the Dutch Wave 6 (18 in CAWI mode and 3 in CATI mode).

The realized net sample sizes per longitudinal SHARE sub-sample – as defined in the SHARE model contract – are presented in Table 5.8.

Table 5.8. Net sample sizes for the longitudinal SHARE sample

	A & B	C	D	Unknown	Total
Realized net sample size (CAWI)	1686	178	74	4	**1942**
Realized net sample size (CATI)	117	4	-	9	**130**
Total realized net sample size	**1803**	**182**	**74**	**13**	**2072**

Sub-samples:

A: Respondents who participated in Wave 5 (2013)

B: Respondents who participated before but not in Wave 5 (2013) and who live in a household where at least one household member did participate in Wave 5

C: Respondents who participated before but not in Wave 5 (2013) and who do not live in a household where at least one household member participated in Wave 5

D: Partners who have not participated before, and new partners

Obviously most of the SHARE respondents are in sub-samples A and B. Still, the CAWI mode seems also to attract respondents who have participated before but not in the previous wave.

In total, slightly more than half of the respondents who were invited for the CAWI (and CATI) survey completed the survey (51 percent). Of these completes, 28 percent were partners. The response rate in the LISS sample was much higher than in the longitudinal SHARE sample. A likely explanation for this is that members of the LISS panel are used to the CAWI mode while for the SHARE respondents this mode was new. Typically, the response to the monthly waves in the LISS panel was around 80 percent in 2015. The response to the SHARE survey was lower (67 percent), but the survey was also significantly longer than usual.

5.7.5 Conclusions

We have documented the transition from face-to-face (CAPI) interviewing mode in Wave 5 to Internet (CAWI) interviewing mode in Wave 6 of the SHARE survey in the Netherlands. Although this transition was born out of necessity (limited funds for the fieldwork), it became apparent that CAWI was a good alternative for CAPI in the Netherlands. The transition, therefore, provided an excellent test-case for SHARE as a whole to learn about all aspects that such a transition entails. One of the important challenges for Wave 6 related to the fact that not all individuals aged 50 and over (SHARE's target population) have as yet Internet access. Although Internet coverage is high in the Netherlands,[3] it may take some time until all individuals aged 50 and over have Internet at their homes. A related issue is that those without Internet access may as well not have the necessary skills (or willingness) to complete a survey through the Internet. In part, the issue of not having Internet access (for whatever reason) has been dealt with in Wave 6 by providing the option of telephone interviewing (CATI), and by using a refreshment sample from the LISS panel (in which those who initially do not have access to the Internet are provided access).

Another important challenge for the CAWI mode is the non-applicability of physical measurements. Although it is possible to use self-measurement devices, this aspect was not tested in the Dutch SHARE Wave 6 due to limited funds. Furthermore, in the appendix we list several practical challenges that have been or can be resolved, but for which awareness may be useful for similar projects in the future.

The overall conclusion that can be drawn from our experience with the transition of the interviewing mode of the SHARE survey in the Netherlands from CAPI to CAWI is that interviewing via the Internet is feasible. We will further improve the CAWI instrument based on our experiences when continuing its use in Wave 7. An important aspect of the transition from CAPI to CAWI that has not been discussed in this chapter is the quality of the data. Now CAWI has turned out to be feasible, next on the agenda is a quality assessment of the data.

3 In 2015, only 8 percent had never used the Internet according to Statistics Netherlands, among the population aged 12 years and older. The Internet usage rate was lower especially as of the age of 75: half of the people aged 75 and older had never used the Internet. In 2012, this was still 66 percent (Statistics Netherlands, 2016).

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Appendix: Practical issues in implementing the experiment in the Netherlands

The following practical issues occurred during the fieldwork period and have been resolved or will be resolved as much as possible for Wave 7.

1. Server and CAWI program load

During the first eight weeks of the fieldwork, problems were encountered with the servers on which the CAWI survey was running. Despite load testing prior to the main fieldwork and sending the invitations in batches the servers went down frequently. After several troubleshooting attempts and consultation with Statistics Netherlands (the provider of the Blaise program), it was concluded that the problems were caused by the size and intensity of the survey program, in combination with the available processing capacity. Unfortunately, there was no immediate cure. Two measures were implemented: First, the survey was allocated to run on two separate, exclusive servers: one for the longitudinal sample and another one for the refreshment sample. Second, the maximum number of respondents that could simultaneously complete the questionnaire was set at 48 (the 49th respondent received a message that he/she should return at a later time). For the remaining part of the fieldwork these measures sufficed. The servers did not go down from that point on.

2. Survey flow

Since the survey flow was designed to follow the CAPI instrument, the first respondent and his or her partner could not take the survey simultaneously, because the answers of the first respondent were used for the second respondent's survey. In an online setting, however, it was challenging to communicate this flow logic and its implications to the respondents. For example, the coverscreen required the respondent to enter an email address for the eligible partner. Without this email address the coverscreen respondent could not continue. The purpose of asking the email address should be made clearer, also what to do if it is the same as the one for the coverscreen respondent or if the respondent is not willing to give his/her partner's email address. Furthermore, in cases where a coverscreen respondent did not want to participate after all but had already started with the coverscreen, it was no longer possible to change the coverscreen respondent within the household (if the partner was also eligible), resulting in the loss of a potentially willing respondent.

3. Internet browsers

When fielding a CAWI survey, it is important to test the performance of the instrument in combination with different kinds of browsers, browser versions, and different devices. Although careful tests were carried out, two major issues occurred:

- the job coder failed in some cases;

It turned out that if a respondent used Internet Explorer 9, the dropdown menu with job descriptions did not work. Also, the respondent was not able to enter the profession manually. The only solution to this problem was to ask the respondent to use a different browser or newer version of Internet Explorer.

- Java Script was not active;

At the end of the questionnaire a bank account number was asked in order to pay out the incentive. A piece of code in Java Script was used in this part to ensure that only valid bank account numbers could be entered. However, due to the fact that some respondents (knowingly or not) did not have Java Script active on their computer, an extra text box (next to bank account number and name holder) became visible on screen. This was the control box for whether or not the IBAN met the requirements. The only way to pass this screen was to enter a '1' in this textbox. For future CAWI versions using Java Script, workarounds should be built into the questionnaire to take computer settings into account which do not support this.

4. Enriching contact information

Although the survey was conducted online, it is important to support the respondents through other modes as well, such as telephone and email. The panel management unit was engaged to contact respondents and non-respondents throughout the fieldwork, and the respondents were also prompted to make contact themselves if any problems occurred. Since no telephone numbers were available for a large part of the longitudinal sample (SHARE Waves 1-5 respondents), the team made several efforts to enrich the contact information by finding telephone numbers in existing registers. Several websites were used during the course of the fieldwork to try and find phone numbers. In addition, a commercial database was consulted. Out of 1579 records, 685 phone numbers (and 67 mobile numbers) could be found this way.

Efforts were also made to enrich other contact information. For example, if an email address bounced after sending a reminder or an invitation to the partner, the coverscreen respondent was called (or emailed) and asked for the correct email address. Enriching the contact information is time consuming but an essential part of successfully making the transition from CAPI to CAWI.

5. Support with Internet usage

A part of the respondents will always need support while completing an Internet survey. For example, a number of respondents could not find the website of the survey. As it turned out, they had typed in the link in a search engine like Google, which turned up hits of entirely different websites. This was solved in part by asking for the respondent's email address and sending a link to the correct website. As another example, at the end of the survey it was not always clear to the respondent that he/she had to click on the 'Next' button after the last screen to close the questionnaire properly and to be registered as 'completed response' (and which generated receiving the incentive). In these cases, the panel management unit closed the questionnaire for those respondents.

6 Collection of Dried Blood Spot Samples in SHARE Wave 6

6.1 Background – why collect Dried Blood Spot (DBS) samples

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Ageing is a complex process associated with psychological, physiological and patho-physiological pathways, leading to physical, mental and cognitive functional deteriorations. Furthermore, these pathways are highly affected by factors related to the individual's life e.g., education, job conditions, smoking, drinking, obesity, leisure time activities, and place of living. Also, early childhood conditions, such as parents SES, number of siblings and living conditions affect later life. While the opportunities provided by parents or choices they made cannot be changed, in adult life the individual can make unhealthy or healthy lifestyle choices that affect health negatively or positively, immediately as well as in later life.

Understanding ageing per se and how we age differently given our individual background, current health and socio-economic factors is the aim of the SHARE survey. The collection of subjective information in a cross-European panel design is unique and has already delivered valuable knowledge to the scientific community.

6.1.1 Self-reported information and objective biomarkers

One of SHARE foremost concerns is health. Since Wave 1, respondents are asked to report past and current diseases and symptoms, list medications as well as functional limitations and disability and are asked for height and weight. They are asked about habits from smoking to drinking but also exercising and physical fitness. Last not least, they are asked to self-rate their health.

While subjective information is of great value in collecting data on past and current health conditions, symptoms, and lifestyle the information relies on recognizing symptoms, having access to medical care and being diagnosed, as well as being able to recall the diagnoses. Moreover, in older adults many diseases may have subtle symptoms, which may be misinterpreted as signs of ageing rather than disease onset, thereby delaying diagnosis and treatment. Other diseases, like diabetes and hypertension, can go without symptoms for quite some time, causing organ damage before being diagnosed. As socio-economic factors are associated with health literacy and access to health care and treatment, understanding health and health outcomes is highly dependent on objective information. A cross-national and cross-cultural setting further adds to the need for objective measurements.

SHARE always combined self-reports with objective health information obtained through tests like physical performance measurements e.g., grip strength, peak flow, and chair stand, and validated questi-

onnaires to assess cognitive health and depressive symptoms. So far health-related objective biological biomarkers have been missing. To close this gap, the collection of blood biomarkers as dried blood spot (DBS) samples was included in 12 countries in SHARE Wave 6 in 2015.

The motivation to combine bio-medical and socio-economic research is manifold: Blood biomarkers can help to identify pre-disease, physiological processes which are below the threshold of individual perception and capture health aspects (yet) unknown to the survey participant; they can help to understand complex relations between socio-economic conditions, health, cognition, and physiological pathways. They can point to interactions with the lifestyle and they are not affected by shortcomings related to self-report.

6.1.2 Collecting blood in a large scale survey: The method of Dried Blood Spot (DBS) sampling

Drawing venous samples would be the top choice for obtaining blood biomarkers even in a population survey. However, collecting venous samples in community-based settings across countries entails major logistic challenges with the collection, transportation and timely laboratory analyses of the samples as well as expenses for venipuncture by certified health professionals. Moreover, a venipuncture is invasive and may potentially cause harm to the individual, may be regarded as intrusive and thus yield higher proportions of non-consent. Instead of drawing venous samples, blood may also be collected using more affordable methods which allow for longer transportation times from collection site to the analysing laboratory. Dried blood spot (DBS) samples are such biological material. DBS samples are drops of capillary whole blood collected on filter paper from a simple finger prick. The idea was first launched 100 years ago, when the Norwegian physician Ivar Christian Bang devised a method with drops of blood absorbed on filter paper for later analyses for glucose with relevant biochemical techniques (Schmidt, 1986). Many other biochemical compounds have since then been added to the spectrum of biochemical analyses in the DBS samples. The best known today is the screening test in newborns for phenylketonuria[1], where DBS samples provide a minimally invasive method compared to collecting venous blood. In newborns the drop of blood is collected from the heel, but the same technique can be applied at the finger tip of adults and may be carried out in a home setting by trained survey interviewers. Moreover, time constraint for the handling of venous blood samples is not an issue for DBS samples. Blood collected on filter cards can be shipped easily by regular mail and stored at –20 °C (some store at –80 °C) until subject to analyses. This makes DBS samples the top choice for many health screening programs and population-based health research. The analytes that can be measured in DBS samples have gradually increased over the years ranging from DNA (viral as well as human) to a variety of proteins and lipids which makes the collection method increasingly interesting (McDade et al., 2007; Brindle et al., 2014).

6.1.3 Blood-based biomarkers in SHARE Wave 6 DBS

The most common ageing-related health conditions and diseases include diabetes, cardiovascular disease (CVD), decline of kidney function, and cognitive decline, as well as loss of muscle function and muscle mass (sarcopenia). Many of these conditions have several underlying factors, both biological and environmental, with complex relationships and, in addition, depending on the genetic make-up

1 Phenylketonuria is an inborn metabolic deficiency; earliest detection right after birth and an immediate, but mostly lifelong low-protein diet can prevent severe mental defects for the individual.

of an individual. Several neuroendocrine, metabolic, and inflammatory pathways are considered to be among the most important biological factors. Especially inflammation and the subsequent inflammatory cascade are particularly important in the atherosclerotic process and the development of CVD (Bruunsgard & Pedersen, 2003; Boekholdt & Stroes, 2012). There are also reports that elevated levels of inflammatory markers are present in mild cognitive decline (Saleem et al., 2015) and may play a role in the neurodegenerative cascade in established Alzheimers' disease (Swardfager et al., 2010). Yet, the body will not only release pro-inflammatory molecules causing progression of inflammation, the same system can also react to activities like physical training (Nascimento et al., 2015; Palmefors et al., 2014) and social contacts and support (Salinas, 2016; Fagundes et al., 2011) with beneficial and anti-inflammatory signals.

Age-related health conditions are not independent from each other. CVD as well as type-2 diabetes are risk factors for cognitive decline and Alzheimers' disease (Stampfer 2006; Dregan et al., 2013; Li & Huang, 2016). Yet, diabetes, obesity and hypertension are important risk factors for CVD as is impaired kidney function (Yaffe et al., 2008; Sarnak et al., 2008; Levin & Lan, 2016).

Using the minimally invasive method of DBS sampling, SHARE collects blood from survey participants and analyses it for a variety of blood-based protein and lipid markers, thereby yielding objective information on the above-mentioned diseases and health conditions. From the many markers which can reliably be assayed from dried blood SHARE has chosen protein and lipid markers associated with common health conditions at older ages. Additional requirements were validated assays on DBS material and markers for which comparative population values are available so that SHARE results can be compared to the values of (inter)national health registers (e.g., the Robert-Koch-Institute in Germany, Eurohealth or WHO) or other population surveys. On the chemical side, some of the markers were chosen as they can be analysed from the same extract of a DBS, thereby limiting the amount of blood needed for the analyses. E.g., from the extract of the HbA1c assay tHb and HDL-cholesterol can be determined in addition. On this background the following markers will be assayed:

C-reactive protein (CRP) measures the general level of inflammation in the body, either caused by acute infections or long-term diseases. Inflammatory processes are involved in CVD, diabetes, obesity, and cognitive decline.

Molecules of the lipid panel include lipids and lipoproteins of the blood, like total cholesterol (TC), high density lipoprotein (HDL)-cholesterol, apolipoproteins, triglycerides (TRG). These molecules are some of the "players" in the lipid metabolism of the body, building blocks as well as transport molecules of lipids to various parts of the body including the brain. Imbalances in the lipid metabolism lead to various diseases of the cardio-vascular system.

Glycosylated hemoglobin (HbA1c) is a marker for diabetes. With too much sugar in the blood sugar molecules will be irreversibly bound to hemoglobin. Thus, HbA1c signals longstanding and high levels of blood sugar.

Total hemoglobin (tHb) is a marker of anemia, which defines the decrease of red blood cells or hemoglobin and therefore a lowered ability to carry oxygen in the blood. Anemia may arise from loss of blood

or pathological removal of blood cells, diseases of the hematopoietic system, chronical inflammatory diseases, kidney disease, wasting diseases (e.g., cancers) and more.

Cystatin C (CysC), is a marker for kidney function and CVD. Cystatin C, though a measure for the clearance of degradation products from blood also signals risk of CVD. As CVD is a multifactorial problem, those with elevated cystatin C levels have been shown to be at highest risk for CVD, even with mild kidney dysfunction; those with the highest levels of cystatin C are older and have hypertension, dyslipidemia, high BMI, and higher levels of C-reactive protein.

Vitamin D (VitD), is essential for several biological processes. Being deficient is associated with mortality and several diseases, among them CVD, but also to functional loss due to lower muscle function and muscle mass (sarcopenia), affecting postural stability (Polly & Tan, 2014). Also osteoporosis ("brittle bones") can be caused by low VitD, as it is essential for the absorbtion of calcium from the diet. VitD is naturally present in very few foods (dairy products; oily fish), but is endogenously produced in the skin when exposed to sunlight, although at a declining rate with ageing. Without supplementation, geographic location (northern vs. southern countries) and lifestyle (clothing, outdoor behavior, functional limitations, local food) determine individual and population levels of vitamin D serum concentrations.

Cytokines (among them chemokines and neurotrophins) are a large and diverse family of small proteins that are important in cell signaling. Their release has an effect on the behaviour of cells around them. They are cell-signaling molecules that aid cell-to-cell communication e.g., in immune responses, and stimulate the movement of cells towards sites of inflammation, infection or trauma. As immune-modulating agents they are pro- and anti-inflammatory molecules. Usually they circulate in the body at very low concentrations (pico-molecular, 10^{-12}) but may increase in magnitude a thousand-fold in case of an infection or low-grade inflammation, pathways which lead to subsequent diseases like CVD and/or functional decline or frailty. Proteins particularly signaling survival, differentiation and growth among developing and mature neurons are called neurotrophins.

The introduction of cytokine analyses from DBS to assess CVD and cognitive status in a survey of ageing is new. Our goal, among other interests, is to investigate new and innovative ways to support the results of objective cognitive testing in the survey questionnaire. We have chosen to analyse a set of ten markers, APOE4 lipoprotein and nine cytokines (BDNF, IL-16, APOJ/Clusterin, VEGF, IL-8, IL-12/23, IL-18, MCP1, EGF) (Malhey, 2016; Apostolakis et al., 2009; Zakynthinos & Pappa, 2009; Guo et al., 2013; Doecke et al., 2012; Budni et al., 2015, Weinstein et al., 2016;) which will be tested in a Multiplex assay (Skogstrand 2011 and literature herein) for around 15,000 SHARE DBS samples, see also Chapter 6.4.2).

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6.2 Preparing the inclusion of Dried Blood Spots in SHARE – legal, ethical and organisational aspects

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One of the central aims for the sixth wave of SHARE was a full-scale inclusion of biomarkers derived from Dried Blood Spots (DBS) in the study. Previously conducted DBS collections in the Health and Retirement Study (HRS)[2] and two pilot studies in SHARE Waves 4 and 5, in which the logistics have been tested, had shown the general feasibility of a full-scale implementation of a DBS collection in a population-based survey such as SHARE.

A coordinating SHARE biomarker team was set up consisting of members of the central SHARE coordination, the German SHARE Country Team and the Danish SHARE Country Team[3], for preparing the implementation of the DBS collection in all countries participating in Wave 6 of the SHARE study. A central aim of this working group was to identify and overcome further methodological and logistical challenges and to get a better understanding of the legal and ethics-related administrative frameworks in all SHARE countries.

6.2.1 Legal and ethical aspects of the inclusion of DBS in SHARE

Experience has shown that in particular a first-time implementation of a DBS collection in a population-based survey gives rise to various concerns from all parties involved (researchers, survey agencies, interviewers and participants), since the collection of DBS is considered to be an invasive method (albeit only minimally invasive). Thus it became clear that these concerns had to be addressed in an appropriate manner and that ethics review was necessitated.

Meticulous preparations were started long before the fieldwork phase of Wave 6 in 2012 already. This was necessary because the process of obtaining ethics approval, including the collection of all relevant information with regard to national legal, administrative and ethics requirements and the preparation of application documents, takes a lot of time. Furthermore, carrying out the DBS collection in the pretest of SHARE Wave 6 has been defined as a mandatory prerequisite for participation in the DBS collection during the main data collection in each country in order to allow for adjustments, if and where needed.

6.2.1.1 Obtaining information about legal, administrative and ethical frameworks

As a first step, the SHARE biomarker team carried out a transnational systematic inquiry (within the SHARE research network) with regard to the collection of biomarkers derived from DBS samples. The aim of this inquiry was gathering all relevant information about national ethics committees' approval procedures (including responsibilities, application procedures, documents, etc.), identifying the most important legal requirements (consent, data privacy, liabilities and other country-specific issues) and

2 HRS is the SHARE‚sister' study in the United States of America.

3 The members of the coordinating SHARE biomarker team were selected based on their practical experience and expertise in the research field. The pilot study in SHARE Wave 4 was conducted in Germany by the German SHARE Country Team. The Danish SHARE Country Team has extensive knowledge of DBS collection in population-based interview surveys among old and oldest old people in Denmark.

identifying probable requirements and restrictions of the responsible ethics committees (previous recommendations, opinions, etc.) with regard to the DBS collection (for details regarding the set of questions that were asked see Annex 10.4 in Schmidutz et al. 2013).

Only in the light of this information it was possible to evaluate the practical and financial feasibility in each single country and to avoid unpleasant surprises and time delays or even serious problems from the very beginning.

6.2.1.2 Preparing consent documents and procedures for DBS processing and storage

In a second step, based on the information gathered from the inquiry, generic versions of all relevant documents were prepared centrally, for all the SHARE countries in which the DBS collection as part of the usual survey practice was possible in principle.[4] Preparation included the questionnaire, consent documents (information leaflets and consent forms), other training and field documents (such as DBS interviewer instructions, etc.) and a "survey protocol" (to be submitted to the various ethics committees). During this step, all known legal requirements/restrictions and potential ethics issues as well as the national institutional and administrative frameworks were taken into account in order to enable an ex-ante harmonisation of the DBS collection across the participating countries.

One of the most crucial issues with regard to the harmonisation of the national DBS collections was the collection of consent. Participant's consent defines how the samples collected in the field can be handled and analysed in the future and so determines the usability of the samples in general. Regarding this, in all participating countries obtaining informed consent in a written form was obligatory before a collection of DBS could be carried out. When it comes to the very concrete question of how participants' consent should be obtained, however, differences – mainly due to ethics committees' requirements – have to be taken into account.[5] Every possible effort was made to ensure harmonisation with regard to these differences across the countries in which the DBS collection in SHARE has been carried out.

After the generic versions of the documents have been prepared, they had to be translated into the respective national languages and – depending on the requirements of each country – compiled, adapted, extended and finally presented to the responsible national ethics committees and – in some cases – other authorities (for further details please see Section 6.2.1.3 below).

Moreover, at this stage a concept of how the DBS and appertaining data (such as shipping dates and amount of blood spots) would be processed and stored within the context of the SHARE survey data collection had to be developed. Particular importance was placed on compliance with all relevant data protection laws and standards of research ethics. All necessary measures in order to ensure the protection of participants' privacy with regard to the shipping and storage of the biological samples and the linkage of the biomarker analyses results to the survey data were taken. A DBS processing procedure

4 In a few countries (Austria, the Czech Republic and Poland), due to legal and occupational restrictions, only medical personnel are allowed to take blood samples and participants are not allowed to prick their own fingers. Therefore, it was clear at this stage already that the DBS part of the study could not be carried out in these countries (cf. Table 6.1 below). These restrictions would have imposed a completely new setting to the DBS collection (employing nurses at least) which is neither practically nor financially feasible in the context of a large-scale survey project.

5 Such differences could be observed regarding the information that had to be provided to the participants and regarding the content and form of the consent documents. In some cases information material and consent forms had to be sent to the participants in form of an advance letter; in other cases it was regarded to be sufficient to inform the participants during the interview prior to the DBS part of the study.

based on barcode numbers was implemented and the SHARE Biobank was established at the Institute of Public Health at the University of Southern Denmark in Odense.

6.2.1.3 Obtaining national permissions and ethics approvals

For the full-scale implementation of the DBS collection in SHARE policy-rules on different levels had to be acknowledged (cf. Schmidutz, 2016):

- the collection had to be conducted in accordance with various national legal provisions,
- ethics requirements as requested by different research ethics committees had to be met and
- the administrative formalities had to be complied with in each country.

These partially cumbersome and time-consuming tasks (as well as the translation work mentioned above) had to be carried out by the respective SHARE Country Teams. In the following a few central insights resulting from this work are summarised:

Regarding the national legal requirements and restrictions the provisions set out in data protection laws and medicine laws had to be observed and complied with. They differ substantially between the different EU Member States.[6] One important legal requirement in some of the countries is the obligation to consult certain authorities. In most of the cases in which this is required the national data protection authority had to be consulted. Sometimes – e.g. in France – several authorities had to be involved in order to be able to perform a DBS collection, which imposed a high administrative burden upon the researchers.

Furthermore, in some countries there is a clear legal obligation to obtain approval from research ethics committees. In these cases the scope of the work of the committees, which generally operate at the interface between the legal system and ethical frameworks, is governed by law. Regarding this, in some of the countries it was even not sufficient to obtain ethics approval from a single ethics committee, but involving several ethics committees was mandatory (e.g. in Belgium, Switzerland and Sweden). Committees' work in other countries takes place within the wider framework of research governance only.

In general it can be noted that in accordance with the present fragmentation of the national ethics committee systems in Europe, the requirements with regard to the review of research projects vary a lot in the different countries. Regarding the ethics review of the DBS collection in SHARE this became particularly apparent when bio-medical research ethics committees became involved (these usually review clinical or medical epidemiological studies). Since the collection of biological material in the context of surveys in the social sciences is relatively new and innovative, the review of the DBS collection in SHARE also seemed to be a new experience for some of the responsible ethics committees.

Due to the various requirements, the (harmonised) implementation of the DBS project in 20 countries has shown to be an extremely challenging task. Finally, however, all required permissions of national authorities and necessary ethics approvals were obtained successfully in all countries prior to the sample collection in the field.[7] Only in a few SHARE countries legal and occupational restrictions existed, which

6 At least this was the case at the time of the DBS collection in SHARE Wave 6.

7 The requirements and related challenges and how they have been solved in SHARE are described and illustrated in detail in the country-by-country documentation of the experiences in SHARE in Chapter 3 of Schmidutz (2016).

eventually prevented a realisation of the biomarker collection that relies on trained interviewers and not on medical personnel (Austria, the Czech Republic, and Poland – and Luxembourg, where legal issues regarding this matter could not be entirely clarified). The practical outcomes for the SHARE countries in terms of participation in the DBS collection in SHARE Wave 6 are illustrated in Table 6.1.

Table 6.1. Participating countries in the DBS collection in SHARE Wave 6

	DBS collection in SHARE Wave 6	
SHARE Country Team	**Pretest**	**Main data collection**
Austria (AT)	–	–
Belgium French (BE-FR)	X	X
Belgium Dutch (BE-NL)	X	X
Croatia (HR)	X	–*
Czech Republic (CZ)	–	–
Denmark (DK)	X	X
Estonia (EE)	X	X
France (FR)	X	X
Germany (DE)	X	X
Greece (GR)	X	X
Hungary (HU)	–*	–*
Israel (IL)	X	X
Italy (IT)	X	X
Luxembourg (LU)	–	–
Poland (PL)	–**	–
Portugal (PT)	X	–*
Slovenia (SI)	X	X
Spain (ES)	X	X
Spain Girona (ES-G)	X	–*
Sweden (SE)	X	X
Switzerland (CH)	X	X
The Netherlands (NL)	X	-*

* Non-participation of these countries (resp. the SHARE Country Teams) in the DBS collection of the main data collection of SHARE Wave 6 is not due to legal or ethical restrictions or requirements but other external restrictions of the survey (e.g. as in Hungary, the overall non-participation in the sixth wave of the SHARE data collection).

** As an exception a small validation experiment was carried out in Poland, in which venous blood and DBS were collected by nurses. Data of this experiment is not publicly available.

6.2.2 Training SHARE interviewers for the collection of DBS

Another important preparatory step with regard to the inclusion of the collection of DBS in a population-based survey such as SHARE is the adequate preparation of the interviewers (who have to collect the samples in the field). Thus, SHARE representatives attended the interviewer training of the HRS in the US in order to design a training program for the SHARE interviewers on how to properly collect DBS from respondents.

Since HRS implemented the collection of DBS with great success, the interviewer training developed for SHARE closely followed the HRS model in preparing the interviewers for their tasks. Interviewers were trained in depth for any possible events, such as advising participants who take blood thinners or helping participants, who do not bleed enough. The interviewer training for the DBS collection in SHARE took half a day and included the following topics:

- Theoretical background
- Demonstration of material
- Mock interview
- Hands-on training with certification
- Question and answer session

Since the blood sample collection differs from the rest of the interview, the training of the Dried Blood Spots module (BS module in the CAPI[8] instrument, see also Section 6.2.3) concentrated on a thorough hands-on training concluding with an individual certification of all interviewers who were supposed to collect blood samples in SHARE. As a matter of principle, only certified interviewers were allowed to collect DBS samples for SHARE. As part of the training every interviewer had to perform a DBS collection under supervision. Step-by-step, a trainer checked on a list if the interviewer was able to perform the entire DBS collection procedure. In the event of an interviewer missing too many or crucial steps, the supervised hands-on training had to be repeated. If successful, the interviewer obtained a certificate documenting the successful participation in the DBS collection training.

The SHARE biomarker team developed an instruction manual with step-by-step instructions as well as a short video showing both the DBS collection including the handling of the DBS card on-site and its shipment, arrival and handling at the SHARE Biobank in Odense, Denmark. With the help of these materials the SHARE Country Teams and their survey agencies were informed and thoroughly trained prior to the pretest.

All interviewers were provided with a printed DBS manual and DBS interviewer instructions as reference for self-training or during the fieldwork. The manual included theoretical background information, practical advice as well as a step-by-step instruction of the blood collection.

6.2.3 Equipment for the DBS collection in SHARE

Another aspect of the preparation of the DBS collection in SHARE Wave 6 concerns the compilation of the equipment needed by the SHARE interviewers in order to be able to collect the DBS in the field. First of all, the interviewers had to be equipped with the documents to obtain participants' consent with

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regard to the DBS collection, processing and subsequent analyses (cf. Section 6.2.1) and the aforementioned interviewer training documents (cf. Section 6.2.2):

- Information leaflets with regard to the DBS collection for the participants (amongst other things, explaining the purpose and conduction mode of the DBS collection and providing the participants with contact details as well as information about his/her rights and privacy practices within the project)
- DBS collection consent forms
- DBS manual and DBS interviewer instructions

The interviewers of each country were provided with ready-for use DBS collection kits (see Figure 6.1). The kit was compiled by the coordinating SHARE biomarker team in Munich, Germany; it contained all items needed for the DBS collection and for shipment of the samples to the SHARE Biobank. The material was ordered centrally and assembled into kits by a local company. The kits were then sent from Germany to the survey agencies that are commissioned with the SHARE data collection, including the DBS collection in the participating countries.

Figure 6.1. The items in a SHARE Wave 6 DBS collection kit

The DBS collection kits contained the following items (cf. Figure 6.1):

- A large plastic bag for all necessary materials, which also served as disposal bag for used items after the DBS collection
- A special DBS filter card with pre-printed circles for placing the blood drops
- A disposable protective cloth used as a clean base for materials and as surface protection from any small blood stains
- Disposable rubber gloves
- Disposable disinfecting wipes
- Two semi-automatic, one-time use lancets (after release the lancet is immediately retracted back into the cover and cannot be activated again)

- Sterile gauze pads
- Plasters
- Desiccant
- A small plastic bag (as part of the packaging)
- A special tear-proof and water-resistant Tyvek® envelope for shipment of the samples[9]

Additionally, the interviewers were provided with the following materials:

- Reusable hand warmers used to warm the participants' hands before the DBS collection, since warm hands show better blood flow[10]
- Barcode stickers (for each participant one sheet holding four stickers with the same barcode number)
- Pre-printed address stickers for mailing to the SHARE Biobank
- Stamps

Finally, a special CAPI module (BS module) guiding the interviewers through the DBS collection during the interview has been developed and integrated in the SHARE survey instrument. The BS module used in SHARE followed closely the CAPI module used for the DBS collection in the HRS. Some adaptations have been included to accommodate experiences made during the two DBS pilot studies in the SHARE Waves 4 and 5. The BS module started with an introduction providing details about the basic idea of the inclusion of the DBS collection in SHARE. After explaining that participation in the DBS part of the study is absolutely voluntary and after obtaining consent from the respondent (using the DBS consent documents), a CAPI item instructed the interviewer to collect the DBS sample according to the step-by-step instruction included in the DBS manual. In addition to this, at the end of the regular SHARE interview the final CAPI item was included with the instruction to initialise the preparation of the sample for shipment.[11]

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9 Different shipment material formats have been tested beforehand in order to ensure best possible temperature and humidity protection: Special bags made of high-tech plastic did not provide more humidity protection than standard polyethylene (PE) bags. Padded envelopes had been expected to protect better or at least longer against high temperatures, but no remarkable difference could be observed between the different kinds of envelopes.

10 After the DBS collection, the hand warmers stayed with the participants as a "Thank you" present

11 As part of the DBS collection training (see 6.2.2) interviewers were instructed to let the sample dry for a sufficient amount of time (e.g., until the end of the regular interview).

6.3 Collecting dried blood spots (DBS) during the sixth wave of SHARE

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This chapter describes the collection of dried blood spots (DBS) during the sixth wave of SHARE and our fieldwork monitoring strategies. In addition, consent rates and total numbers of collected DBS are reported. The chapter closes with logistic aspects and a description of the storage of the DBS samples.

6.3.1 Procedure of taking DBS from a respondent

Eligible respondents in all panel households of participating countries (see Table 6.1) were asked for consent to have their capillary blood sampled in form of DBS. Proxy respondents and respondents who mentioned any medical reason preventing blood taking were excluded from the blood collection. No blood was taken from respondents, who refused to participate or were not able to give consent themselves.

An information leaflet explaining the project in general was handed to each respondent. Moreover, the interviewer explained the entire procedure and expressed the importance of participating.

Once respondents had given their written consent, the interviewer prepared the blood collection (see figure 6.1). An activated warming pad was handed to the respondent. Warm hands show increased blood flow, making it easier to collect blood from the fingertip. Wearing rubber gloves, the interviewer sterilized the puncture site on a finger and used a semi-automatic lancet for pricking. Self-pricking by the respondent or pricking by another person was an alternative option. In France, the interviewer was not allowed to prick. Therefore, almost all French respondents pricked their fingers themselves, except for some being pricked by a third person. In all other countries the ratios of pricking by the interviewer, another person or self-pricking varied.

Blood was collected by letting the drops fall onto absorbent filter paper. Drops were placed on five preprinted small circles. After filling preferably all circles, the filter card was left to dry until the end of the regular SHARE interview, but at least 15 minutes. The filter card was furnished with a unique barcode sticker and the date of the DBS collection was noted on the card. Another sticker with the same barcode number was attached to the consent form, and the barcode number was entered into the CAPI instrument. The barcode number will ensure that the CAPI data, the consent form and the collected DBS match, while ensuring the respondents' data privacy. All three data sources have to be available for the sample to be analysed later.

Finally, the DBS card was packed and prepared for shipment. The signed consent form was sent to the survey agency of the respective country and the DBS card to the SHARE Biobank in Denmark (see 6.3.4 below).

6.3.2 Fieldwork monitoring

A monitoring process was installed to control the entire DBS collection process in the field with the option to intervene if necessary. The monitoring results were mailed as bi-weekly reports to all survey agencies and country teams. Interventions for quality improvements were applied to countries individually. Our main aim was to ensure the collection of high-quality DBS samples. Perfect samples contained five large drops of blood that were neither smeared nor overlapping. However, the quality of the samples varied (see figure 6.5 in chapter 6.4 below).

The quality of the DBS samples (e.g., share of completely filled circles on the filter card) and quality of packing (e.g., usage of desiccant, stamping of envelope) were monitored. Interviewers were contacted by the agency once repeated deviations from the trained procedure were observed. Additionally, the shipping time for every country was monitored. The median shipment time of the DBS samples from all participating countries was five days. In case of remarkably long durations, interventions could be arranged together with the respective survey agency. In Spain, for example, postal strikes took place during the SHARE Wave 6 fieldwork increasing the shipment time of the Spanish samples. The agency reacted by collecting the DBS envelops at their headquarters first and then sending them collectively with a courier service to the biobank.

Furthermore, country-specific consent rates were reported. We calculated two different consent rates to account for possible reasons for not participating that are substantially different (unwillingness vs. perceived impossibility due to medical reasons):

$$consent\ rate_1 = \frac{N_{consent\ given}}{N_{DBS\ eligible} - N_{prevented\ by\ medical\ reasons}} \quad \text{(I)}$$

$$consent\ rate_2 = \frac{N_{consent\ given}}{N_{DBS\ eligible}} \quad \text{(II)}$$

Consent rate$_1$ is based on eligible DBS respondents, who were able to give consent on their own excluding those who mentioned medical reasons preventing them from participating in blood taking. Consent rate$_2$ includes respondents in the denominator, who abstained from participation due to medical reasons. Consent rate$_1$ is always higher than consent rate$_2$.

Figure 6.2 shows the country-specific consent rate$_2$ over the entire monitoring process by individuals having completed an interview at the time of the bi-weekly monitoring report. Most countries had stable trajectories and reached their highest consent rates in initial weeks. In general, persons, who are more likely to participate in the SHARE survey, are expected to be interviewed early in the field. Those cooperative respondents might be more likely to also participate in the DBS collection. Greece and Estonia started their fieldwork later than the other countries. Greece, Italy, Spain, and Israel could not reach an overall consent rates above 70 percent. This may indicate differences in cooperation behaviour between northern and southern countries.

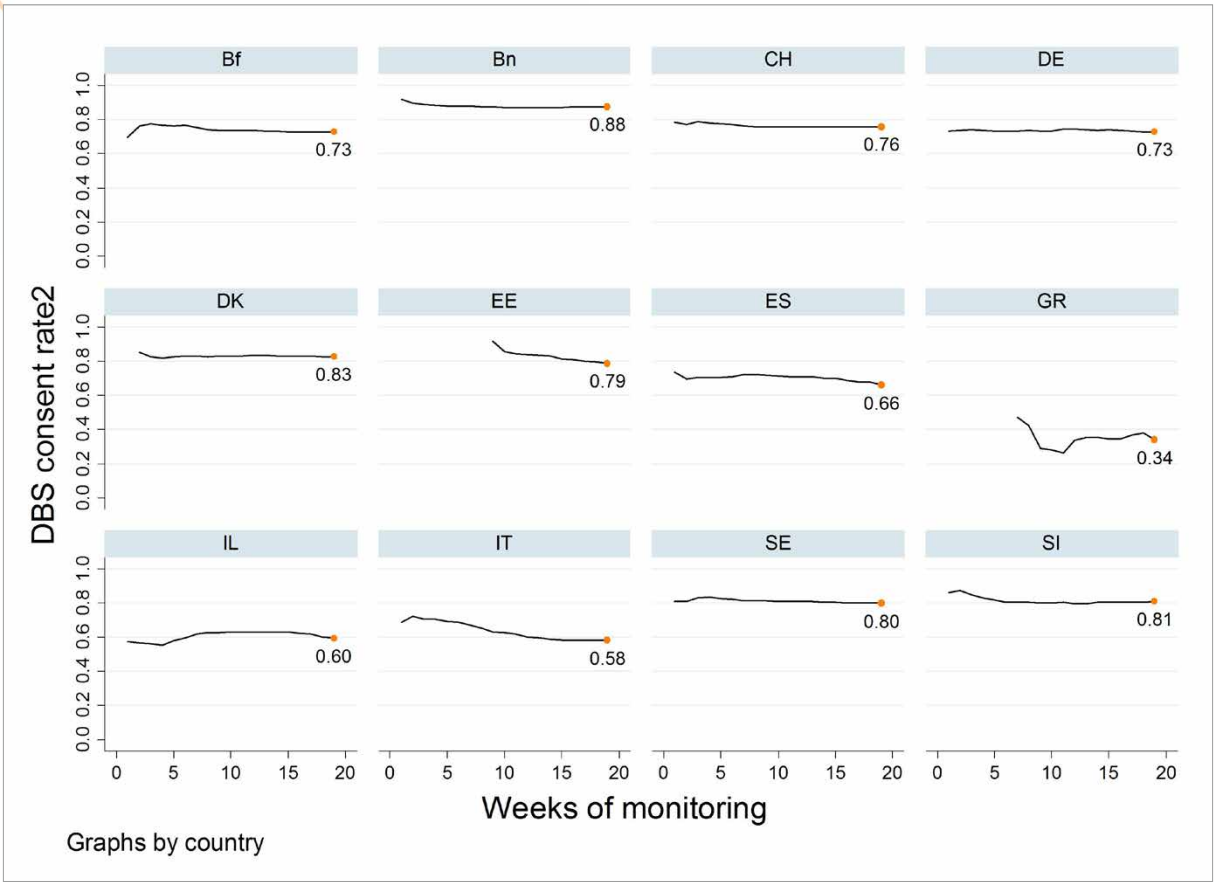

Figure 6.2. Country-specific[12] DBS consent rates$_2$ over time

Next, we monitored interviewer-specific consent rates by country during the fieldwork. Figure 6.3 illustrates the interviewer-specific consent rate$_2$ by country at the end of fieldwork. The interviewer-specific consent rate$_2$ is reported on the y-axis, whereas the total number of DBS eligible interviews by interviewer is reported on the x-axis. The majority of all interviewers reached a threshold of 70 percent and many interviewers had rates over 90 percent. Nevertheless, interviewers within one country differed a lot. At any stage of fieldwork, a wide range of interviewer-specific DBS consent rates could be observed, independently from the interviewers' numbers of DBS eligible interviews. This variety is most obvious in figure 6.3 for Spain and Italy.

Interviewers who had low consent rates (especially in combination with a high number of eligible respondents) were contacted and re-instructed by the agency via email or phone during fieldwork. The aim was to help the interviewers to subsequently be more successful in obtaining DBS samples and, thus, to increase the total consent rate of the country. Higher consent rates increase the absolute number of blood samples, leading to more statistical power, and may reduce the risk of non-consenting bias (Groves, 2006; Groves & Peytcheva, 2008).

12 France is missing in this monitoring figure. In France only panel households in four districts were eligible for DBS collection. Nevertheless, a certain number of non-eligible respondents were asked and gave consent. A list of the ultimately eligible respondents was not available at the time of monitoring. Hence, the calculation of consent rates was not yet possible.

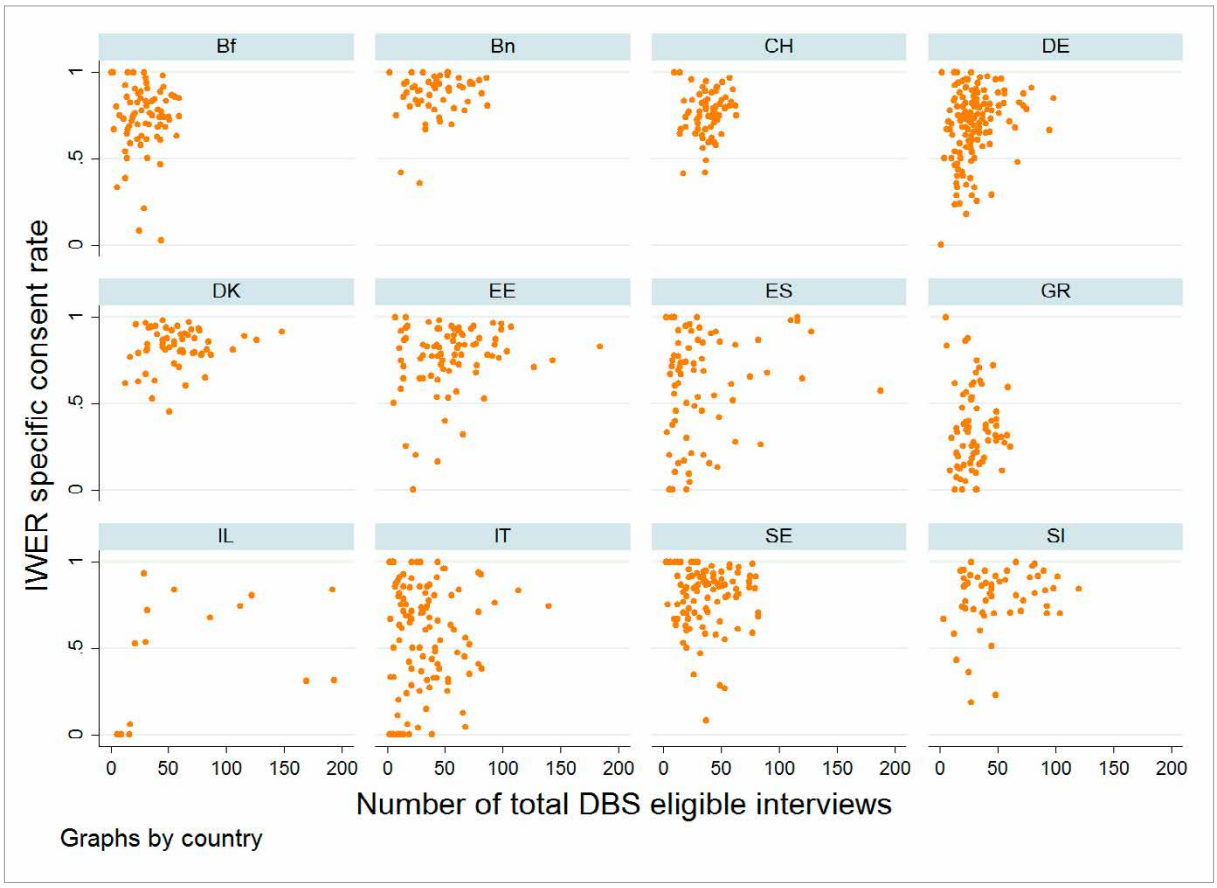

Figure 6.3. Interviewer-specific DBS consent rate$_2$ per country[12]

6.3.3 Final outcome

Figure 6.4 displays two consent rates that differ in the way the denominator was computed (see equations I and II in 6.3.2):

(I) consent rate$_1$: the rates indicated by the orange bars are based only on respondents, who did not mention medical reasons preventing them from participation;
(II) consent rate$_2$: the rates indicated by the dark-red bar include respondents in the denominator, who abstained from participation due to medical reasons.

The red line is the mean of the dark-red bars over all countries with a consent rate$_2$ of 72 percent, showing good acceptance of this new measurement.

More than 27,000 cards were collected. The numbers per country are shown in table 6.2. A card was counted as analysable when the DBS sample was complete (see next chaper) and contained at least one good quality spot of blood.

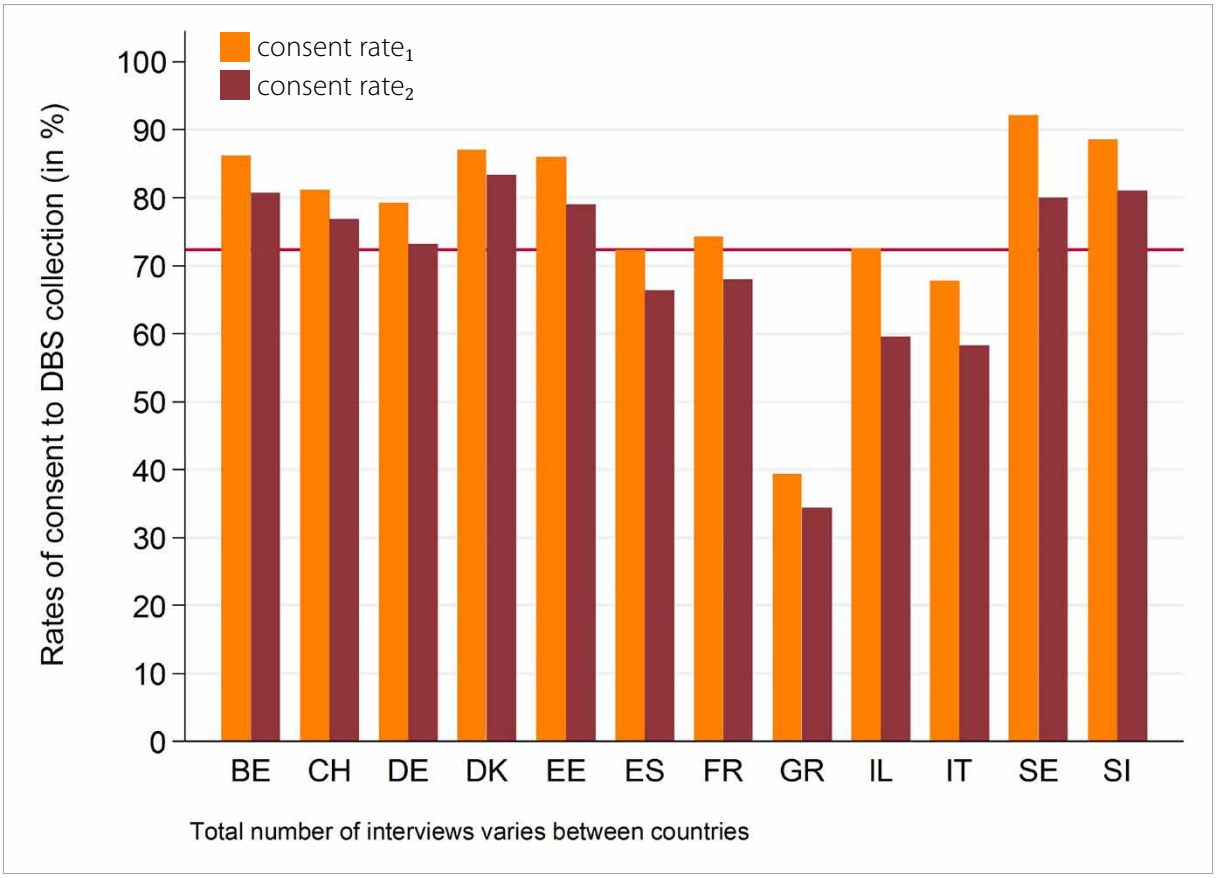

Figure 6.4. DBS consent rates 1 and 2 by country[13]

6.3.4 Shipment and storage of samples

Once the blood spots were dry, the interviewer folded a protecting paper flap around the DBS filter card and put the card into a small polyethylene (PE) bag, together with a desiccant for humidity protection. The PE bag was placed directly into the shipping envelope. For the protection of the samples during shipment, SHARE used envelopes made of tear-proof and water-resistant Tyvek®. Other types of envelopes did not provide better protection against humidity or high temperature than the Tyvek® envelopes. Interviewers were instructed to deliver the samples directly to a post office, but at least as soon as possible, after the collection to avoid extended heat exposure in post boxes (especially during summer fieldwork).

SHARE used a central biobank for all participating countries. The SHARE Biobank is located in Odense, Denmark and is affiliated to the biobank of the Danish Twin Registry, hosted by the University of Southern Denmark (SDU). The SHARE DBS samples are stored at –20 °C, each together with a desiccant in

13 The calculation of consent rates in France is based on the actually eligible subsample (see also footnote 12)

Table 6.2. Numbers of collected DBS cards per country

	Total number of DBS samples collected	Number of complete DBS samples	Number of complete DBS samples with blood	Complete DBS samples with at least one good-quality blood spot
Belgium	3692	3607	3486	3167
Switzerland	2132	2098	2054	1956
Germany	3148	3124	3095	2872
Denmark	2861	2842	2833	2715
Estonia	3683	3670	3652	3285
Spain	1827	1771	1754	1462
France	578	552	507	429
Greece	807	736	735	580
Israel	1073	1030	1030	821
Italy	2175	2155	2123	1840
Sweden	3013	2907	2893	2600
Slovenia	2242	2221	2196	2101
Total	27213	26713	26358	23828

SHARE-ERIC owned laboratory-style freezers. All freezers are connected to an alarm system which notifies a biobank staff member in case of a temperature rise or another hazard.

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6.4 Analysis of the samples – status quo and further tasks

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6.4.1 Preparing the samples for analysis

For analysis, all DBS samples need to meet strict requirements. Only complete samples can be considered. A DBS sample is considered as complete if three data sources are available and linkable via the unique respondent-specific barcode number: (1) a completed BS module in a complete CAPI interview, (2) confirmed receipt by the survey agency of a signed consent form and (3) a DBS card with at least one drop of blood registered at the biobank.

With only one data source missing, further consideration of the DBS sample was not feasible: Without a CAPI interview no data linkage of the blood sample to the corresponding respondent is possible, without a written consent, SHARE is not allowed to consider the sample for laboratory analyses; without any blood, analyses are obviously impossible. Hence, only data obtained from complete DBS samples will appear in the released dataset.

6.4.1.1 Recovering seemingly incomplete DBS samples

After fieldwork completion, we investigated seemingly incomplete samples to avoid losing them. We asked country teams and survey agencies for support and provided them with a list of barcode numbers of the incomplete samples. Most incomplete cases could be retrieved because we were able to correct errors which had occurred when entering the barcode number into the CAPI by the interviewer. Another reason was seemingly missing consent forms that were actually received at the survey agency but were accidentally not reported as such. Survey agencies were able to double check for available consent forms and to correct typing errors by verifying the list of incomplete cases.

In some cases we had to deal with duplicates of barcode numbers in the CAPI data, DBS cards or consent forms. This was mostly due to typing errors as well. By checking additional information of the DBS samples, many of these duplicates could be matched to their correct counterparts. Examples for such additional information are the number of collected blood drops and/or the date of the interview on the DBS card. Only if we could match the three data sources with certainty, we cleaned the data accordingly. Overall, the close collaboration between agencies, country teams and MEA helped turning seemingly incomplete samples into complete ones and, therefore, usable and analysable samples.

6.4.1.2 Portioning the blood spots for marker analysis: Punching the samples

The blood-containing filter cards of the participating respondents are stored in the SHARE biobank at the University of Southern Denmark (SDU) in Odense. Approximately 26,000 complete and usable DBS samples from the main survey of SHARE Wave 6 are available for analyses; these are 97 percent of all cards. The blood material on a filter card of a single SHARE respondent may contain up to five blood spots of different size, optimally five completely filled circles, but a substantial share of the usable DBS

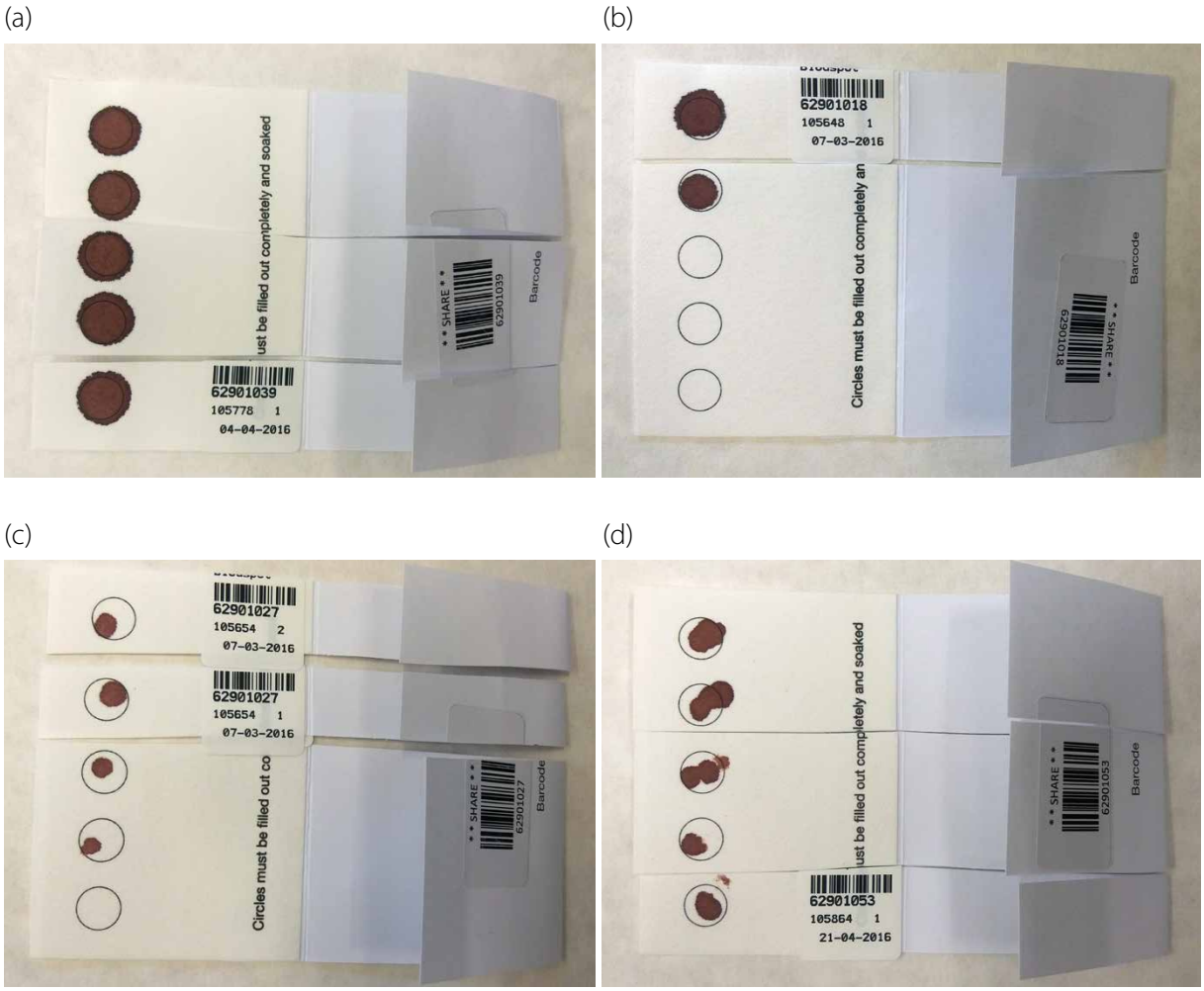

Figure 6.5. Varying amounts of blood on the DBS cards:

a) A completely filled card;

b) A partially filled DBS card;

c) Minimal amounts of blood (<one full circle) and otherwise unsuitable material (paper was touched and smeared in circle 2);

d) more blood than on the card shown in c) but the card was touched in circles 1, 2, 3 and drops are overlapping in circles 3, 4, 5; this card is unsuitable for marker analyses except for HbA1c.

cards have only a very limited amount of blood (≤ one full circle, see Fig. 6.5). Another major number of cards contain only smeared, overlapping or very small blood spots, which are unsuitable for analyses of any markers except for HbA1c. HbA1c is the ratio of glycosylated versus total hemoglobin and, thereby, concentration-independent. It can be determined from the otherwise unsuitable cards (for an overview of complete and usable cards see Chapter 6.3.3 and Table 6.2). Given the differences in quantity and quality, we spent considerable time carefully planning how to gain as much information as possible from all cards, and at the same time cover the list of markers which we intended to analyse.

For the analyses of a marker or a marker group only a small part of a blood spot is needed. Therefore, the original blood spots of adequate size have to be divided. This is done by punching small discs with a diameter of 3.2 mm (the punches) from the blood spots. The punching is performed at Staten Serum Institute in Copenhagen (SSI). For the analyses of all nine markers (see first chapter on DBS) or marker groups, five punches from each DBS sample will be necessary (see Table 6.3).

Table 6.3. Markers analysed from SHARE DBS

Marker Set	Individual Markers	Number of 3.2 mm discs needed for analyses
A-markers **or**	• HbA1c • total Hemoglobin (tHb) • HDL-Cholesterol	2
HbA1c-only (alternatively, in case of limited material)	• HbA1c	1 (can be taken from an otherwise unsuitable blood spot)
B-markers	• total Cholesterol (TC) • Triglycerides (TRG) • C-reactive protein (CRP) • Cystatin C	1
C-markers	• 0 Cytokines: BDNF, IL-16, APOJ/ Clusterin, VEGF, IL-8, IL-12/23, IL-18, MCP1, EGF, VCAM (see below) • Vitamin D	2

Before the punching starts with a semi-automated robot punching system (Panthera Puncher 9, Perkin Elmer), the samples have to be sorted according to how many punches for which markers can be made. Then, the sample is registered in the system by scanning the respondent-specific barcode. The card is manually positioned in the puncher, the 3.2mm disc is cut and drops into the well of a standard 96-deep well microtiter plate (Fig. 6.6). After completing the punching into the 96 wells, the microtiter plate receives a cover to prevent the discs from falling out or getting mixed during handling and future transport of the samples to the laboratories.

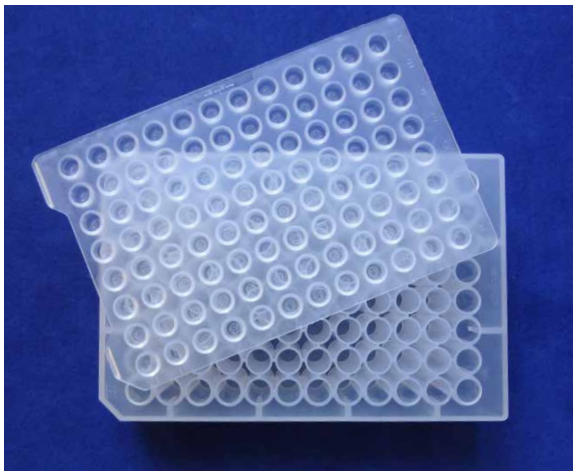

Figure 6.6. 96-deep well microtiter plate with cap

The approximately 26,000 DBS samples derived from the main data collection were divided into four randomly drawn batches, which are punched and analysed consecutively.

The DBS samples of the SHARE Wave 6 pretest served as a pilot to have one run through the entire logistic of the analyses process:

- selection at the biobank,
- shipments between biobank and the laboratories,
- organising and executing the punching process,
- keeping track of the samples,
- evaluating and analysing the punches for
  - HbA1c-only
  - A- and B-markers at the University of Washington,
  - C-markers at Staten Serum Institut,
- using pretest samples for validating cytokine markers at SSI,
- adjusting the analyses conditions to the SHARE DBS samples.

6.4.2 Laboratories and analyses

We have chosen two laboratories which have expertise in analysing certain markers from DBS and are also able to handle the huge amount of DBS samples. One laboratory is the Department for Laboratory Medicine at the University of Washington (UW) in Seattle, USA. The A- and B-markers (see Table 6.3) were analysed there. The other laboratory is located at SSI in Copenhagen and performs the analyses of cytokines and vitamin D, the C-markers (see Table 6.3).

Each time the punching of approx. 1000 DBS cards is completed, SSI sends two plate sets (the A- and the B-markers) to Seattle. The C-marker set remains at SSI and is stored at −20 °C until subject to analysis. Any left-over material is returned to the biobank for extended storage (also at −20 °C) and is re-registered there.

By the time of writing, all samples from the first randomly drawn batch (8000 DBS samples) have been received in Seattle and the analyses of HbA1c-only, A- and B-markers has been performed. SSI has completed the validation of a set of 10 cytokines from DBS and ordered the test plates containing the antibodies for the analyses of the entire SHARE DBS samples at Meso Scale Diagnostic, Rockville, MD, USA. The analysis conditions for the 10plex plates have to be adjusted again. In 2018, analyses of the SHARE DBS for cytokines may start.

The samples will be analyzed for the following markers and according to the techniques listed below:

- Cholesterol, total: Enzyme assay (Lakshmy et al., 2010 and 2012)
- Cholesterol, HDL: Enzyme assay (Huang et al., 1997; Arranz-Peña et al., 1998)
- Triglycerides: Enzyme assay (Quraishi et al., 2006; Lakshmy et al., 2010)
- Hemoglobin, glycosylated (HbA1c): HPLC (Egier et al., 2011)
- Hemoglobin, total: Micro plate assay (Frenchik et al., 2004)
- hsCRP: high sensitive enzyme immunoassay (McDade et al., 2004; Brindle et al., 2010)
- Cystatin C: ELISA (Immunoassay) (Vogl 2014)
- Cytokines: Multiplex Immunoassay (Skogstrand et al., 2005, 2008; and Skogstrand 2012)
- Vitamin D: HPLC-Mass spectrometry (Eyles et al., 2009)

6.4.3 Further tasks

The chemical process in the laboratory has to be monitored for unexpected analysis products appearing in the field samples. If applicable, it has to be investigated if they are analyses-dependent or due to sample exposure during collection. If possible, results can be adjusted. Once the results from DBS analyses are available, they can be converted into values comparable to standard venous blood samples (so called plasma or blood equivalents) to permit comparison of the SHARE results with usually available clinical data, publically available health data (e.g., national health registers) or results from other surveys (Lacher et al., 2013). A SHARE-specific conversion equation has to be generated.

Analyses results for the DBS of the first randomly drawn batch are expected to be available in 2018.

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