

# A Review of Longitudinal Datasets on Ageing

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**Abstract** The growth in longitudinal datasets on ageing have resulted from a recent global initiative, in a large part encouraged and partially funded by the NIA, over the past 20 years in numerous countries eager to understand the complexities of their ageing societies. In the main these studies aim to collect data on population ageing in terms of social, medical and environmental factors. Accordingly the studies being compared in this review focus primarily on health, wellbeing and social issues. These studies have made it possible to measure, evaluate and understand a wide variety of determinants of population change and helped to identify the challenges faced on many levels for the twenty first century and beyond. They have enabled organisations, health care service providers and government more readily able to anticipate and be responsive to the need of the dynamics of the population change as not only the population rapidly increases but faces a significant rise in the percentage of elderly persons. This review looks at the aim of each study, comparisons in methodology, key policy themes, benefits, collaborations with other datasets, gaps and challenges and key findings to date. For further information, an appendix is attached with the contact details of the Principal investigator and study website.

**Keywords** Longitudinal surveys · Datasets · Population ageing

## Longitudinal Datasets Contribution to Population Ageing<sup>1</sup>

This review which has compared fifteen current studies and two under development, revealed a wide variety of types of national studies (Table 1).

There are seven kinds of longitudinal data reviewed here. These include:

- personal interviews, self-enumerated questionnaires and clinical and home-based instruments (ALSA, TILDA);

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<sup>1</sup>The information in this article is based on an outline which was sent to each study with specific questions.

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**Table 1** Data sets reviewed

Dataset	Acronym	Primary purpose of study	Number of participants	Launched	Age range included
Established					
Australian Longitudinal Study of Ageing	ALSA	Social, biomedical & environmental factors	2087 (Wave 1 followed by varying responses)	1992	70 years and over
China Health and Retirement Longitudinal Study	CHARLS	Elderly households, elderly respondents and their spouses	17,000	2006	45 years and over
Canadian Longitudinal Study on Aging	CLSA	Changing biological, medical, psychological, social, lifestyle and economic aspects	50,000	2008	45 to 85 years
English Longitudinal Study of Ageing	ELSA	Economic, social, psychological and health	12,000 over 12 years	2002	50+ years
Global Ageing Survey	GLAS	Health & retirement, attitudes, behaviours and expectations	110,000	2005	40 to 80 years
Household, Income and Labour Dynamics in Australia	HILDA	Household, income and labour dynamics	Over 25,391 (Wave 1 only)	2001	15+ years in private households
Health and Retirement Study	HRS	Changes in labour force participation and health transitions	30,000	1992	50 years and over
The Italian Longitudinal Study on Ageing	ILSA	Health and disease, physical & mental function	5,632	1992	65 to 84 years
Japanese Study of Aging and Retirement	JSTAR	Economic, social, and health aspects	4,200	2007	50 to 75 years
Korean Longitudinal Study of Ageing	KloSA	Work, income and health, disability and family transfers	10,000	2006	45 years and over
Longitudinal Aging Study in India	LASI	Adult health, population ageing processes	30,000	2009	45 years and over
Mexican Health and Aging Study	MHAS	Health and socio-economics	15,000	2001	50 years and over
Swedish Panel Survey of Ageing and the Elderly	PSAE	Older persons' living conditions, retirement, social inclusion, family relationships, health development	6,000	2002	55 to 64 years
Survey of Health, Ageing and Retirement in Europe	SHARE	Health, socio-economic status, social and family networks in depth in 20 European countries	60,000	2001	50 years and over

**Table 1** (continued)

Dataset	Acronym	Primary purpose of study	Number of participants	Launched	Age range included
Irish Longitudinal Study on Ageing	TILDA	Health, social and economic circumstances	10,000 10 years	2009	50 years and over
Under development					
Brazilian Longitudinal Study of Ageing	ELSI-Brasil	Relationships between health and functioning, economic position, social participation/networks and well-being; impact of environment & genetic factors	15,000	2013	50 years and over
Scottish Longitudinal Study of Ageing	THSL	Health, population ageing in particular unique issues to Scotland	10,000	TBD	45 years and over

- household panel surveys which regularly follow-up some or all household members (over a specified age) and include components such as demographic background; family; health status and functioning; social networks and supports; social, civil and cultural participation; health care and insurance; work, retirement and pension; income, expenditure and assets (CHARLS, ELSA, GLAS, KLoSA, MHA & SHARE);
- cross-sectional surveys in which respondents were selected randomly (GLAS);
- longitudinal studies of individuals which begin in adolescence or adulthood; (ALSA) and
- enhanced in-person interviews that collect wide range of measures of physical function, biomarker and DNA samples and (HRS, ILSA, LASI)
- computer-assisted personal interviewing (CAPI) studies which also link data from other national studies (JSTAR, LASI & TILDA).

### **Aim of Each Study and Background**

The studies being reviewed encompass an extensive range of elements including exploration of the impact of social, biomedical and environmental factors on health and well-being; a review of the demographic profile of households of the elderly; life and economic aspects; cultural influences in ageing; perception and the dynamics between families and communities; and patterns in spending, retirement and social welfare. Most importantly, one common objective is the desire to provide government with the tools it needs to develop policies and plans for its' ageing society. The aims of each study can be summarised as follows:

The **Australian Longitudinal Study of Ageing** (ALSA) was launched in 1992 as Australia's first multi-dimensional population based study of human ageing. The general purpose was gain further understanding of how social, biomedical and environmental factors are associated with age related changes in health and well-being of persons aged 70 years and over. Emphasis was given in the overall study to defining and exploring the concept of healthy and successful ageing, particularly in a South Australian context.

The **China Health and Retirement Longitudinal Study** (CHARLS) was launched in 2007 with the aim to set up a high quality, nationally representative and publicly available micro-database that provides a wide range of information about the households of the elderly and also individual information on the elderly respondents and their spouses. CHARLS is a multidisciplinary research project jointly carried out by China CDC and Peking university, with special attention to the national aging population, a series of problems in health, economic and social security and etc. and worthy of long-term tracking.

The **Canadian Longitudinal Study on Aging** (CLSA) a large, national, long-term study launched in 2010 will be collecting information on the changing biological, medical, psychological, social, lifestyle and economic aspects of people's lives. These factors will be studied in order to understand how, individually and in combination, they have an impact in both maintaining health and in the development of disease and disability as people age. The

CLSA will be one of the most comprehensive studies of its kind undertaken to date, not only in Canada but around the world.

The **English Longitudinal Study of Ageing (ELSA)** was the first study in the UK to connect the full range of topics necessary to understand the economic, social, psychological and health elements of the ageing process. (Chicago Core on Biomarkers in Population-based Aging Research. 'HRS-harmonized studies all over the World' Chicago Core on Biomarkers in Population Based Aging Research 2005). One of ELSA's key aims is to help the government plan for an ageing population and longer periods of retirement and to ensure that the UK's healthcare and pension systems will meet everyone's needs.

The **Global Ageing Survey (GLAS)** a study undertaken between 2005–2008 (GLAS) by the Oxford Institute of Population Ageing in collaboration with HSBC Insurance included 25 countries in Asia, Americas, Europe and Africa and comprised cross comparative modules with HRS and SHARE on health and retirement, explored attitudes, expectations and behaviours towards later life and retirement, including financial planning for retirement.

The University of Michigan **Health and Retirement Study (HRS)** is a longitudinal panel study that explores the changes in labour force participation and the health transitions that individuals undergo toward the end of their working lives and in the years that follow. Through expanding its science into new areas of biology and psychology, it has become the most comprehensive study for understanding the lives of ageing Americans. Since its launch in 1992, the study has collected information about income, work, assets, pension plans, health insurance, disability, physical health and functioning, cognitive functioning, and health care expenditures.

The **Household, Income and Labour Dynamics in Australia (HILDA)** Survey, a household-based panel study collected its first wave of data in 2001 focusing on household composition, employment, income and wealth, and health and well-being. Funded by the Australian Government, it is intended to be a major resource for researchers and policy-makers about economic and subjective well-being, labour market dynamics and family dynamics.

The **Italian Longitudinal Study on Ageing (ILSA)** launched in 1992 aimed to study the prevalence and incidence rates of common chronic conditions in the older population, and the identification of their risk and protective factors. ILSA was also designed to assess age-associated physical and mental functional changes.

The **Japanese Study of Aging and Retirement (JSTAR)** aimed to capture the diversity of the elderly population given the fact that the Japanese population is ageing ahead of other developed countries and the government needed valuable input for real-world policymaking. As a result, The Research Institute of Economy, Trade and Industry (RIETI) and Hitotsubashi University jointly launched a comprehensive survey of elderly people in 2007 to collect panel data on their life and health. This rich dataset provides information on how middle-aged and elderly Japanese live in terms of economic, social, and health outcomes, and how these interact with their family status. The JSTAR project aims to provide longitudinal data enabling detailed policy-relevant comparisons to other industrialized countries (e.g. the Survey on Health, Aging and Retirement in Europe, the US Health and Retirement Study, the English Longitudinal Study on Aging, and similar surveys now launched in Korea, China, and India).

**The Korean Longitudinal Study of Ageing (KLoSA)** was first conducted in 2006, to create the basic data needed to devise and implement effective social, economic policies to address the trends that emerge in the process of population ageing. Its aim was to collect information on work and income and health and disability and includes detailed questions on family transfers. This statistical data covers the following areas: Institutional reform and policy-making in preparation against the aged society require systematic build-up of data that can track individuals' labour participation, income and asset status, spending patterns, retirement decisions, impact of social welfare, health, and intra-family transfer of income, among others.

**The Longitudinal Aging Study in India (LASI)** is being conducted as a partnership between the Harvard School of Public Health (HSPH), the International Institute for Population Sciences (IIPS), and the RAND Corporation. The study examines the physical, financial, and social correlates and implications of population aging in India, with the aim of informing policies that could mitigate related challenges. It will allow a better understanding of India's adult health problems and population ageing. As one of the most recent established studies in 2009, LASI is fully collaborative with several other key studies. The study is supported by a grant from the National Institute of Aging, as well as by supplemental support from HSPH, IIPS, and RAND.

**The Mexican Health and Aging Study (MHAS)** is a prospective panel study of health and ageing in Mexico. The study is a collaborative effort among researchers from the Universities of Pennsylvania, Maryland, and Wisconsin in the U.S., and the Instituto Nacional de Estadística, Geografía e Informática (INEGI) in Mexico. The overall goal of the study was to examine the ageing process and its disease and disability burden in a large representative panel of older Mexicans from a wide socio-economic spectrum.

**The Panel Survey of Ageing and the Elderly (PSAE)** was conducted between 2002 and 2003 to answer several key questions posed by the Government in Sweden in conjunction with a directed focus by the country's research councils on elderly people's living conditions. The first question was to look at the far-reaching social and economic consequences of the demographic challenge as the population ages. The second was to look at ways to deal with: a) the extent to which health status among the elderly improve, worsen or remain constant, b) the extent to which older people will remain in employment, c) the older social networking and what type of support these networks will contribute and, d) the extent to which older people are productive even after they have left the labour market. Through its unique design, integration with the annual Survey of Living Conditions (ULF) and the use of registry data, PSAE outset offers information with unique breadth and a longitudinal approach that offers the opportunity to study different stages of ageing of employment among older workers, from work to retirement, social inclusion, family relationships, health development and the need for help and care among the oldest old. The study did continue from 2010 through to 2012. This update has not only enhanced the PSAE's longitudinal capacity, but also enabled a range of analyses related to issues of change and causal relationships to be undertaken.

The **Survey of Health, Ageing and Retirement in Europe (SHARE)** is a multidisciplinary and cross-national panel database of micro data on health, socio-economic status and social and family networks of more than 55,000 individuals from 20 European countries aged 50 or over.

SHARE seeks to analyse the process of population ageing in depth. It is the first study to examine the different ways in which people aged 50 and older live in 20 European countries from Sweden to Greece and Portugal to Estonia. Its scientific potential lies in the extensive data gathered from more than 60,000 people all across Europe, covering the interplay between economic, health, and social factors in shaping older people's living conditions (SHARE. Available: [http://www.share-dev.mpsoc.mpg.de/fileadmin/SHARE\\_Brochure/share\\_broschuere\\_webfinal.pdf](http://www.share-dev.mpsoc.mpg.de/fileadmin/SHARE_Brochure/share_broschuere_webfinal.pdf)).

The **Irish Longitudinal Study on Ageing (TILDA)** is a study of a representative cohort of over 8500 people resident in Ireland aged 50+, charting their health, social and economic circumstances over a 10-year period commencing late 2009. TILDA is unique amongst longitudinal studies internationally in the breadth of physical, mental health and cognitive measures collected.

Two new studies are currently under development in Scotland and Brazil.

The **Scottish Longitudinal Study of Ageing (THSLs)** is in its planning stages.

A scoping study was undertaken in 2008 aimed at evaluating the costs and benefits of carrying out an ageing survey in Scotland similar but not identical to ELSA, TILDA or SHARE. (Anderson, Boyle & Sharp 2008). It was concluded that current datasets do not provide enough relevant information to study in a systematic and meaningful way population ageing in Scotland. It also concluded that given the unique nature of Scotland's demography and potential policy differences brought about by devolution a specific study is warranted. It has received funding from the Economic and Social Research Council, Centre for Population Change and the Scottish Institute for Research in Economics. An application to the National Institute for Aging for a pilot study is under review. The ten year study aims to interview around 10,000 individuals every 2 years along with a full medical examination. Individuals older than 45 years will be included in the sample. This is a younger starting age than most ageing studies but is justified by the relatively poorer health experience in Scotland compared to most other high income countries. The study plans to innovate in several areas. For example, the nature of the health service in Scotland makes it possible to match into the survey data detailed information from hospital and physician records. Physical activity will be carefully monitored through accelerometers and GPS devices. Information will continue to be collected when sample members leave their homes and enter institutions. "Cloud data" methods and tablet computing technology will be used to collect information between interviews (Wright 2012).

The **Brazilian Longitudinal Study of Ageing (ELSI-Brasil)** ELSI-Brasil which will be based on ELSA is also under development with the support of the Brazilian Ministry of Health and the National Institute on Aging (NIA/NIH) in the US and intends to be launched in 2013. Compared to the Scottish study, it is looking at including nationally representative samples of an older age cohort, those aged 50 years of age with an even more ambitious number of interviews at 15,000

consisting of household interviews every 2 years, annual telephone interview and a nurse visit every 4 years. The main aims of ELSI-Brazil are: to provide data necessary for the exploration of the unfolding dynamic relationships between health and functioning, economic position, social participation/networks and well-being, as people plan for, move into and progress beyond retirement; to investigate separate and joint effects of environmental and genetic factors on health outcomes (highly mixed population: African, European and Native American ancestry); to include strategic themes for the Brazilian government: i.e. the impact of public policies (public pensions and the Unified Public Health System); to improve well-being and health conditions and to reduce social inequalities; and to enable international comparisons (harmonization) (Oliveira 2012)

### Methodology (Sampling, Design, Timeframes, Method of Collection)

Methodological development was as wide ranging as to the aims of the studies and was dependent on the outcomes required. Sample sizes and diversity were based on a number of factors including geographic location, health condition, economic status, and so on which was further complicated by some studies interviewing not only the elderly respondents but their families and household members. This was further complicated by the fact that when new waves for studies were conducted they sometimes also amended the questions, intentions and made up for the attrition by recruiting additional subjects. One final factor was the frequency in which the follow-up took place (Table 2).

### Benefits & Key Findings

Overall the benefits realised in each individual study were a much clearer snapshot of the issues reflecting the ageing society in the country or countries in which the study was undertaken. The data served as the source for hundreds of publications, policy and working papers, created new lines of inquiry and created a baseline for governments, institutions and individuals to project and follow the issues of their national ageing populations and compare it to other countries. More specifically:

**ALSA** - The material collected during the ALSA comprises the most comprehensive longitudinal data base yet assembled on ageing Australians and it complements in a unique way those available internationally. The findings of the ALSA are directly relevant to policy formulation and planning of health and social services for an ageing population. Researchers have reported on the Australian Longitudinal Study of Ageing in over 200 publications including reports, book chapters, refereed journal articles, abstracts, conference proceedings and theses. Recent funding from the Australian Research Council's Discovery Projects Scheme will also enable a multidisciplinary team of researchers to study Adelaideans over the age of 85, also referred to as the 'oldest old'. This data will be combined with ALSA data collected previously to enable the dynamics of ageing to be revealed, i.e. it will look prospectively at risk and protective factors associated with ageing well. The ALSA has also been integral to a project funded by the Premiers Science Research Fund.

**Table 2** Methodological comparison

Datasets	Methodology applied	Number of waves	Dates
ALSA	Comprehensive personal interviews, functional assessment, self-completion questionnaire, telephone interviews	Wave 1 to 11	1992–2010
		Waves 12	Scheduled 2013
		Wave 13	Scheduled 2014
CHARLS	Computer assisted interviews (CAPI), health status assessment, collection of biomarkers	Baseline	2008
		Wave 1	2011
		Wave 2	2013
CLSA	Comprehensive Questionnaires, Tracking Questionnaires, Physical Assessments, Biospecimens	Baseline Follow up every 2 years for 20 years	2008
ELSA	Interviews, health status assessment, life-history interview	Wave 1 - Interview	2002–2003
		Wave 2 - Interview & Nurse visit	2004–2005
		Wave 3 Interview & Life-history interview	2006–2007
		Wave 4 Interview + Nurse visit	2008–2009
		Wave 5 Interview	2010–2011
GLAS	Self-completion questionnaire (individuals & employers)	Three waves	2005–2008
HILDA	Household questionnaire, Individual Self-completion Questionnaire	Wave 1	2001
		Wave 2 – household wealth	
		Wave 3 - Retirement	
		Wave 4 – Health Insurance & youth	
		Wave 5 – Fertility, expenditures, intentions	
		Wave 6 – Household wealth	
		Wave 7 – Retirement, Health	
		Wave 8 – Fertility	
		Wave 9 – Immigration, Health, Diet	
		Wave 10 – Household wealth, intentions	
		Wave 11 - Fertility	
HRS	Mixed mode design including individual interviews in person or by telephone as well as mail and internet questionnaires, collection of biomarkers and genetic information	Most recent wave took place in February 2012	1992, 1993, 1994, 1995, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012

**Table 2** (continued)

Datasets	Methodology applied	Number of waves	Dates
ILSA	Personal interviews, health assessment (physical exams, laboratory tests)	Baseline examination Second examination	1992-1993 1995
JSTAR	Self-completion questionnaire & computer assisted personal interviews (CAPI)	Baseline survey Follow up	2007 2009
KLOSA	CAPI interviews, collection of biomarkers, measurement of wellbeing.	Wave 1 Wave 2 Wave 3	2006 & 2007 2008 & 2009 2010
LASI	Comprehensive personal interviews (individual & household), CAPI interviews, collection of biomarkers, measurement of wellbeing	Pilot Wave 1	2010 2012
MHAS	Comprehensive personal interviews, collection of biomarkers, measurement of wellbeing	Baseline survey	2001 and 2003 2012 Scheduled 2014
PSAE	Questionnaires, measurement of living conditions and wellbeing	Co-ordinated with Statistic Sweden's annual survey on living conditions	2002 – 2003
SHARE	CAPI interviews & self-completion questionnaire, collection of biomarkers, measurement of wellbeing, all components translated into all languages of participating countries	Wave 1 (12 countries) Wave 2 (15 countries) Wave 3 (13 countries) Wave 4 (16 countries) Wave 5	2004/2005 2006/2007 2008/2009 2010/2011 2012/2013
TILDA	CAPI interview & self-completion questionnaire, full health assessment (home & centre based), measurement of wellbeing	Wave 1 Wave 2 Wave 3 Wave 4	2009–2011 2012 Scheduled 2014 Scheduled 2016
Under development			
ELSI - Brasil	Plan include comprehensive personal interviews, telephone interviews, collection of biomarkers, measurement of wellbeing	Wave 1	2012–2013 Dependent on availability of funding
THSLS	In designing study, ideal methodology to be used will be CAPI, followed by in-home nurse interview. Other considerations include telephone, postal or web-based questionnaires.		Life of survey will be minimum 10 years.

The South Australian Population Health Intergenerational Research (SAPHIRE) project will provide valuable new insights into the complex factors that contribute

to positive and negative health outcomes for people from childhood through to old age.

**CHARLS** – The study has been instrumental in providing vital information for the government to develop policy, particular in the areas of health and security and assisted in the long-term tracking of “The Twelfth 5-year Planning” and healthcare reform. Providing this in-depth understanding of the relationships between elderly health, social security and economic status has proven helpful to the development and evaluation of government policies. In the area of health care, it has enhanced the ability to monitor chronic diseases and analyse policies through the provision of detailed data on the heavy burden of disease prevalence on ageing people and its impact on the country’s economic development.

The extensive output has encompassed reports on a variety of topics such as effects of China’s pensions system; health care utilisation; elderly living arrangements; and land productivity (CHARLS 2012).

**CLSA** - is a large, national, long-term study of adult development and aging. The longitudinal design and extended follow-up will provide a unique opportunity to examine health transitions and trajectories over time, with the goal of better understanding the complex interplay among the vast array of determinants of health, from gene-environment interactions to transitions to retirement. The CLSA will advance ageing research in Canada and enable researchers to move beyond providing a snapshot of the adult Canadian population toward observing and understanding the evolution of diseases, psychological attributes, function, disabilities, and psychosocial processes that frequently accompany aging. This information is critical to prepare for 2026 at which time one in five Canadians will be 65 or older (CLSA 2009).

**ELSA** – ELSA is the first representative longitudinal study of older people in England to have a well-integrated multidisciplinary approach that is equally strong in measuring economic, health and social aspects of people’s lives, with such a strong joint emphasis on detailed economic processes and the assessment of all elements of health processes including symptoms, subjective assessments, diagnoses and biomarkers. Innovative techniques for estimating income and wealth have greatly strengthened the scope for obtaining comprehensive data on financial circumstances in a phase of life that is difficult to quantify in terms of simple indices of income. The harmonization of ELSA with other national studies of ageing has facilitated international comparisons, while linkage to administrative data has added great analytic power to the study. The age distribution of the cohort means that disability, disease and mortality emerge at a substantial rate, facilitating longitudinal analyses of health outcomes and these are strengthened by the inclusion of objective markers of health, physical and cognitive performance and biology. The detailed psychosocial and economic phenotyping has presented opportunities for geno-economics. The rapid availability of data to the general research community overcomes the time delays present for many cohort studies and ensures that up to date information can be analysed. The study has resulted in more than 165 publications, with 59 alone during 2011 and 2012.

The highly ranked publications reflect the extensive variety of topics covered by the study including disease; health literacy; and coronary artery disease prevention (ELSA 2011).

**GLAS** - In the first wave of the Global Ageing Survey funded by HSBC in 2004, approximately 11,000 persons aged 18 years and over in 10 countries and territories across four continents were surveyed on a variety of issues relating to ageing and later life. That first wave revealed that people's attitudes to ageing and later life were predominantly positive across the globe. In addition, people's expectations in respect of withdrawal from the labour market proved to be more flexible and forward-looking than labour market infrastructures often allow. The interplay between individuals, families, workplaces and government is complex, and the first wave of the survey showed that this is no less so in later life. Thirty years down the line, those same governments and workplaces are struggling to encourage us to delay our departure from the workplace. But how do these societal and workplace needs compare with the expectations and aspirations of the people? And are employers in tune these expectations and aspirations? The Global Ageing Survey was able to provide significant insight into how peoples and businesses worldwide are meeting one of the 21st century's greatest challenges in addition to identifying other key questions which need to be investigated (Harper and Leeson 2006).

**HILDA** - Research applications of HILDA data have successfully covered four main topic areas. The first is in the area of transformation of family and household structure. This data has added to the knowledge about economic consequences of marital relationships, impact of divorce, patterns of cohabitation and quality of living arrangements (Watson and Wooden 2002). The second is in the area of fertility where data has enabled researchers to look into both fertility intentions and whether and how quickly these intentions translate into subsequent births. More importantly, as additional waves of data are accumulated the data should facilitate an analysis of the factors intervening between intentions and realised births. The third area is with relation to population ageing and retirement. This data has been valuable in monitoring both subjective and economic well-being among the elderly, and in particular, the impact of ageing on well-being. It has assisted with understanding what factors influence work retirement and how tax and income support policies influence those decisions (Watson and Wooden 2002). Lastly, the HILDA survey has provided the potential to undertake rich analysis into both residential mobility and housing outcomes (Watson and Wooden 2002). As of June 2006, the HILDA data had already been applied in approximately 300 journal articles, research papers, working papers, and conference papers and hosted about 560 registered HILDA users (Kortt 2006).

**HRS** - Since its launch in 1992, HRS has collected information about income, work, assets, pension plans, health insurance, disability, physical health and functioning, cognitive functioning, and health care expenditures. Through its unique and in-depth interviews, the HRS has provided an invaluable and growing body of multidisciplinary data that researchers have used to address important questions about the challenges and opportunities of ageing. The availability of comparable cross-national data has presented opportunities for new research, such as comparing the impact of different national policies on the health and work patterns of older populations. Comparisons also point out areas for policy to address. For example, research examining the health of the U.S. and English populations showed that Americans in middle age are much less healthy than their English counterparts.

**ILSA** – The data from this study has been applied to a host of research studies which have included a close exploration of psychosocial factors such as depression, wellbeing such as vitality, cognitive issues such as dementia, and chronic disease particularly impacting the elderly such as diabetes. Before this study, there was little previous research on topics like the impact of longitudinal changes in late-life depressive symptoms on mortality, and of their remission in particular. Depression had always been recognized as being associated with increased mortality. ILSA data has underpinned this increased robust scientific research in these areas (Scafato et al. 2012; Solfrizzi et al. 2012; Minicuci et al. 2005).

**JSTAR** - As Japan's first globally comparable panel data survey of elderly people JSTAR has provided researchers with the capability to analyse and more accurately track the characteristics of the Japanese elderly population both in terms of their specificity and universality in the world (JSTAR 2013). It has provided several unique opportunities such as how lifestyle and preferences affect health conditions among elderly through dietary patterns. In addition, for the first time, JSTAR publicly available panel data on labour market transitions has been made available to both Japanese and foreign scholars (Smith and Majmundar 2012). JSTAR is unique due to its sampling strategy which takes the municipality as a cluster of sampling, instead of adopting nationwide probabilistic sampling. By comparing across and within municipalities with adjustment of individual characteristics, JSTAR provides insights into what is shared and what is diverse in the lives of middle-aged and elderly people in Japan, making an unusually large potential to extract new scientific findings and policy implications (Ichimura, Shimizutani and Hashimoto 2009).

**KLoSA** - Data from the KLoSA study has helped to identify and observe different dimensions of an aged society, built datasets that enable studies in different fields, and generated data comparable with similar panel studies in other countries (eg. U.S., Europe) that provide the basis for policy-making and academic studies.

**LASI** – The LASI data will provide a much-needed foundation for scientific research and policy-making related to ageing in India. As the study has been designed in harmony with several other studies it will more easily contribute to scientific insights and policy development on a global scale. The substantive analyses of ageing, health, retirement, finance, familial support and social networks will enable researchers to clearly understand population ageing in India; most specifically the economic, social and psychological factors associated with population ageing and of the impacts of population ageing on public finance and public health in India. It is hoped that LASI will ultimately become an important player in the worldwide effort aimed at understanding how different institutions, cultures and policies can influence – and prepare for – population ageing.

**MHAS** – The study concluded that there is evidence of large heterogeneity among older adults in Mexico, which is illustrated in a brief and precise way in the results presented. This study and its data bases have shown there is great

analytical potential for exploring multiple dimensions in the health of older adults (Wong et al. 2007).

The MHAS study was designed to achieve research goals that included:

- Examining the aging processes and its disease and disability burden in a large representative panel of older Mexicans;
- Evaluating the effects of individual behaviors, early life circumstances, migration and economic history, community characteristics, and family transfer systems on multiple health outcomes;
- Comparing the health dynamics of older Mexicans with comparably aged Mexican-born migrants in the U.S. and second generation Mexican-American using similar data from the U.S. population (for example the biennial Health and Retirement Study HRS) to assess the durability of the migrant health advantage;
- Assessing the health of all components of the population from which migrants are selectively recruited: Mexican-born migrants living in the US, migrants who return to Mexico after various length of time in the U.S., and Mexicans with no residential history in the U.S.; and,
- Considering the ways in which intergenerational transfer systems affect old-age health dynamics in a country where migration is commonplace and remittances may repay prior investments or ensure against uncertainty in old age.

This data also provided estimates of prevalence and incidence of dementia and cognitive impairment in the Mexican population for projection of future burden (Mejia-Arango and Miguel Gutierrez 2011).

**PSAE** – A basis positive feature of PSAE is its integration into Statistics Sweden Annual Survey of Living Conditions, which means that PSAE contains longitudinal data that in some cases goes back as far as 1979, even though the survey itself was launched in 2002 (Kumashiro 2008). Academic papers which used data from PSAE concluded that:

- Almost one-half of all pensioners cited health problems as a contributory reason for ceasing work.

Furthermore, others who who retired due to health problems or labour market factors, experienced a lower psycho-social wellbeing than others. Results therefore indicate that retirement is not a uniform process (Nordenmark and Stattin 2009)

- A gendered labour market that generates an unequal intra-household distribution of incomes has repercussions not only for gender equality among intact households, but also for the coping process of both widows and widowers (Halleröd 2012).
- The findings improve our understanding of the relationships between indicators of health and wellbeing and the various latent dimensions that simultaneously affect response patterns. More importantly, they also facilitate our understanding of older people's wellbeing and assist the interpretation of single, commonly used indicators such as subjective health (Halleröd 2009).

**SHARE** was created as a response to a Communication by the European Commission calling to “examine the possibility of establishing, in cooperation with Member States, a European Longitudinal Ageing Survey”. While its development process started only in 2002, SHARE has become one of the crucial pillars of the European Research Area. Additionally, it is the first ever European Research Infrastructure Consortium (ERIC), giving it a new legal status with many of the advantages of major international organisations, as well as a long-term perspective up to 2024. Eleven countries have contributed data to the 2004 SHARE baseline study. They are a balanced representation of the various regions in Europe, ranging from Scandinavia (Denmark and Sweden) through Central Europe (Austria, France, Germany, Switzerland, Belgium, and the Netherlands) to the Mediterranean (Spain, Italy and Greece). Further data were collected in 2005–06 in Israel. Two new EU member states – the Czech Republic and Poland – as well as Ireland joined SHARE in 2006 and participated in the second wave of data collection in 2006–07. The survey’s third wave, SHARELIFE, has collected detailed retrospective life histories in thirteen countries in 2008–09. The fourth wave (2010–11) – including a new social network module based on a name generator approach – also included Estonia, Hungary, Portugal and Slovenia. This adds up to 19 European countries that contribute to the survey and prepare collecting data for the fifth wave in 2012 (SHARE. Available at: [http://www.share-dev.mpsoc.mpg.de/fileadmin/SHARE\\_Brochure/share\\_broschuere\\_web.final.pdf](http://www.share-dev.mpsoc.mpg.de/fileadmin/SHARE_Brochure/share_broschuere_web.final.pdf)).

SHARE’s multidisciplinary approach continues to deliver the full picture of the ageing process across this cultural expanse of 19 countries in Europe. Covering the key areas of life, namely health, socio-economics and social networks, SHARE includes a great variety of information: health variables (e.g. self-reported health, health conditions, physical and cognitive functioning, health behaviour, use of health care facilities), bio-markers (e.g. grip strength, body-mass index, peak flow; and piloting dried blood spots, waist circumference, blood pressure), psychological variables (e.g. psychological health, well-being, life satisfaction), economic variables (current work activity, job characteristics, opportunities to work past retirement age, sources and composition of current income, wealth and consumption, housing, education), and social support variables (e.g. assistance within families, transfers of income and assets, social networks, volunteer activities) as well as social network information (e.g. contacts, proximity, satisfaction with network. What makes SHARE unique among all other studies and this has been integral in designing LASI is that all components are accessible in SHARE languages and have been carefully translated to ensure cultural sensitivities.

**TILDA** - TILDA is unique amongst longitudinal studies internationally in the breadth of physical, mental health and cognitive measures collected. The TILDA dataset has already created new employment opportunities for researchers throughout Ireland, generated employment for small and medium businesses in Ireland and attracted considerable additional resources from international funding bodies which further create research, development and employment opportunities in Ireland (Barrett, Savva, Timonen and Kenny 2011).

## International Collaboration

International collaboration among these studies were tied together by their funder and supporter – the National Institute on Aging and the RAND Corporation. However for those studies which have not fallen into this category, most notably PSAE, ALSA, GLAS, and HILDA, alignments were forged more closely with either regional studies within their own country or in their geographic area.

Collaboration among these datasets was extensive. For example ELSA has been part of an international consortium; the HRS family of longitudinal ageing studies which encompass HRS, SHARE, CHARLS, KLoSA, TILDA, and ELSI-Brasil. KLoSa has been designed to be compatible with HRS and SHARE. TILDA in all cases, has been measuring its study against three others: ELSA, SHARE and HRS. LASI has been designed to be conceptually comparable to HRS and is appropriately harmonized with other health and retirement studies, including CHARLS and KLoSA thereby allowing for cross-country comparison while at the same time taking into account the features unique to India, including its institutional and cultural characteristics.

Like the other studies housed in university settings, collaborations exist within those and other institutions. For example, TILDA conducts its research in collaboration with the Gear Institute at UCD, NUI Galway, the University of Mannheim in Germany, Cambridge University and the NBER in Massachusetts, USA. Other studies, such as the GLAS study, may not be as collaborative with other studies or institutions, but comprise cross comparative modules such as HRS and SHARE on health and retirement, explore attitudes, expectations and behaviours towards later life and retirement. Some datasets, like HILDA are integrated into the Cross National Equivalent File (CNEF) which contains population panel data from Australia, Canada, Germany, Great Britain, Korea, Switzerland and the United States. However, not all studies recognise the benefits of collaborating with other international studies. To illustrate, the recent scoping study for the Scottish Longitudinal Study on Ageing (Anderson, Boyle and Sharp 2008). Concluded that there would be minimal gain from aligning itself directly with ELSA or SHARE, but much more beneficial to take a hybrid approach and consider drawing on the elements which matched the goal of the Scottish study. One example cited was that SHARE encountered limitations with its smaller sample size and restricted questionnaire.

At the consultative seminars, there seemed to be an emerging consensus that there would be little to be gained from aligning a Scottish longitudinal study of ageing exclusively with either ELSA (given the high costs of developing a survey of this scale entirely from scratch and the likely loss of useful comparability if we were to do so) or SHARE (given the limitations posed by the much smaller sample size and restricted questionnaire instrument). A hybrid approach would allow an element of ‘piggybacking’ in terms of using existing instruments and approaches, which would be beneficial in resource terms, but will also allow different points of comparison for different measures and the development of new measures if and when necessary. It might be, for example, that for comparator data on benefits and pensions, the study would look to England (via ELSA), since these issues tend to differ internationally, but are largely common across the UK. For data on other issues, such as health or social networks, it might be felt that a wider set of comparator data would be appropriate and this might be sought via alignment with sets of questions from SHARE.

Several of the subject countries hosted a variety of other longitudinal studies with a different or limited focus. This was the case in Japan which in addition to JSTAR, developed (NUJLSOA) The Nihon University Japanese Longitudinal Study of Ageing and the National Institute for Longevity Sciences (NILS) Longitudinal Study of Aging. NUJLSOA is a longitudinal survey of a nationally representative sample of the population aged 65 and over in Japan; a study designed primarily to investigate the health status of the Japanese elderly and changes in health status over time. An additional aim has been to investigate the impact of long-term care insurance system on the use of services by the Japanese elderly and to investigate the relationship between co-residence and the use of long term care. While the focus of the survey has been health and health service utilization, other topics relevant to the ageing experience are included such as intergenerational exchange, living arrangements, caregiving, and labour force participation (NUJLSOA 2004). NILS-LSA was launched in 1997 targeting females and males aged 40 to 79 years of age with the purpose to investigate the causes of geriatric diseases and health problems in the elderly such as depression, mental disturbance, restriction of ADL, low nutrition and physical activity. The data will also be useful to prevent these diseases and health problems in the elderly (Nihon University Japanese Longitudinal Study on Ageing. Available <http://www.ncgg.go.jp/department/ed/monograph2nd/obj.htm>). Studies like these can be seen as complementary to the other datasets being undertaken.

Not only has it been recognised as beneficial to collaborate with other datasets, study leaders have recognised substantial benefits from assisting in the actual design for other studies at the early stages. To illustrate, HRS leaders and researchers have provided extensive consultation through the many phases of study planning, design and implementation. Faculty and staff from the University of Michigan have provided crucial start up assistance and training for many of these studies. Dynamism in the new studies has benefited HRS in a number of ways, including the development of new instruments and ways of thinking.

## Gaps & Challenges

Those gaps and challenges within each study which pertain to the content or methodology have been refined in subsequent waves, but overall there are four general issues which have been identified.

The first is that the challenge to ensure that each study is inclusive continues to be consistent funding on a national basis in addition to the support provided by the NIA. To illustrate, the irregular availability of funding for ALSA has influenced the duration of intervals between data collection occasions and also had an impact on the scope and nature of components included at any given Wave.

The second is the need to factor in an ethnic component. In the ELSA study, although this was identified as important, establishing representative oversamples of ethnic minority groups was deemed to be prohibitively expensive. In the HILDA study, some users also remarked on the desire to know more about recent migrants, which required additional samples targeted at recent arrivals (Melbourne Institute of Applied Economic and Social Research HILDA Annual Report 2011, p 31). In

the HRS study it has proven difficult to separate the small number of American Indians, Alaska Natives and other Native American respondents with those of Asian background (HRS Data on Health and Well-being of American Indians, Alaska Natives, and Other Native Americans, Data Catalogue 2006).

The third is that the level of detail on any given study may not be sufficient to engage in all desired research explorations. One illustration provided by ELSA was that the level of detail on any particular health outcome or psychosocial process was not as great as in focussed or hypothesis-driven investigations. In the HILDA study, the overwhelming request was for some types of data, such as wealth, to be collected more frequently. One study leader's personal view is that the biggest gap is biomarkers/physical health measures (which of course are costly and burdensome to collect), and linkages with administrative data sets (which of course are plagued by problems of privacy/access).

The fourth challenge is for national studies to be more widely compatible with a host of other studies. To enable global comparisons to be made, the studies need to be set up with this in mind. Both THSLs and ELSI have factored this requirement into their development and the recent LASI study has also incorporated the cultural aspects required to do so. However, the gains for any collaborations also need to be clarified prior to the establishment of the study.

Furthermore challenges faced in the implementation of each study encompass the recruitment and retention of respondents; expansion of cohorts to include a wider age range which may be beneficial but more costly; and the cultural sensitivities and regional disparities for each country.

Overall, however, it appears that within the subject studies the benefits realised have far outnumbered the gaps and challenges needing to be resolved.

## Next Steps

A number of the studies which have been addressed have now been concluded, while for others variables are being considered to broaden the scope of their explorations and the remainder are continuing on the same path following up in the same vein they have begun.

**ALSA** - The continuation of the study, through the following of remaining participants, now on average 85 years or more, will increase the data's potential as a source of knowledge for policy-makers and position South Australia as the holder of the most extensive record of ageing at the latest stage of life (Anderson et al. 2008).

**CHARLS** – Since the last wave undertaken in 2011, CHARLS data has been made available for academic purposes and training conducted on the most effective application of this data to research studies.

**CLSA** – To date, over 18,000 participants have been recruited to participate in the study. This groundbreaking study will continue to collect information from a total of 50,000 people on changing biological, medical, psychological, social, lifestyle and economics aspects. The team of 160 investigators across the country hopes to fill the gaps in ageing data and apply this data to creation of a better health care delivery service and influence the design of government policies. Within the next 20 years of the life of the study it is projected

that the elderly will account for approximately 25 % of the Canadian population (Teotonio 2011).

**ELSA** - Supplementary modules have been included at various points during the history of ELSA to address additional topics. Linkage to administrative records has been an important component of data collection strategy since the inception of the ELSA study. Respondents have been asked for permission to link to official records of National Insurance contributions, welfare and benefit receipt (Department for Working and Pensions), details of any tax credits they may be claiming (Inland Revenue), Hospital Episode Statistics (in progress) and NHS Central Register (mortality) and cancer registration data. Most critically, ELSA has been chosen as the most effective model to be followed by the Brazilian Longitudinal Study of Ageing (ELSI-Brasil) and ELSA leaders are therefore consulting with the Brazilian research team.

**GLAS** – There are currently no plans to extend data collection within the GLAS survey, but the richness of this global data continues to serve researchers with indepth insights to underpin studies on retirement. This is particularly relevant as retirement issues are at the forefront of government and social agendas.

**HILDA** - The HILDA survey team aims to continue collection of annual waves. Wave 11 data is currently being prepared for release in December 2012 and the collection of Wave 12 data will begin in August 2012 with anticipated release in December 2013. The main issues in moving forward are whether the Australian Government will continue to support the subsequent waves; and (ii) whether serious consideration should be given to altering the content in any significant way – from the current 4 year cycle that covers: (i) health (ii) wealth; (iii) retirement + fertility/partnership; and iv) education, skills and ability.

**HRS** – HRS has become the model and hub for a growing network of harmonized longitudinal aging studies around the world—including England, Ireland, 20 European Union countries, Israel, Mexico, China, Japan, South Korea, and India. The global network has greatly enhanced the value of each of its members, including the HRS itself, through opportunities for comparative research and sharing of ideas and methods. The availability of comparable cross-national data has presented opportunities for new research, such as comparing the impact of different national policies on the health and work patterns of older populations (Growing Older in America Health and Retirement Study HRS 2012).

**ILSA** – Further investigations are being undertaken resourcing the data from the completed ILSA study to encompass all health issues impacting the ageing society both in Italy and beyond.

**JSTAR** –The JSTAR survey conducted for the purpose of contributing to academic research and policymaking has opened access to utilisation of its data from the 2009 survey. This includes diverse information on the economic, social, and health conditions of elderly people

**KLOSA** – The basic data collected by KLoSA to address the trends that emerge in the process of population ageing is now available for research purposes. The data will help identify and observe different dimensions of an aged society, build datasets that enable studies in different fields, and generate data comparable with similar panel studies in other countries (eg. U.S., Europe) that can provide the

basis for policy-making and academic studies (KLoSA. Available <http://www.kli.re.kr/klosa/en/about/introduce/jsp>).

**LASI** – LASI will ultimately be part of a worldwide effort aimed at understanding how different institutions, cultures and policies can influence and prepare for population ageing. Following the pilot survey, the team is conducting substantive analyses of ageing, health, retirement, finance and familial support and social networks. The full scale LASI will be part of the mega data system of ageing surveys, which are under development by the RAND Corporation and integrates HRS, ELSA, SHARE, KLoSA ad CHARLS (LASI 2011).

**MHAS** - Current plans are to conduct another two follow-up surveys in 2012 and 2014. The new study will be a collaborative effort among researchers from the University of Texas Medical Branch (UTMB), the University of Wisconsin, the University of Pennsylvania, the Instituto Nacional de Estadística y Geografía (INEGI, Mexico), the Instituto Nacional de Geriatria (INGer, Mexico) and the Instituto Nacional de Salud Pública (INSP, Mexico) (MHAS 2013).

**PSAE** - This study which has examined the relationship between retirement preferences, expressed as preferred retirement age, and actual retirement age in Sweden continues to provide empirical support for those researchers, debaters and policymakers who have addressed the importance of changing preferences towards later retirement in order to prolong working life. The data which covers a broad spectrum of welfare indicators such as health, daily activities, social interactions, labour market and working conditions, and attitudes towards and experiences of retirement has proven to be beneficial in meeting the purpose of the study (Örestig 2013).

**SHARE** – SHARE continues its collection in 20 countries and continues to profile research results which impact ageing societies in these countries on a diverse range of topics including demographic change, intergenerational relationships, impact of Alzheimer’s disease, socio-economic considerations, to name a few (Press Review SHARE 2012). While extending the scope of its own data, the SHARE team is actively serving as a model to other studies and ensuring that they are designed to maximise the opportunity for collaboration and comparative surveys in the future.

**TILDA** – TILDA will return to the field and by 2013 will be able to provide the first direct analysis of the trajectories of ageing within the Irish population, and therefore, an analysis of the determinants as opposed to the correlates of successful ageing. As subsequent waves of data collection are undertaken, a complete picture of the factors that shape the ageing process in Ireland will emerge.

**ELSI-Brasil & THSLS** – ELSI and THSLS are currently under development and are being designed in collaboration with the above successful longitudinal ageing studies underpinned by the RAND Corporation and National Institute on Aging. (NIA/NIH).

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