European Network of Economic Policy Research Institutes

INCIDENCE OF POOR HEALTH AND LONG-TERM CARE

HEALTH TRANSITIONS IN EUROPE – RESULTS FROM THE EUROPEAN COMMUNITY HOUSEHOLD PANEL SURVEY AND INSTITUTIONAL DATA

ANDREW BEBBINGTON AND JUDITH SHAPIRO

ENEPRI RESEARCH REPORT NO. 34

AHEAD WP3

DECEMBER 2006

ENEPRI Research Reports publish the original research results of projects undertaken in the context of an ENEPRI project. This paper was prepared as part of the **AHEAD project – *Ageing, Health Status and the Determinants of Health Expenditure*** – which has received financing from the European Commission under the 6th Research Framework Programme (contract no. SP21-CT-2003-502641). The views expressed are attributable only to the authors and not to any institution with which they are associated. The authors assume all responsibility for any errors or omissions.

ISBN 92-9079-649-9

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Abstract

This is the final report of Work Package 3 of the AHEAD project, undertaken by the Personal Social Services Research Unit (PSSRU) at the University of Kent. This Work Package has aimed at providing estimations, based on the European Community Household Panel (ECHP), of annual probabilities of transition between health states, including two states regarded as absorbing: permanent institutionalisation and mortality. The purpose of this work is to serve as a building block for estimating healthy life expectancy and forecasting the future health expenditure needs of populations. This report breaks new ground in providing comparative information on rates of long-stay entry into permanent health-care institutions for persons aged over 65.

Two definitions of health state are used for this purpose: self-assessed health and a chronic, hampering health condition. After an initial assessment of the ECHP, undocumented problems regarding the reporting of mortality and institutionalisation resulted in a change of strategy. This change involved post-stratification to adjust for mortality and obtaining information about rates of institutionalisation from alternative sources on a country-by-country basis for those countries for which information was available. Yet this approach was not practicable for all of the countries participating in the ECHP.

Full results are provided for Belgium, the UK, Ireland and Italy; partial results are provided for Germany, Denmark, the Netherlands, Greece, Portugal and Finland. These results consist of the estimated annual probabilities of transition between health states (including mortality) for adults living in private households, and for persons over 65 the estimated annual probabilities of first-time admission from the community as a long-stay resident of a health-care institution. The results are presented in the form of probit equations, which enable estimates to be prepared by age and gender.

Contents

Summary i

1. Introduction 1

2. Incidence and prevalence of ill-health and disability 2

3. Using the ECHP for health transition rates 3

3.1 The ECHP 3

3.2 Choice of health measures 4

3.2.1 Self-assessed health 4

3.2.2 A hampering health condition 6

3.3 Missing information on mortality and institutionalisation 7

3.4 Sample attrition 9

3.5 Trends in health 11

4. Weighting and post-stratification for mortality 12

4.1 Eurostat weights 12

4.2 Need for additional weighting 12

4.3 Choice of method: Limited post-stratification 14

4.4 Explanation of the general procedure 15

5. Institutionalisation 16

5.1 The problem with surveys 16

5.2 Alternative sources of information 17

5.3 The survey of information on entry to institutions 19

5.4 A basis for assumptions about institutional turnover 20

5.5 Prior health of those admitted to institutions 22

5.6 Institutionalisation and mortality 23

6. Constructing transition estimates 24

6.1 Decisions about estimation for individual countries 25

6.2 Smoothing by age for transition estimates 26

6.3 Estimation details 27

7. Results and conclusions 28
7.1 Format of results 28
7.2 Concluding remarks on the ECHP 29
7.3 Concluding remarks on the survey of institutionalisation 30
Bibliography 33
Appendices 39
Appendix A1. Germany 40
Appendix A3. The Netherlands 53
Appendix A4. Belgium 58
Appendix A5. Luxembourg 64
Appendix A6. France 65
Appendix A7. The United Kingdom 69
Appendix A8. Ireland 76
Appendix A9. Italy 82
Appendix A10. Greece 89
Appendix A11. Spain 94
Appendix A12. Portugal 98
Appendix A13. Austria 103
Appendix A14.Finland 106
Appendix A15. Sweden 111

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Two definitions of health state are used for this purpose: self-assessed health and a chronic, hampering health condition. After an initial assessment of the ECHP, undocumented problems regarding the reporting of mortality and institutionalisation resulted in a change of strategy. This change involved post-stratification to adjust for mortality and obtaining information about rates of institutionalisation from alternative sources on a country-by-country basis for those countries for which information was available. Yet this approach was not practicable for all of the countries participating in the ECHP.

Full results are provided for Belgium, the UK, Ireland and Italy; partial results are provided for Germany, Denmark, the Netherlands, Greece, Portugal and Finland. These results consist of the estimated annual probabilities of transition between health states (including mortality) for adults living in private households, and for persons over 65 the estimated annual probabilities of first-time admission from the community as a long-stay resident of a health-care institution. The results are presented in the form of probit equations, which enable estimates to be prepared by age and gender.

The report discusses in some detail the practical problems associated with such estimates, particularly: i) sample attrition from the ECHP, especially as it relates to health status; ii) post-stratification with adjustment for institutionalisation as a method of correcting for the under-reporting of mortality in a community sample; and iii) the availability of data on institutionalisation across Europe, the different types of data sources and problems of comparability.

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Andrew Bebbington and Judith Shapiro*

1. Introduction

The purpose of this Work Package is to serve as an analysis of the transitions between poor and good states of health and of the socio-economic factors associated with migration from households to institutional care.

The Work Package sought to look at the potential of the European Community Household Panel (ECHP) for this analysis. The ECHP was a multipurpose annual longitudinal survey coordinated by Eurostat and undertaken (at least in part) by 14 countries of the European Union, across the years 1994-2001 (Peracchi, 2002). The survey involved a standardised questionnaire given annually to a representative panel of households based on a core sample of individuals aged 16 and older. It has been and continues to be used for a considerable number of studies of health profiles and health outcomes, which were reviewed by our interim report (Bebbington & Shapiro, 2004).

The major output of this Work Package was originally designed to be the estimation, based on the ECHP full dataset, of annual probabilities of *transition* between health states, including two states regarded as absorbing: permanent institutionalisation and mortality. This estimation was to be for all participating countries except Sweden and Luxembourg. The probabilities were to be estimated as a smooth function of age and gender, for each country, and would thus be the cornerstone of a method of forecasting the future health expenditure needs of populations, ideally on a comparable basis. A by-product of this analysis would be the estimation of health expectancy by the method of the *multistate life table*.[1] It is not the purpose of the present Work Package, however, to estimate either of these aspects but to develop the health transitions that would be required. The focus of this report is on the practicality of obtaining plausible estimates of health transition rates from existing imperfect data (including estimates of their precision) and to provide details of the steps and assumptions that are necessary for dealing with the lacunae.

Following the initial assessment of the ECHP, undocumented problems regarding the reporting of mortality and institutionalisation resulted in a change to the strategy, which was agreed with

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*Andrew Bebbington and Judith Shapiro were with the Personal Social Services Research Unit, University of Kent at the time this report was prepared. Thanks are due to our AHEAD colleagues for their comments and feedback, and in particular to Namkee Ahn, Stefana Gabriele, Maria Hofmarcher, Esther Mot, Hannu Piekkola, Erika Schulz (for the provision of the important AGIR database), Windy Vandevyere and Jérôme Wittwer who collected and supplied valuable additional data and to Maria Hofmarcher, Monkia Riedel and Martin Weale for informative discussions.

This is the final report of Work Package 3 of the Aging, Health Status and Determinants of Health Expenditure (AHEAD) Project under the EC 6th Research Framework Programme.

[1] Ledent (1980) and Rogers et al. (1990) develop this approach in an accessible way.

the sponsors. This change involved obtaining information about institutionalisation from alternative sources, requiring the cooperation and time of our partners (see cover acknowledgements). Nevertheless, the Work Package has continued to pursue the approach of establishing transition rates in principle, even with limited and problematic information regarding institutionalisation. The consequences of these lacunae on subsequent analysis are discussed in section 6. Therefore, it may be useful to remind ourselves why in principle at least it is important to pursue this approach, which is always characterised in the literature as more demanding than forecasting on the basis of prevalence data (see, for example, Robine et al., 2000).

2. Incidence and prevalence of ill-health and disability

The usual approach to estimating the future demand for long-term care has been to apply to future population projections estimates of current age-specific utilisation rates for treatments and services and their costs, or even current age-specific rates of health states combined with predictions about future services. This approach has been used by even sophisticated models such as the Health Care Financing Administration (HCFA) health model (Burner et al., 1992), and the Personal Social Services Research Unit (PSSRU) long-term care model and its European extension (Wittenberg et al., 1998 and 2003), as well as by related forecasts such as those by the ENEPRI AGIR project (Schultz, 2004). Yet, as all these modellers recognise, health needs will not necessarily increase pro rata with trends in the numbers of persons in different age groups, particularly the oldest. In the absence of evidence, these approaches have sometimes adopted hypothetical scenarios based on assumptions of a slow decline in the age-specific prevalence of chronic ill-health.

There is a close parallel here with the popular method of healthy expectancy estimation using "Sullivan's method" (Jagger, 1997), whereby the prevalence of certain health states is combined with life-table information to generate estimates of healthy life. The ECHP has already been used in this way. Nam (2004) undertook this kind of estimation for the AGIR project, based on the 1994 ECHP. The REVES[2] group had produced such calculations earlier (Robine et al., 1998) and has supervised a set of disability-free life expectancy (DFLE) indicators for 1996 in its (2002a) *Key Health Statistics*. Eurostat has just produced a new Commission social indicator, with healthy life expectancy concretised as DFLE. It is based, up to 2001, on the ECHP, calculated by Sullivan's method.[3] Of course, by using prevalence rates from the annual waves, the essential longitudinal design of the ECHP is being ignored in these approaches – the results could just as easily have used a succession of national cross-sectional surveys.

Although most empirical research has used Sullivan's method, it is better in principle to base future estimates on health care needs on the current incidence of ill-health, rather than on current prevalence. Prevalence of chronic health conditions is affected by past history. For example, past wars may continue to affect current disablement rates, as may the past state of health care, as conditions such as polio and thalidomide illustrate. If public health is changing, present prevalence may be a poor guide to the future. This is one reason why it is inadvisable to simply project current average age-specific expenditure rates to predict future long-term care needs. Incidence is a better guide to the current state of health needs, and hence to predictions of future health. Better still would be an understanding of likely trends in incidence.

[2] REVES stands for Réseau Espérance de Vie en Santé, an international network.

[3] See the Eurostat website (http://europa.eu.int/comm/eurostat/newcronos/reference/sdds/en/health/hlye_base.htm).

Precisely the same argument applies to forecasting healthy life expectancy. As the authoritative manual produced for the European Commission recently by the Euro-REVES team of Robine et al. (2000) concluded:

> Health expectancy estimates based on increment-decrement life tables are an important supplement to Sullivan-based estimates: despite their heavy data requirements and more complex modelling, the increment-decrement life tables are a very powerful tool in understanding current mortality and morbidity patterns and their implications (and changes therein) for population health.

They accept that Sullivan calculations will be performed because they are straightforward, but also urge that those who want to make the investment in the dynamic approach should be strongly encouraged. As they further note in their comparison,

> Broadly, the choice is between a method that gives accuracy but is based on a complex methodology and requires data that are rarely available – multiple-decrement or increment-decrement life tables – and a method that contains more assumptions but is based on a straightforward, robust methodology and requires data that are widely available.

The key assumption to which this quote probably refers is that of stationarity in health and vital rates. Barendregt (1994) showed that if this applies (and effectively only if) the two methods will produce identical estimates of healthy life expectancy. Yet this assumption is at odds with the steady decline in mortality over a long period in most Western European countries and a presumption that chronic morbidity rates may well also be changing.

In passing, it is noted that the richer material from the transition approach can provide extra insights relevant to other aspects of health forecasting. In terms of acceptability, the fact that transitions explicitly include return to better states is important. This enables a distinction to be made between a recurrent health condition that allows for recovery and one of a steady decline to mortality. Estimates of transition rates can be used for the prediction of life-time risk to individuals with particular states of ill-health. Prevalence-based measures cannot do this.

This Work Package, then, is about change, about duration and about the dynamics of health. For example, we have a 53 year-old woman living in Helsinki, who reports that she is mildly hampered in daily activities owing to a long-standing health condition (perhaps arthritis). A 62 year-old man in Paris reports the same. What is the probability that each of these will be in the same health state next year, be free of this disability, be in worse health, have departed their home for a permanent health-care institution or have passed away? As Crimmins (1992) observed, in the forecast of future population health and care needs, the dynamics of health is paramount.

3. Using the ECHP for health transition rates

3.1 The ECHP

The project protocol proposed use of the ECHP, the major innovative attempt at a harmonised household (longitudinal) panel across the member states of the EU. The ECHP's first wave, carried out in 1994, surveyed some 60,000 private households and 130,000 individuals aged 16 and older in 12 countries (Nicoletti & Peracchi, 2004). On joining the EU, Austria entered in the second wave and Finland in the third. At the time of its EU accession, Sweden made the decision to provide comparable cross-sectional data instead (Peracchi, 2002), which it did from the start of the fourth wave. Thus it may more accurately be said that it has not been a part of the ECHP, particularly for the purposes of studying health dynamics, which is central to this Work Package. The Luxembourg implementation lacked many key variables including those relating to health, so this country's sample is frequently not utilised, as is the case here.

The survey, designed and coordinated by the Statistical Office of the European Communities (Eurostat), finally ended with its eighth wave in 2001. Its successor, EU Statistics on Income and Living Conditions (SILC), which is being phased in across the 25 member states, is designed to provide more timely but less fully longitudinal data with a more concentrated focus (EPUnet, 2004). Therefore the ECHP represents an unrepeatable opportunity for the particular policy-oriented analysis to which this project is committed.

As a pioneering study on a continent-wide scale, there was bound to be adaptation as the ECHP proceeded, and this is well-minuted in expert group meetings and other Eurostat documents. In addition to questions of coordination, given the substantial autonomy of the National Data Units (NDUs) in each country, the pressure of budget constraints is evident, most clearly in the abandonment of early, fully-integrated, British and German panels, parallel with already-existing national equivalents (Peracchi, 2002). Yet other, less obvious organisational issues have impacted the data in a manner that compels our attention here in a more dramatic and less well-known way. This aspect is discussed in further detail below and in the separate country reports (see the Appendices).

3.2 Choice of health measures

From the range of health status variables available in the ECHP we originally selected four for investigation and have further confined our focus to two. These are self-assessed health (indicator PiH001) and the existence of a chronic health or disability problem (PiH002) combined with the degree of hampering caused (PiH003). With a third variable, the existence of a long-standing illness, they have been selected as the "Minimum European Health Module", which has been incorporated into EU-SILC (Robine et al., 2004).

For both of the domains distinguished, an additional health state is added as the least favourable value: that of mortality, the only absorbing state. In the empirical strategy originally conceived, it was also projected that permanent institutionalisation would be incorporated as a health state. This has been precluded as a consequence of the impact of inconsistent and exceptionally weak adherence to the ECHP's guidelines for recording causes of loss to the panel. Eurostat's own judgment is that normal analytic use of the sparse data on permanent transfer to long-term residential care is not possible on a rigorous basis. The scope of this problem is further elucidated in section 3.3.

3.2.1 Self-assessed health

In the ECHP User Data Base (UDB) self-assessed health (SAH) is asked as "How is your health in general?" (PiH001), to which the English language response is listed as "Very good, good, fair, bad, very bad". We abstract in this section from variation on this in practice within the ECHP, noting only that it appears to have been substantial. This is undoubtedly the result of the pattern observed, inter alia, by Robine et al. (2004), in which experienced organisations are very reluctant to alter the instruments with which they are familiar solely in order to achieve harmonisation.

SAH, one of the common terms for this variable, has received wide and accelerating acceptance in the past decade. This has largely been attributed to the authority deriving from the robustness of its predictive capacity for mortality, famously summarised in the influential meta-analysis of Idler & Benyamini (1997). This overview presented the findings of 27 community studies; since that date at least 40 more have appeared in leading health and social science journals. For the German SOEP, Schwarze et al. (2000) replicate this result. For the entire body of evidence, this predictive power of SAH for mortality is found to hold, despite controlling for the variety of

demographic and socio-economic variables with which it often co-varies. It has also been found to predict health-care utilisation in a more limited range of studies.

The ECuity research network[4] propose a somewhat different basis of support for this measure, arguing that it is not only an excellent ordinal measure of overall health, capturing an underlying latent variable that summarises health status, but that it is also conceivable to use it in the form of a cardinal scale, given appropriate statistical assumptions and the right data opportunities to exploit. Van Doorslaer et al. (2004) implement this approach for the wave 7 (2000) of the ECHP, and do not consider it necessary to examine the question of systematic national reporting differences. Contoyannis et al. (2003) have examined the dynamics of health, measured as SAH in the British Household Panel Survey (BHPS) and in Jones et al. (2004 and 2005) have applied this in a limited way to the ECHP.

A formidable group of sceptics remain unconvinced, however, that SAH possesses a sufficient degree of international comparability without the introduction of exogenous information. The strongest expression of this has been from key researchers within the World Health Organisation's Burden of Disease programme, whose dissatisfaction initially took shape while attempting to use a variety of national health surveys to produce internationally comparable aggregate health indicators. Sadana et al. (2000) detail the emerging concerns, which may have been provoked initially by the exceptional anomalies that cannot be avoided when confronting a data array in which French health is reportedly just below that of Paraguay. The newly available ECHP health data actually played a catalytic role in the crystallisation of doubt. Before that point, it seemed more plausible that comparability problems arose from the methodological diversity of the surveys. The ECHP SAH results did not, however, appear simply to reflect objective realities and did not correspond with mortality probabilities.[5] For the AGIR project, Ahn et al. (2003) have also observed that there are puzzling results, such as the unusually favourable health reports in Ireland, which do not appear to have a parallel in more objective evidence. Jytla et al. (1998) concluded, after a careful study in a Finnish city (Tampere) and an Italian one (Florence) of SAH over a seven-year follow-up, that cross-national comparisons should be made with great caution.

While the ECuity econometricians remain satisfied with their modelling of SAH as a latent variable, in which shifts in cut-points (or an 'index' shift of the entire range) can then be detected, the WHO has opted for a different approach, in which 'anchoring vignettes' establish exogenously whether respondents share the same assessment criteria, by reference to their assessments of the health of hypothetical individuals whose salient health features are described. Obtaining sufficient evidence to inform comparisons has evidently turned out to be more difficult than envisaged, as disappointingly the full results from the WHO methodology have yet to be published. Interim results are intriguing – suggesting for example that it is indeed the case that where the Irish place their cut-points differ systematically, inducing an apparently more favourable distribution of reported health than had the Irish used the Belgian standards for instance (Saloman et al., 2003).

The value of exogenous anchoring, which may also lie in reference to other studies and data (van Rijckevorsel et al., 2001), has become more significant within the EU when all the present 25 members are considered. As Andreev et al. (2003) and Carlson (2002 and 2004) have shown, there is a sizeable East-West European gap in SAH. (And incidentally, even greater differences with Russia.) At present, however, there is no research examining whether this reflects or

[4] See the ECuity Project website (http://www2.eur.nl/bmg/ecuity/).

[5] National frequencies of reporting good health are shown in the earlier report by Bebbington & Shapiro (2004, Table 5.1).

indeed whether it exaggerates the East-West gap in objective measures of health, such as those concerning partial life expectancy from ages 15 to 60.

What exactly drives responses to the self-assessed heath question is an issue to those behavioural scientists who have been its most strenuous promoters (Idler, 2003). Deeg & Bath (2003) note that "little evidence exists for the reasons why SRH (Self-reported health) is such a good predictor of mortality". Utilising a measure of health for long-term prediction requires more understanding of its mechanisms. SAH is not to be exempt from a tendency to "state dependent reporting bias" (Bound, 1990), in which, for example, retirees or recipients of disability benefits, justify (to themselves or to others) the reasons for their inactivity. Bound also found, however, that that where it was possible to compare subjective and – unknown to the respondent – 'hard' measures, the relationship between the two was in the main strong. Yet this is one reason why the sum total of all the causes for caution in interpretation has not diminished the appeal of SAH. Of the 18 studies we identified (Bebbington & Shapiro, 2004), which utilise the ECHP for health status analyses of some type, all but two use self-assessed health as either an independent or dependent variable.

SAH is often converted into a dichotomy and at other times it is reported as a full scale. The ECuity project argues that a dichotomy may distort reporting of inequalities in health status by income level among countries (van Doorslaer et al., 2004). The approach here had generally been to consider the full range of values. After evaluation, however, we made the decision to combine "bad" and "very bad" health states. Although this may subtract some potential information, it avoids a serious problem arising from the small numbers found in the worst category in even the highest age groups.

3.2.2 A hampering health condition

This indicator derives from two questions, separated after wave one:

- "Do you have any chronic physical or mental health problem, illness or disability?" (PiH002).
- "Are you hampered in your daily activities by this physical or mental health problem, illness or disability?" (PiH003).

The possible resulting states are "no such condition"; "a chronic condition, but not hampered"; "some hampered to some extent"; and "hampered severely". Mortality is, as indicated, an additional state. Following the preliminary report (Bebbington & Shapiro, 2004) a decision was taken to simplify this variable by the combination of those who had no chronic illness/disability, and those who do have one but it has no hampering consequences. The analytic models tested in the earlier report had found these two categories difficult to distinguish for predictive purposes.

The usual expectation is that this indicator is less prone to subjectivity than SAH and more immediately connected with disability, dependency and a need for long-term care. The European Commission considers this to be an indicator for disability (van den Berg, 2001; Eurostat, 2003). Bajekal (2004) recently surveyed a variety of questions on disability for the UK Department of Work and Pensions, and noted that a similar census question, which first made its appearance in 1991, had been validated as a disability measure. The leadership of the REVES group, which had been campaigning since it was founded for internationally comparable measures of disability, also initially believed (Robine et al., 1998) that this was a straightforward measure to minimise national distortion.

In retrospect, the use by REVES colleagues of the ECHP data (Robine et al., 1998) and the reciprocal use of Robine's calculations on healthy life expectancy by official EU sources (Eurostat, 2002) may be one of the more important outcomes of the ECHP. The close working

relationship that has resulted may be viewed in a number of Commission documents, and has led to major input by the REVES group into new Commission health surveys. The Commission's (2003) report on *The Health of Adults in the European Union*, based on a special Eurobarometer survey commissioned by the Directorate-General for Health and Consumer Protection (SANCO) in 2002, is an indicator of the marked improvement in comparability of international data that could result from continued collaboration.

Of the 18 analytic health studies we have identified based on the ECHP (Bebbington & Shapiro, 2004), eight make some use of this variable, but for only two is it selected as the principal health outcome of interest.

More work is needed to validate this measure against more objective measures of disability across countries. The SOEP and BHPS surveys, which feed into the ECHP, also contain a richer selection of data. The BHPS, for example, has a detailed inquiry into functional limitations for aged 65+. These and other national health surveys are too rarely exploited to learn more about the nature of global and general self-assessments of limitations (Van Rijckevorsel et al., 2001).

In the absence of such data, this indicator represents one of the few internationally comparative metrics on activity limitations produced to date[6] (Robine et al., 2001). Despite the caveats, therefore, growing EU interest in disability at all ages indicates one source of this developing interest. The latter publication, however, overseen by Robine & Jagger (2003) for Euro-REVES, finds some consistent national discrepancies between reports of global activity limitations on the one hand, and replies to a battery of concrete questions on functional limitations in mobility, vision and hearing. In the ECHP, Irish respondents are a little above average in reporting no hampering health condition, while detailed disabilities are higher than the EU average.

3.3 Missing information on mortality and institutionalisation

The principal divergence from the original plan for this Work Package has been the consequence of the varying effort that was revealed to be available in the ECHP to be expended on tracing individuals who left the panel, as against the rules that were established for the panel (Eurostat, 2002b). There is a large shortfall in recorded mortality and permanent institutionalisation for health reasons across most member countries compared with what might be expected from a longitudinal enquiry of a representative household population. This is at its most extreme for the Netherlands, which recorded no mortalities. It is presumed that many individuals who died or moved to a health-care institution will instead have been recorded among the 'lost'. Table 1 shows the distribution for each country for persons over 65. This is not a major problem for studies on other topics, but here it is critical.[7] Eurostat itself informed us that, as a consequence of the subsequent national evolution of coding for individuals, it is *not*

[6] The major difficulty with its use remains the one identified very quickly by REVES (Robine et al., 1998): differential and imprecisely-known institutionalisation rates for the elderly across member states, in combination with even more inadequate information about varying disability status in institutions. The REVES estimates of healthy life expectancies made for Eurostat are based on the knowingly implausible assumption that institutional rates will be identical to those found in the ECHP in private households, which produces a lower bound for disability (Eurostat, 2002).

[7] Schupp & Wagner (2002, p. 9), who have responsibility for the very long-running German panel that now forms the basis for the German ECHP sub-sample (the SOEP), note that individuals are more likely to decline to be interviewed just before mortality (or emigration), and consider that later status checks are the way to resolve these problems. This has major implications for all attempts to study transitions to mortality in longitudinal studies, of course, if establishing point estimates is the goal. The goal of most longitudinal studies has been seen to be in the estimating of behavioural relationships, where this may well not be a problem. The ECHP was, however, designed for a mixed purpose.

possible to draw comparative conclusions on mortality or institutionalisation from any of these records. The assumption that it was possible lay at the heart of the original research design for this Work Package.

This is part of a general problem of attrition in relation to the analysis of health, which is discussed in subsection 3.3, but we note here the conclusion we subsequently draw that the under-reporting of mortality seems to be a key element in understanding biases seemingly introduced by attrition. While we postpone measurement of the shortfall in mortality until section 4, it may be noted in passing that for most of the countries in Table 1, the true figure should probably be around 3.5% or a little over.

An even greater problem exists in the failure to record the transfer to institutions. The UK sample, for example, like that of the Netherlands, records no transfers at all. Oddly, this is inconsistent with the underlying BHPS sample. Scott et al. (2001) report an annual average for those over 65 of 1% transition. Klein (1996) found a 0.6% migration rate, in 55 cases, for those over 65 in the national database of the German SOEP for the first eight waves and considered that low. The 'cloned' version of the SOEP reported for the ECHP that there were (weighted) four such transfers. We have been unable to establish the reason for this divergence. In general across all the countries, elderly institutional transfers in the ECHP appear subject to an even greater under-recording than mortality.

Table 1. Transitions to institution, mortalities and other losses between successive waves of the ECHP survey, persons over 65, all waves combined (%)

	Survivors in survey	Permanent transition to institution	Mortality	Other losses	Total
Germany (SOEP)	95.7	0.0	3.4	0.4	100.0
Denmark	94.3	0.5	4.2	0.8	100.0
The Netherlands	98.7	none	none	1.3	100.0
Belgium	95.9	0.0	2.0	2.0	100.0
France	90.6	0.1	1.3	7.8	100.0
The UK (BHPS)	96.5	0.0	1.4	1.9	100.0
Ireland	93.6	0.4	3.1	2.7	100.0
Italy	95.9	0.2	3.7	0.0	100.0
Greece	89.9	0.0	2.8	7.1	100.0
Spain	89.5	0.1	2.6	7.6	100.0
Portugal	93.4	0.1	3.1	3.2	100.0
Austria	89.0	0.1	2.6	8.2	100.0
Finland	85.8	0.1	0.9	12.8	100.0
Overall	93.0	0.1	2.5	4.2	100.0

Sources: The ECHP (1994-2001) and authors' calculations based on variable PRESIDi, interview status of individuals at each wave; unweighted data, Luxembourg, Sweden and the German and UK matching surveys (waves 1-3) have been omitted.

Based on external data from several countries for the 1990s, we know that the institutionalisation rate for those 65 and over, in countries with medium-level prevalence (such as the UK, Ireland, Belgium and France) should be of the order of at least 1% a year. In only two cases – Ireland and Denmark – do numbers reported in the ECHP approach even half of this rate.

As is discussed further in section 4, the issue of the scale of the institutional sector also affects the estimation of transitions between health states and mortality within the ECHP itself, since in many countries a significant proportion of mortalities, particularly of persons in the oldest age groups, occur among those resident in institutions that are excluded from the ECHP.

3.4 Sample attrition

Differential attrition by health status appeared self-evident in the ECHP. Thus it was given centre stage at the Eurostat meeting in 2002, which carried out a post-mortem on the ECHP attrition (Eurostat, 2002). Attrition in the ECHP has been well-studied and with regard to socio-economic status it is well-understood. It is worth emphasising that patterns of attrition vary substantially among member states, with a general 'northern' pattern of low socio-economic dropout and a 'southern' pattern (including the Irish) of high-level dropout (Peracchi & Nicoletti, 2001; Rendtel, 2003; Rendtel et al., 2004; Watson, 2001). Generally speaking, the context of these enquiries has been to determine the extent to which the sample as a whole has become unrepresentative of the domiciled population of each country and to devise methods of improving the consistency of estimates. With our present focus on transition, the issue of bias becomes even more salient. Just as the shortfall in mortality reporting would, if uncorrected, result in an underestimate of the probability of a transition from any health state to mortality, so a differential loss of persons in particular health states would lead to underestimates of the probability of entering or remaining in such states. This problem is on top of any loss of consistency introduced by general non-response.

Table 2 specifically shows the attrition in terms of health transitions for each country. This is computed as the proportion of cases where the health state, including mortality, is reported at one wave but not at the next. All waves are pooled for this (excluding, of course, the final wave of a survey and individuals after they had been reported deceased).[8] In fact the table shows 'completed' transitions, i.e. where attrition did *not* take place: this is the data on which our subsequent analysis is based. There are more completed transitions for self-assessed health than for a hampering health condition because the latter question was not asked in a comparable way in the first wave in most countries. Note that Germany is represented in this table only by the SOEP and the UK by the BHPS cloned series, for reasons explained in the Appendices. Overall, for both health measures, fewer than 10% of transitions are 'lost'. The rate varies, however, among countries and attrition is particularly high for Ireland and Finland. Ireland had a high drop out generally, with only about two-fifths of the original interviewees remaining by the eighth wave.

[8] Three persons in the ECHP appear to have 'resurrected'! Two are in the Luxembourg sample (which is anyway omitted from this analysis) and one is from Greece. The latter was reported dead in wave 2 and has been excluded thereafter.

Table 2. Completed health transitions, including to mortality, reported between successive waves of the ECHP survey, by country, all ages

	Self-assessed health		Hampering health condition	
	Proportion of completed transitions (%)	Number of completed transitions	Proportion of completed transitions (%)	Number of completed transitions
Germany (SOEP)	93.5	74,453	93.5	62,992
Denmark	88.0	27,488	88.1	22,303
The Netherlands	89.0	56,531	88.8	48,040
Belgium	89.3	34,324	88.9	28,153
France	90.2	72,629	91.0	60,812
The UK (BHPS)	94.9	52,725	95.3	45,077
Ireland	83.9	39,815	84.5	31,599
Italy	92.3	102,173	91.8	85,236
Greece	90.4	65,227	90.6	54,013
Spain	88.0	86,247	88.9	71,376
Portugal	94.1	70,985	93.9	59,970
Austria	90.1	35,180	90.1	35,175
Finland	83.4	26,454	86.2	30,238
Overall	90.4	744,231	90.6	634,984

Notes: A completed transition is one where health at the start and finish is known (including mortality). An incomplete transition is where there is no information at the finish.

Sources: The ECHP (1994-2001) and authors' calculations; unweighted data, Luxembourg, Sweden and the German and UK matching surveys (waves 1-3) have been omitted.

The importance of mortality to health-related attrition does not appear to have been fully appreciated before. Table 3 shows the completion rate concerning health transitions in terms of the starting health, for all the waves pooled. For both health measures this indicates that attrition is greatest for persons who previously reported either the best or the worst health, but variations in attrition between the states are not great. On the other hand, if mortality were to be included as a form of attrition rather than a state of health, then the rate of attrition from the poorest states of health soars dramatically, more than half as much again for "very bad" self-assessed health. Subsuming mortality in with other forms of attrition has led other authors to report much greater health-related attrition.[9] Thus Jones et al. (2003) report attrition by self-reported health status for all waves. They observe that at the most extreme, 75% of those reporting very bad health in wave 1 in Denmark did not stay until wave 8, nor did 66% of those reporting bad health, compared with 49% of those reporting very good health.

[9] These results apply to the raw data. Section 4 discusses the effect of measures to adjust the sample.

Table 3. Completed health transitions, including to mortality, reported between successive waves of the ECHP survey, by starting health state, all ages

	Proportion of completed transitions (%)	Number of completed transitions
Self-assessed health		
Very good	88.8	159,321
Good	90.6	318,025
Fair	91.3	187,327
Bad	91.5	62,366
Very bad	88.7	17,192
Overall	90.4	744,231
Hampering health condition		
No chronic health condition	90.4	475,711
Non-hampering	92.1	32,620
Some hampering	91.5	79,561
Severe hampering	90.1	47,092
Overall	90.6	634,984

Notes: A completed transition is one where health at the start and finish is known (including mortality). An incomplete transition is where there is no information at the finish.

Sources: The ECHP (1994-2001) and authors' calculations; unweighted data, Luxembourg, Sweden and the German and UK matching surveys (waves 1-3) have been omitted.

3.5 Trends in health

The ECHP contains eight waves from 1994 to 2001 inclusive. For a person who was interviewed throughout this means there is information about seven possible transitions from one health state to another, for each of the two measures with which we are concerned. We note in passing two important results concerning successive transitions from the previous report (Bebbington & Shapiro, 2004) that are significant to the choice of approach here.

First, it was demonstrated that health state at any wave is dependent not only on health state at the previous wave but also on health at the wave before: those who had changed their long-term health state recently were most likely to change again. The possibility exists for employing dynamic structural models to characterise changes in health. Yet the principal remit of Work Package 3 was the estimation of (first order) health transition matrices by country, age and gender – and structural models are not pursued here.

Second, the question of whether any trend could be detected in health transitions over the period was investigated. While a general improvement in age-specific health is widely postulated, implying a fall in rates of transition to states of ill-health, no evidence of this or any other simple trend could be found. Even if such general improvements exist, their effect on net annual changes could be too small to be distinguishable. For this reason we consider that it is acceptable to pool transitions across all waves for the purpose of estimation of transition rates (except where changes in procedures made successive years incompatible). This implies repeated measures on individuals and the non-independence of observations, requiring robust estimates of standard errors.

4. Weighting and post-stratification for mortality

4.1 Eurostat weights

Eurostat provides sets of national weights, some constructed centrally and some by the national statistical units, which adjust for the divergence of the sample from specified population parameters and also adjust each successive wave for differential non-response by these strata.

There has been some reluctance on the part of a number of analysts to use weights. In an authoritative manual on survey methodology, demographer Jan Hoem (1989, p. 539) advised that the use of weights when *modelling* human behaviour can complicate statistical inference and is best avoided where possible. But more recently, for the UK Economic Social and Data Service, Crockett (2004) provided the opposite advice: in answer to the question of whether one should always weight one's analyses, he proposes that as a general principle one should. Although it may be sub-optimal for some multivariate analyses, reducing precision more than alternative, model-based, methods, in the presence of attrition it will still be preferable to no adjustment at all. We observe, however, that econometricians, having experimented with inverse probability weighting, are now less inclined to disdain such weights (see, for example, Jones et al., 2005).

The Eurostat weights, applied to the starting wave of a health transition, increase the proportion of mortalities in most national samples. Some of this effect is through weighting the sample so the age distributions more closely fit the population distributions (Nicolletti & Peracchi, 2002), as the oldest age groups are under-represented, partly as a result of slightly higher attrition among persons over 75, even excluding mortalities. Therefore we have opted to use Eurostat weights in the main part of this analysis (augmented further as described below).

As Eurostat offers a variety of weights, it should be noted that we consistently use the pooled (unbalanced) sample in the present analysis and we necessarily use the individual cross-section weights (PiGO02),[10] as not all individuals have non-zero longitudinal weights (PiGO03). The cross-section weights are derived from the longitudinal weights, using what is called the 'fair shares principle'. This is the sharing out in a given household of the total of (sometimes diverse) longitudinal weights so that all individuals who are interviewed have a positive sample weight.[11]

4.2 Need for additional weighting

Despite the improvement, however, the ECHP mortality rates remain well short of those expected in all but three countries. As an example, there is only an average 3.6% mortality rate annually in the Greek ECHP among women 75 years old and older, whereas from Greek vital statistics the expectation is 8.7%.[12] This would result in seriously biased estimates for transition matrices. The probability of transition to mortality would be underestimated (by over half in this example) and the corresponding probabilities of transition between live states of health

[10] See the *Construction of Weights in the ECHP*, Eurostat (2003). This note does not take up a number of other weights that are available, such as register weights and household weights, which are not relevant to our use.

[11] If there are no newcomers in a household who need a positive sampling weight, then there is no difference between the two weights. Therefore substantially more than 90% of cases reveal no difference between longitudinal and cross-section weights and PiGOO2 may also thus be thought of as modified longitudinal weights.

[12] We have chosen Greece for this example because it is not complicated by mortalities in long-stay health-care institutions, which are out of the scope of the ECHP. Comparatively few people in Greece live in health-care institutions.

somewhat overestimated. The latter implies, in fact, that years spent in disability or poor health might actually be overstated in final estimates of healthy life expectancy.

Therefore we have sought to address this problem through other methods of correcting for missing data. The most straightforward method is to simply use the fact that mortality rates for age and gender groups in EU populations are an excellent source of auxiliary information for post-stratification. Before explaining this methodology in more detail, we offer an explanation of the reason why the alternatives are less satisfactory.

We first considered two other standard corrections for attrition. As Lundstrom & Sarndal (1999) observe, the statistical literature on correction for attrition may be divided into two broad methods for treating non-response: by imputation and by weighting. Both, in fact, have been implemented in recognised health studies of the BHPS (Contoyannis et al., 2003 for self-assessed health and Wiggins et al., 2004 for minor psychiatric morbidity). Multiple imputation (MI) involves the selection of proxies by missing values (individuals), in which some form of 'pattern matching' is used to select the values reported by those already surveyed, which replace those missing. (Wiggins et al., 2004, provide a guide to its applications. The UK ESRC Research Methods programme maintains a website on missing data that emphasises multiple imputation methods.)

Inverse probability weighting (IPW) is a widely accepted form of corrective weighting at present, particularly in economics and econometrics (Wooldridge, 2002 and 2003). This method was examined in the present context in our earlier report (Bebbington & Shapiro, 2004).

Both MI and IPW properly require the specification of a model that can adequately predict dropout, that is, specify and estimate the 'missingness' mechanism. In the case of IPW, where selection is normally done by probit modelling of attrition propensity, it is easiest to see how selection is done. MI goes through the same essential process, but uses a programme to match missing individuals by patterns and to replace those individuals with the information of others who have not been lost. Thus much the same modelling needs to be carried out. Otherwise this will simply result in random replacement. If IPW weights are applied that do not change the outcome, this tends to confirm that the pattern of attrition is not affecting the particular issue under examination. In most cases this is highly satisfactory to researchers. For Contoyannis et al. (2003), analysing self-assessed health in the BHPS, this is a demonstration that for states other than mortality selective attrition can be ignored.

We cannot be satisfied by this, as we consequently find that IPW weighting provides no augmentation of the clearly downwardly-biased mortality rates (Bebbington & Shapiro, 2004). Our interpretation is that we cannot find an adequate 'missingness' mechanism that explains attrition by other observable variables – notably age, gender, housing tenure, household structure, education and initial health status – that will adequately explain the shortfall in mortalities, judging by the external evidence. This serves a positive role, in that it emphasises that selective attrition by health status has not been a major problem in itself, once we condition on the fact that individuals in poorer health have a higher probability of leaving the panel through mortality.

We suggest that the 'missingness' mechanism is most likely because when an individual dies the likelihood of their household being contacted to establish that fact is reduced, most obviously if the household ceases to exist as a result of their mortality. An exception is in the case of those NDUs that proactively sought out such cases. The documentation for the DIW's GSOEP and the minuted explanations by Statistics Denmark and ISTAT (Italy) in the documentation of the ECHP indicate that they did have such strategies, and these are reflected in mortality rates in the sample close to or even above that expected. The British BHPS also does this: Gardener & Oswald (2004) found mortality rates from 1994 to 2001 for persons aged

40+ entirely within the expected sampling error for such a panel. It remains unclear why the BHPS clone information sent to the Eurostat fails to reproduce this.

4.3 Choice of method: Limited post-stratification

Another widely accepted form of adjustment, post-stratification weighting, is however, both possible and considerably less restrictive, and this route has seemed particularly appropriate given the wealth of independent information on mortality. What is required for the reduction of both the sampling error and the non-response bias, as Lundstrom & Sarndal (1999, p. 306) note, is strong auxiliary information. The mortality rates for the population by age and gender groups fulfil this requirement. But we do have to consider whether standard mortality data would be strictly applicable to the ECHP sample, given its sampling frame. The main problem to take into consideration is that the ECHP would not include mortalities among persons resident in institutions, since the ECHP considered persons who moved permanently into institutions to be out of scope. This means it will not include a significant number of mortalities among older persons. There are other possibilities but these are less important. For example, in some national circumstances with heavy unrecorded migration it is possible that there may be some doubt about the size of population group in the denominator of mortality rates.

In order to convert population mortality rates, age and gender into expected probabilities of mortality within the ECHP, it is necessary to estimate the shares of persons dying in institutions who would be out of the scope of the ECHP. Yet to do so involves a number of practical difficulties in deciding just who would be out of scope, which is discussed further in section 5. For example, short-term admission to an institution does not take a person out of scope. We have focused on understanding mortality in health-care institutions since this is where it will be particularly high. It is convenient to assume that mortality rates in other types of institutions (prisons, hotels, military and religious establishments, etc.) will be similar as those for persons in the community in similar age groups. As comparatively few persons under age 65 are resident in health-care institutions, we have particularly concentrated on older persons. From our results, we have estimated for example that the expected population mortality rate for those over 65 in the UK is 5.6%, whereas the expected rate for a private household-based population would be only 4.5%.

As we have to predict the mortality rate in the population from which the ECHP is drawn, we have introduced some further imprecision in our estimates. In treating the resultant weights as probability weights, and estimating the standard errors derived from all the steps through bootstrapping, we will find some inflation of the variance. Given the divergence of expected mortality rates from actual mortality rates in the ECHP in most countries, and the consequent bias, the resultant total error will certainly be diminished. In cases where the mortality rate in the ECHP has been close to the predicted value (in the German SOEP and in Italy) we refrain from this additional weighting.

It is not possible to consider applying this post-stratification weighting reliably to a small initial base, since it implies that one actual person in the ECHP sample may have to stand proxy for several. While all weighting increases the variance inflation factor, it is also well known that extreme-weighting adjustment increases it greatly (Kalton & Flores-Cervantes, 2003, p. 90). As a rule of thumb, we have declined to apply this approach where the proportion of mortalities actually recorded is less than half that predicted. This unfortunately means that not only the Netherlands, but also France and Finland cannot be treated by this method.

While post-stratification can involve a complex iterative algorithm to maximise the data fit to the population in multiple dimensions (called ‘raking’), we have focused on just the two principal health variables. The adjustment has been applied to broad age and gender groups

within each country (typically six), so that the numbers in each group are not too small. This decision was facilitated by the requirements of our study, which focuses on producing probabilities for transition from a given health state to another by age and gender.

This method of post-stratification is similar to that proposed by Djerf (1997) for the Finnish Labour Force Survey (LFS), which stratified according to register estimates of active job seekers. Zhang (1999, p. 332) notes that the method is used with LFS in a number of countries. He conducts a simulation exercise that finds for Norway it would remove about 50% of both the variance and the bias caused by selective non-response of the unemployed in an LFS rotating panel. Our method produces an even stronger result, as there is no dispute about a difference between someone registered as deceased in the population mortality register and their would-be status in the ECHP. (In the case of unemployment, it may be argued that even those registered as job-seekers on the official register may have given a different anonymous answer, had they cooperated with the Labour Force Survey.)

4.4 Explanation of the general procedure

We have given the example above of the under-representation of women aged 75 in Greece. With the correct weights, derived as explained in Box 1, each of those recorded as in wave *t-1* who will die before wave *t* is weighted to represent 2.42 persons. Correspondingly, persons remaining alive are slightly over-represented so these are weighted downward, in this case multiplying by 0.95. We have calculated the post-stratification weights after applying Eurostat weights. The total weight for each individual is then the product of the two separate weights.

Box 1. Method of post-stratification weighting

This is illustrated for women over 75 in Greece, for self-assessed health.

1. The number of 'completed' transitions between all states of self-assessed health, including mortality, across all waves of the ECHP = 3042. (This is after applying Eurostat weights.)
2. The number of these transitions that end in mortality = 110.
3. Therefore the mortality rate in the ECHP = 110/3042 = 3.62% per annum (average).
4. The actual mortality rate in Greece for women aged 75+ = 8.74% per annum (this is the figure for 1996).
5. Hence the post-stratification weight for those who died is = 8.74/3.62 = 2.42, and the predicted number of mortalities in Greece = 2.42 × 110 = 266.
6. The number of live transitions was 3042 – 110 = 2932, whereas we would have expected 3042 – 266 = 2776. Therefore the post-stratification weight for survivors is 2776/2932 = 0.95.

Source: Authors' calculations.

Box 1 takes no account of mortalities in institutions, and where these are significant they need to be estimated and allowed for. (Greece is exceptional in there being a very small number of residents in health-care institutions.) We need to estimate mortality rates in each age/gender group for the institutional population, so we can establish the mortality rates in each age/gender group for the community from population mortality statistics. To do this we have had to take account of what institutional data is available for different countries, often quite limited, and the general procedure is explained in section 5 and Box 2 with details in the country reports. One important detail should be noted. The transitions we observe are between waves, which are nominally one year apart. If after being recorded in wave *t* of the ECHP someone moves to an institution and then dies before wave *t+1* is made, then that person ought to have been reported

by the ECHP at wave *t+1* as a mortality rather than a transfer to an institution, since that is the current situation. In this case, not all mortalities of residents in institutions should be deducted, when converting the overall population mortality rate to that which we would predict should have been reported in the ECHP. Those who had been resident for under a year, between waves of the ECHP, should be excluded. We have therefore assumed, on average, that those dying in institutions within six months of permanent entry should not be deducted for the purpose of adjusting for mortalities in institutions. The basis for estimating this fraction is explained in section 5.

We also need to estimate the mortalities in the institutional population in each age/gender category, which may be more accessible but may also have to be estimated to some degree.

With the mortality rates after allowing for residents in long-stay institutions thus established, the procedure described in Box 1 can be followed. It is this part of the estimate that is the most troublesome, however, given the still scarce data on mortalities in institutions (see section 5.4).

5. Institutionalisation

Improvements in comparative information on health-care institutions have resulted in an increasing number of European studies of health needs that have taken the prevalence of this into account, even if, as Van Oyen (2001) points out, there are few that have looked specifically at the health state of persons in institutions on a comparable basis to persons in the community. The more usual approach is to regard institutionalisation as being itself a (severe) defined state of health for all such persons.[13]

The original intention of Work Package 3 was to describe transfers to (if not from) institutional health care in similar terms to other transitions between states of health, using the ECHP, consistent with our assumption of the superiority of incidence measures for forecasting health needs where these are practical. This is particularly important given the high proportion of long-term care expenditure that goes to institutionalisation in many European countries. In the event, we are obliged to use alternative sources of evidence about incidence rates for institutionalisation, numbers of admissions and discharges. We believe this to be the first time it has been attempted on a cross-country basis. This section describes some of the issues that were faced in attempting to derive such estimators.

5.1 The problem with surveys

Just as cross-sectional health surveys often exclude individuals in institutions, so likewise do longitudinal health surveys (such as the ECHP) often fail to pursue individuals after a long-term admission,[14] and so offer no more information about health at the time of the survey other than

[13] Van Oyen deplores this, as there are certainly variations among individuals in institutions, and these may reflect differences between types of institutions and policies for providing institutional care, which are otherwise brushed over. Moreover, entry to an institution providing health-related care, such as a residential or nursing home, on a long-term basis, is not itself purely a health event, but may also depend on a changed housing situation or perhaps the loss of a carer. Yet once someone has lived long-term in a health-care institution, it is often impractical to consider an involuntary return to a private household. The fact of institutionalisation predicates some health-care costs irregardless. This approach is at least far better than simply assuming that the distribution of health states among persons in health-care institutions is similar to that of persons in private households. Regrettably this is still implicit in some calculations of healthy life expectancy, although for some countries this would result in a serious underestimation.

[14] We refer to such moves as a 'long-term transfer' to distinguish them from a temporary stay in an institution, where a person might not actually be present in a private household but continues to regard it

that the person has been admitted. Such follow-ups transitioning to and within institutions involve further investigation, permissions, travel, a different form for the questionnaire and possibly a quite difficult interview. And very few studies indeed have pursued individuals in and out of institutions through time and thus generated a full transition matrix.

In fact, many longitudinal surveys experience trouble in reporting moves to long-stay institutionalisation accurately, even when they do not follow up. All longitudinal community-based surveys fail to trace significant numbers of persons between waves, and those moving to institutions are particularly at risk. Self-evidently, these persons have changed address, often in difficult circumstances, so there are likely to be problems tracing them, but also long-stay institutionalisation often implies the break-up of the household and thus difficulty in finding someone to report what has happened. Without special tracing measures and crosschecks, these persons are simply included among those lost to follow-up and the estimate of those who moved to an institution is too low. As was reported in section 3, this problem was particularly acute with the ECHP, from which AHEAD Work Package 3 was originally expected to obtain information about transfer rates to institutions. This survey has only recorded a very small fraction of all long-term transfers to health-care institutions, and so unlike the case of mortality, post-stratification is not an option.

5.2 Alternative sources of information

Many countries have alternative sources of evidence about transfer rates to and out of long-stay institutions, which include: i) other national surveys; ii) the administrative records of institutions and insurance agencies responsible for purchasing/provision; iii) registers recording place of residence; and iv) population censuses. Owing to the problems with the ECHP, the approach taken here – similar to that used for population health measures from community-based cross-sectional surveys – was to seek to combine findings about health transitions from the community sample with evidence from these alternative sources, where they were available.

There are, however, six major practical problems in doing so. The first concerns the difficulty of equating different sources of evidence. The ECHP protocol was to exclude, as being no longer in scope, certain categories of persons, including those who had moved permanently into institutions. Yet in studying the documentation provided by Eurostat, the definition of permanent versus temporary does not seem to have been offered, and it presumably relied on self-reporting, interviewer discretion or NDU instruction. A definition was attempted of the difference between an institution and a collective household.[15] As a guideline it sought to make the distinction between an institution and what is termed 'sheltered housing', including the French *foyer-logements*. Yet its language is vague for a survey rule:

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as their permanent home address to which they will return. This corresponds to the distinction made in the ECHP. The implication of a temporary stay is that they could or should be expected to be back in a private household at the next wave of the survey. Yet in practice many are not, and the boundary between a short-stay and permanent admission is a difficult one. Some European panels have asserted an intention to follow an initial sample of persons through their institutionalisation, including both the SOEP and BHPS. But puzzlingly, the BHPS 'clone' for the ECHP does not include transfers to institutions, presumably reflecting a decision like that of the Netherlands NDU, and the SOEP's ECHP data has 4 such transitions, in contrast with 55 for the same period of time in the original SOEP for an earlier period (Klein, 1996).

[15] See Eurostat (1994).

> Basically, institutions are distinguished from collective households, in that in the former, the resident persons have no individual responsibility for their housekeeping. In some cases, old persons' home can be considered as collective households on the basis of this last rule (Eurostat, 1994, p. 3).

This problem is one that many censuses sooner or later have had to grapple with and most have had some difficulties.

Nor were we able to identify any clear rules for differentiating when a person was in an institution temporarily and expected to return (and thus would continue to be included in the ECHP) from those who were not expected to return based on guidelines such as how long they had been away. These problems of definition may not matter too greatly within the context of the ECHP itself, but create serious difficulties in achieving comparability with other records of institutionalisation – and so of determining how many such persons there ought to have been. The latter is further complicated, in practice, by the fact that official records of long-stay transfers to health-care institutions may or may not be clearly separated from short-stay admissions, and they may or may not include certain marginal types of establishment.

Second, and this applies particularly to information originating from institutional and insurance records, it is necessary to be sure they are complete, and this may involve tracking down very many different sources of information. In the UK, for example, there are easily accessible records of annual national accounts for persons admitted to mainstream institutions with state support, but much weaker information for persons who fund their own care, or for minor or small institutions. Thus there is a major problem of completeness when using this type of administrative record.

Third, records originating from institutions often do not distinguish between admissions from the community – which is what concerns us in relating to the ECHP – and transfers between institutions. So numbers of admissions will be an over-estimate of those leaving the community. On the other hand, information about discharges (including mortalities),[16] which may be more precise about destination, is less common and may tend to be under-reported, for example where a vacated place in an institution is not immediately required for a new resident, it may be held 'open' on the chance the person will return.[17] As was mentioned earlier, if the sector size is not changing, annual admissions and discharges should be similar, but where both statistics are available typically the former is reported as larger than the latter.

Fourth, although population registers avoid the problem of fragmentation and of distinguishing transfers from the community and transfers between institutions by recording all address changes, in practice they suffer from delays in reporting. This probably leads to significant under-reporting, particularly when there have been subsequent moves or mortality. In a finding that may reflect on the sensitive nature of movement into institutions for the elderly, Van Oyen (2001) reported that only one-third of Belgian nursing and elderly home inhabitants were then on the national register at the address of their institution. The others either retained their old addresses or had transferred their official domicile to that of one of their children.[18] A Spanish

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[16] Throughout this section discharges may be taken to include mortalities unless otherwise stated.

[17] A related issue regarding prevalence measures is that caution must be exercised to be sure that persons, and not beds or places, are being counted. Even in the very tautly-run Dutch systems for example, there is now a vacancy rate of 5%.

[18] Abramowska et al. (2004), reporting on very recent results from the same Belgian registers, find a much smaller discrepancy between institutional records and the national register. Here the reflexivity of what we do may be important. In noting these problems we are assisting in their correction. Van Oyen had also noted that the Belgian administrative records saw no reason to report gender, and by the time Abramowska et al. undertook their study such records had materialised.

study cited below, and called to our attention by AHEAD partner Namkee Ahn, also concludes that the population register has a substantial shortfall in permanent institutional residents, as does a warning of Statistics Finland in offering the data that was collected for us by AHEAD partner Hannu Piekkola.

Fifth, population censuses are good for determining the prevalence of residents in health-care institutions but of limited use regarding transfers. Censuses may report how long individuals have lived at their present address and where they lived before. Considerable extra assumptions would be needed to convert this to an admissions rate. The same applies to attempts to establish admission rates from cross-sectional surveys of institutions that determine how long a person has been living there.[19]

Sixth, the expected rate of permanent admissions to institutions as they should be reported in a panel survey such as the ECHP is a little below the actual admission rate for the community population. This is because by the time of reporting at the next wave of the ECHP, some of those who were admitted will have died and so should be reported as deceased rather than institutionalised. This point is raised further in section 5.6. It corresponds to a similar problem in determining expected mortality as raised in section 4.4.

5.3 The survey of information on entry to institutions

What was required were estimates for each country of the numbers or rates of persons being admitted as first time long-stay residents of health-care institutions, and where practical, discharged. This definition should as far as possible correspond to persons lost to the ECHP for this reason, and so what was counted as a health-care institution might well vary among countries. A request was made to each of the participating ECHP countries except Sweden and Luxembourg (through their AHEAD representatives where possible) for such information as might be available in the ECHP timeframe of 1994-2001 on numbers of residents and annual admissions rates, by age and gender.

As prevalence rates for younger adults are low, this survey concentrated on persons over 65. We are adopting two simplifying assumptions: first, that expenditure on health-care institutionalisation for persons under 65 is too small to be a consideration for this study; second, that the health needs of persons in other types of institutions (such as those living in hotels, military and religious establishments or prison) are similar to those in private households.

The following countries were able to provide information for estimation purposes: Belgium, Finland, the UK (England), Ireland, Italy and the Netherlands. This implied at least some data on the overall admission/discharge and prevalence rates for at least one year in the period, an indication of the age and gender distribution for each and some indication of the likely accuracy of such data bearing in mind the problems raised in section 4.2. In most cases the information we required needed compilation (with assumptions) of data from more than one source. Other countries provided helpful information on prevalence but little regarding admissions/discharges; these included Denmark, France, Germany, Portugal and Spain. (Remaining doubts about the completeness of the determination of mortality rates in the landmark French handicap and disability (HID) study prevent us from placing it in the first category.) Evidence from the Greek census suggests that uniquely for this country, the number of residents in health-care institutions is sufficiently small that this group will not heavily impact on the overall costs of long-term care. Details of what each country was able to provide are included in the country reports (see

[19] The length of time existing residents have been living in an institution cannot be used to infer turnover rates, without a number of additional and quite restrictive assumptions. It is not an uncommon error in reports of surveys of institutions to over-estimate lengths of stay based on existing residents.

the Appendices). Only two countries – England and Finland – were able to provide exactly what we had requested, although even with these we encountered some questions about accuracy, but the others were sufficient to allow estimates to be prepared with assumptions and approximation, and some provided a considerable amount of information that may be of interest for other purposes.

There remains some doubt as to whether the institutions defined in the information supplied would necessarily be in exact one-to-one correspondence with the ECHP tracing rules for determining when a subject was beyond the scope of the survey. In general we have received confirmation that this is broadly the case, as in the exclusion of the French *foyer-logements* from the institutional category in the HID data we received, although they have traditionally been covered by previous French inquiries into institutions for the elderly (EHPA). The assumption must be that there are, but we describe where we have doubts about the overlap in the country Appendices.

Information on institutional rates was sought for several years where it was available. It was evident from this and from other studies such as Tomassini et al. (2004), that there have been significant changes during the period of the ECHP. There has been a consistent move towards de-institutionalisation across most countries in Europe in the last decade. Even where this has not changed gross numbers, it has meant lower participation rates. Nevertheless, the decline in numbers is not necessarily accompanied by a decline in admission rates, with countries such as Belgium and Finland showing sharp increases at certain points in time. We believe this could well be related to improvements in reporting arrangements, rather than a genuine increase in turnover. In consequence, we do not think the evidence is robust enough to take account of changes in admission rates, but have contented ourselves with a single point estimator corresponding if possible to the centre of the period, around 1997-98.

5.4 A basis for assumptions about institutional turnover

As previously mentioned, it has often been necessary to use assumptions to convert the data supplied to the required form. In doing so, we have been considerably influenced by the results of a national survey undertaken in England during the period of the ECHP (Bebbington et al., 2001). This survey was of admissions to long-stay institutions for older persons, who were subsequently monitored to the time of mortality. Similar large-scale surveys have been conducted in the US and Australia (AIHW, 2002), but not as far as we know in other EU countries.

Although the situation in England is, as in all countries, a reflection of its unique welfare history and the current health-care policies there, nevertheless there were some observations that with caution and in the absence of any other information may be applicable elsewhere.[20] These include the following:

i) The number of short-stay admissions to institutions greatly exceeds the number of long-stay admissions, so that it is essential that these are differentiated.

ii) The majority of long-stay admissions have come from a short stay in an institution immediately prior to long-stay admission, typically an acute hospital bed. This is

[20] The survey was of publicly supported admissions to residential and nursing homes. In England, this includes about two-thirds of all older persons resident in institutions. A parallel study of privately funded individuals indicated that the conclusions drawn here are also broadly applicable. Since 1990, only a comparatively small number of older persons are resident in hospitals (general and psychiatric), the only other kind institution of any significance.

significant to the differentiation used in the ECHP between permanent and temporary absences from the household. A considerable proportion of those described as 'temporary' are lost at the next wave.

iii) The admissions rate, the ratio of annual admissions to the population living in the community, increases rapidly with age, up to the highest age groups where a substantial proportion of the entire population are resident in institutions.

iv) A significant proportion of reported admissions, up to about 20%, are actually transfers of long-stay residents between institutions. For the present purpose these need to be discounted.

v) Very few persons admitted as a long-stay resident ever returned to a private household – 3% in total. Those who did were quite often re-admitted to an institution not long after. Those who left mostly did so in the first six months following admission (and so might not be reported as a loss in the ECHP). This was true even when rehabilitation was a stated goal.

vi) The majority of discharges were to hospitals and in most but not all cases were for terminal care. Nevertheless, often the transfer to a hospital for terminal care was not formally recorded as a discharge.

vii) As a result of iv), it may be assumed that with only slow changes in the overall size of the sector, the general mortality rate is similar to the first-time admissions rate: by knowing one we have a handle on both.

viii) The mortality rate is not steady, but much higher in the first few months than later. On average, 20% of all new long-stay admissions had died within six months.

ix) Sometimes it could be many years from the first admission to mortality, but this is not true in the majority of cases. The median time from admission to mortality was 20 months. This is less than in the past. Women survived on average longer than men.

x) As a consequence of ix), the age distribution of new admissions may be assumed to be similar to that of current residents, but there will be a higher proportion of men among admissions than is reflected among residents.

xi) Also as a consequence of vii) and ix), age-specific mortality rates will be similar to age-specific admissions rates.

The country reports in the Appendices explain where and how these observations have been used. Of these, the one that is most problematic for generalisation is that few long-stay residents (in the ECHP sense) leave institutions other than through mortality, so that admissions and mortality rates are comparable. Two countries, the Netherlands and Italy, provided information on both admissions and discharges, both of which show as many live discharges as mortalities. The detailed data for the Netherlands supplied by Esther Mot shows that for homes for the elderly, the number of mortalities annually is close to the number of new residents, and it is possible the difference is partly accounted for by transfers to hospital for terminal care, as in England, although in the Netherlands there is much more emphasis on palliative care outside hospitals. The situation is different for nursing homes, which it should be noted also serve a major short-term rehabilitation and intermediate care function in the Netherlands. The mortality rate is less than half the admission rate so the majority are discharged alive. Moreover, about 20% of admissions are repeat admissions. For these two countries we have estimated age-specific admissions rates and mortality rates separately. For Belgium and Finland, given the limited data, there is no realistic alternative to regarding admission as a long-stay resident as a one-way process (absorbing state). Ireland provided mortality rates but no other turnover data.

The second conclusion that may not be generalised concerns the shortness of stay of most admissions. The turnover rate will be loosely related to the ratio between the annual admissions and the average number of long-stay residents. The higher this is, the greater the turnover, unless the sector is expanding fast. The ratio for England is 40%. The Netherlands and Italy are slightly higher at 42%, while Finland is the lowest at 27%. Ireland has a ratio of annual mortalities to residents of 37%. On balance this suggests that all countries for which evidence was available would have experienced average stays not too dissimilar to those for England.

5.5 Prior health of those admitted to institutions

A serious drawback of the approach described above is that even where we are able to establish rates of entry into institutions, there is no evidence about the health of individuals during the previous year.[21] As a result, it is not possible to complete the health transition matrix with information about the health of the persons admitted or even to report the transition rate from particular health states into institutionalisation. Yet it is possible to gain limited insight into this on the basis of the 275 persons throughout the ECHP who were reported as having permanently entered an institution.

Tables 4a and 4b show the health in the preceding wave of persons who were known to have been admitted, above and below age 65, for all countries combined. Insofar as these persons are representative of all who were actually admitted (given that the ECHP rate must be a considerable underestimate among older persons), these figures provide a crude basis for estimating transitions between health states in the community and permanent admission to institutions.

Table 4a. Health state at the previous wave of persons permanently admitted to institutions – Self-assessed health (%)

	Under 65		Over 65	
	Proportion of all persons (completed transitions)	Proportion of persons among those admitted to institutions	Proportion of all persons (completed transitions)	Proportion of persons among those admitted to institutions
Very good/ good	25	22	6	3
Good	46	39	26	8
Fair	22	13	41	36
Bad/very bad	7	26	27	53
Total	100	100	100	100
Number	604,977	107	139,253	168

Notes: Luxembourg, Sweden and the German and UK matching surveys have been omitted. Eurostat weighted (except for total numbers).

Sources: The ECHP and authors' calculations.

[21] The only exception is for England, where the admissions survey reported a hampering health condition immediately prior to entry, as well as thereafter. Nevertheless, this evidence would not correspond to the time interval between the waves of the ECHP survey.

Table 4b. Health state at the previous wave of persons permanently admitted to institutions – Hampering health condition (%)

	Under 65		Over 65	
	Proportion of all persons (completed transitions)	Proportion of person among those admitted to institutions	Proportion of all persons (completed transitions)	Proportion of persons among those admitted to institutions
Not hampered	85	70	56	40
Some hampering	10	9	24	15
Severe hampering	5	21	20	45
Total	100	100	100	100
Number	514,943	88	120,040	157

Notes: Luxembourg, Sweden and the German and UK matching surveys have been omitted. Eurostat weighted (except for total numbers).

Sources: The ECHP and authors' calculations.

An example illustrates the procedure. Suppose for a particular country, we know from independent evidence (from the appendices) that the probability of a person over 65 becoming resident in an institution is estimated at 1.8%. Table 4a shows that 53% of persons in this age group who are admitted to institutions have bad/very bad self-assessed health, compared with 27% of this age group generally. Invoking Bayes Theorem, the probability of a person over 65 with bad/very bad self-assessed health being admitted as a resident is 1.8% × 53% ÷27% = 3.5%. Although these calculations might have been incorporated in the transition matrix estimates presented in this report, we have not done so because of all the approximations and assumptions involved.

5.6 Institutionalisation and mortality

We have twice already drawn attention to the problem caused by individuals who are institutionalised and die within a single wave of the ECHP on transition estimates involving both mortality and institutionalisation.

First, in section 4.4, it was observed that in order to estimate true mortality rates among the ECHP from population mortality rates, it is necessary to allow for mortalities in institutions – less those that will have occurred prior to the next reporting wave of the ECHP. There is very limited evidence available for the latter. Fortunately, the estimates are not unduly sensitive to this quite small number and a rough approximation is adequate. Re-analysis of the English admissions survey reported above showed that in England at least, the proportion of a sample that is admitted at a uniform rate throughout the year and has deceased by the year-end (some will then have been admitted for nearly 12 months, some for just a few days) is 20%. Accordingly, the estimated mortality rate in institutions has been reduced by 20% in order to estimate the expected rate in institutions. The procedure is illustrated in Box 2. In the absence of other information the same rate has been used for all countries where post-stratification by mortality has been undertaken. We invoke the observation in the final paragraph of section 5.4 to justify this.

Box 2. Adjusting population mortality rates for mortalities in institutions

This is required for establishing post-stratification weights as described in Box 1. It is illustrated for women over 75 in Ireland.

1. In 1997 the population in this age/gender group was 109,500 and total mortalities were 9,892.
2. The number of institutional residents (31.12.97) was 12,217 and the estimated number of annual mortalities was 4,659.
3. Deducting 20% for those dying in the first few months, the estimated number of mortalities was 80% × 4,659 = 3,727.
4. The expected community annual mortality rate was therefore: (9892 – 3727)/(109500 – 12217) = 6.34% per annum.

This figure is inserted at step 4 in Box 1 (note the actual calculations for Ireland average across 1997 and 1998).

Source: Authors' calculations.

Second, in section 5.3, it was observed that the expected reported rate of permanent admissions to institutions from the ECHP would be below the actual annual admission rate because a proportion have died before the next wave of the survey and will be reported as deceased rather than institutionalised. Essentially the same approximation applies: the expected reporting rate is 20% below the actual rate. Note, however, that in the tables given in this report, we have *not* made this adjustment. Our assumption is that the actual rate of permanent admissions will be more useful than the rate that we might have expected from the ECHP had reporting been complete.

6. Constructing transition estimates

This section describes how the ECHP results, combined with the modifications described above, have been used to derive age-/gender-specific annual transition rates between states of health including mortality and institutionalisation.

Because of all the differences among countries, both in the handling of the ECHP and in the availability of ancillary mortality and institutionalisation data, a decision was made following the earlier report (Bebbington & Shapiro, 2004) not to attempt this for all countries simultaneously, as was tried there. Section 5 of that report had shown that country differences in response could not be fully accounted for by allowing different cut-points in a common underlying health domain. There were significantly different age gradients in transition rates, as well as differences involving other correlates. Instead, a country-by-country approach has been taken. For each country, wherever possible, three sets of formulae have been derived for:

- health transitions of persons under 65 in the community, self-assessed health and a hampering health condition separately;
- health transitions of persons over 65 in the community, self-assessed health and a hampering health condition separately; and
- transitions to/from long-stay institutions for persons over 65, admissions and mortalities, depending on the available data.

The reason for splitting the community sample at age 65 was twofold. First, permanent admissions to health-related institutional care only start to become very significant for persons over 65, for whom other forms of institutionalisation become less significant. For persons under

65, transfers to institutions may not be for health reasons (although note Table 4). Second, the functional forms described in section 6.2 tend to be rather different above and below age 65. The fit is improved by estimating them separately.

6.1 Decisions about estimation for individual countries

Because of the limited availability of information about institutional care, health transition estimates cannot be provided for all countries of the ECHP. For forecasting purposes, transition matrices must be accurate with regard to mortality (and hence life expectancy) and for this the post-stratification method described in Boxes 1 and 2 is crucial. Countries are omitted for two reasons:

i) where the number of reported mortalities is too low a proportion of the likely total number to allow post-stratification mortality weighting of the ECHP (Finland, France and the Netherlands); and

ii) where no information on throughput in the institutional sector is available, so we also cannot estimate mortality rates among persons over 65 living in the community and therefore cannot undertake post-stratification of the ECHP accurately for older persons. (For Greece it is assumed the institutionalisation rate is too low to have much effect on post-stratification.)

In consequence this led to the following decisions with regard to individual countries shown in Table 5. These are the analyses contained in the separate country reports in the Appendices. Note that some transition data from the ECHP is presented for all countries other than Luxembourg and Sweden, even where a full analysis is not possible.

Table 5. Analyses undertaken for each ECHP country

	Health transitions, persons under 65 in the community	Health transitions, persons over 65 in the community	Transitions to long-stay institutions, persons over 65
Germany	Yes	Yes	No
Denmark	Yes	Yes	No
Netherlands	No	No	Yes
Belgium	Yes	Yes	Yes
Luxembourg	No	No	No
France	No	No	No
UK	Yes	Yes	Yes
Ireland	Yes	Yes	Yes
Italy	Yes	Yes	Yes
Greece	Yes	Yes	No
Spain	No	No	No
Portugal	Yes	No	No
Austria	No	No	No
Finland	Yes	No	Yes
Sweden	No	No	No

Notes: Countries are presented in the standard ECHP order.

Source: Authors' data.

6.2 Smoothing by age for transition[22] estimates

If there were sufficient data we could obtain an estimate of the annual transition rates between states of health for every country, for both genders and for every year of age individually. The ECHP is not sufficiently large for this, however, even with around 700,000 useful transitions (rather more for self-assessed health than for a hampering health condition, which was not asked in most countries in the first year). In the earlier report (Bebbington & Shapiro, 2004) age groups were used, providing sufficient observations within each age group for what was an examination of the influence of socio-demographic factors on health transitions. But the present context is different – we are now seeking a descriptive rather than an explanatory model. What is required are reliable estimates of individual health transitions by age and gender, and particularly at older ages allowance must be made for rapidly changing probabilities with age, so that grouping by age may not be satisfactory.

The method has been to generate a smoothing function that will fit transition rates across a range of ages. Such a function enables transition probabilities to be presented economically and irons out any exceptional values that may be the result of sampling or for any other reason.

Four different smoothing functions (expressing transition rates as a function of age and gender) were considered for this purpose. They included: power series (up to a cubic), three-parameter Gompertz, polychoric logistic and ordered probit. The choice was a balance between the relative simplicity of the functional form and how well it fit the data, with a preference for using a similar functional form throughout. We omit details of the comparisons, which were undertaken for a number of trial transition probabilities, but in practice there was not a great deal to choose between them. Our preference was for the probit, which was the generally best fitting in the trial cases examined (although usually similar to the logistic) and has an established history in this type of application. The underlying logic for the probit function follows Wooldridge (2002, section 15.10) and was used for example by Contoyannis et al. (2003) in a similar analysis of health transitions with the BHPS. It is supposed that there is some underlying continuous latent health variable h_i^* for the individual, which is in effect partitioned into the observed states h_i by a set of unknown cut points (or threshold parameters), such that:

$$\begin{aligned} h_i &= 1 \text{ if } h_i^* \leq \alpha_1 \\ h_i &= 2 \text{ if } \alpha_1 < h_i^* \leq \alpha_2 \\ &\ldots \text{ etc., until } \ldots \\ h_i &= J \text{ if } h_i^* > \alpha_{J-1} \end{aligned} \tag{1}$$

In other words, each observed health state corresponds to a value range within the unobserved, latent distribution for health, such that the entire range of the distribution is covered by one and only one health state. This function was used by Contoyannis et al. (2003) in their analysis of health in the BHPS. Nevertheless (unlike the BHPS analysis), a fully ordered probit using the same cut-points for all transitions involving each pair of health states was shown in our earlier report (Bebbington & Shapiro, 2004) to be a bad fit for transitions between the poorer states of health. We have therefore employed a *partially* ordered-probit function, which derives an ordered set of cut points α for each outcome state of health, but uses a different set of cut-points according to the earlier health state. In effect, what this means is that a separate analysis is undertaken for each distinct starting health state.

[22] For convenience, in this section we refer to *transition* rates (or probabilities) between each possible state of health at the beginning and end of an annual wave, even when the health state at the end is the same as at the beginning.

With this formulation, there are no longer J –1 cut points α_j, but rather $(J-1)^2$ parameters $\alpha_{j,k}$. k = 1,…,J –1 only because the Jth health state represents the absorbing state of mortality and so it is not necessary to estimate probabilities from this state.

A modelling approach to estimating transitions makes use of the latent variable form. That with which we are concerned is of the type:

$$h_{i,t+1}^* = \beta_k + e_{i,t+1} \tag{2}$$

where β_k is a constant depending on the starting health state 'k', 'e' denotes a random, independently distributed component following a normal $N(0,1)$ distribution.

The transition probabilities derive from the conditional distribution of $h_{i,t+1}$ given the state 'k' at time 't':

$$P(h_{i,t+1} = 1 \mid k) = P(h_{i,t+1}^* \leq \alpha_{1k}) = P(\beta_k + e_{i,t+1} \leq \alpha_{1k}) = \Phi(\alpha_{1k} - \beta_k) \tag{3}$$

$$P(h_{i,t+1} = 2 \mid k) = P(\alpha_{1k} < h_{i,t+1}^* \leq \alpha_{2k}) = P(\alpha_{1k} < \beta_j + e_{i,t+1} \leq \alpha_{2k}) = \Phi(\alpha_{2k} - \beta_k) - \Phi(\alpha_{1k} - \beta_k)$$

… etc., until …

$$P(h_{i,t+1} = J \mid k) = P(h_{i,t+1}^* > \alpha_{J-1,k}) = P(\beta_k + e_{i,t+1} > \alpha_{J-1,k}) = 1 - \Phi(\alpha_{J-1,k} - \beta_k)$$

where Φ denotes the cumulative standardised normal distribution. This model contains $(J-1)^2$' terms 'α' and J-1 terms 'β', i.e. $J \times (J-1)$ terms in total. It should be noted that the number of terms is the same as the number of transitions to be estimated and the model is just determined. The estimates of the transition rates $P(h_{i,t+1} = j \mid h_{i,t} = k)$ are simply the mean probabilities in the sample, and the α and β coefficients can be estimated using the mathematical relationship:

$$P(h_{i,t+1} = k \mid h_{i,t} = j) = \Phi(\alpha_{k,j} - \beta_j) - \Phi(\alpha_{k-1,j} - \beta_j) \tag{4}$$

for j,k = 1,…J; and setting $\alpha_0 = -\infty$; $\alpha_J = \infty$.

Standard maximum likelihood methods are needed if covariates are added to the model, i.e.

$$h_{i,t+1}^* = \beta_j + x_i' . \gamma_k + e_{i,t+1} \tag{5}$$

where x_i is a vector of covariates and γ_k a vector of parameters, which again are assumed specific to the starting health state. In the present case the covariates include age and gender.

We have argued that it is plausible to drop the time-dependence 't' in the present case and pool across waves, since there is no discernable evidence of trend in the transitions. Contoyannis et al. (2003) extended the model as suggested by Chamberlain (1984) and Wooldridge (2002) to separate the error component into two parts, one of which is truly random error, the other being an individual-specific component (which may be correlated with observed regressors). This treatment allows for the repeated measurements on individuals, and so improves the consistency of the resulting estimators. This methodology has been adopted here, using STATA robust estimation methods.

6.3 Estimation details

Partially ordered-probit functions were fitted for each of the three separate analyses. For persons in the community, the function was fitted directly to the individual transitions using the ECHP after applying weights derived from the Eurostat weights and post-stratifying to adjust for mortality, for both self-assessed health and a hampering health condition, separately for each starting state and each country, but pooling across the available waves.

For the probability of admission to residency in a health-care institution, the probit function has been fitted to data-giving admission (mortality) rates prepared by gender in five-year age bands,

for each country. As only one transition is involved, strictly speaking this is not an ordered probit. As there are marked gender differences in entry to institutions, a separate function was fitted for men and women. Further – for most countries the fit was much improved by including a quadratic term in age. Three important caveats should be observed here. First, the admission rate is the ratio of the number of persons in an age/gender group admitted annually to the average number of persons at risk, i.e. still living in the community. This is what the formulae given here predict. Published tables (including those shown in the country tables here) often present the rate in terms of the number of admissions relative to the total population in the age group, but the difference can be considerable in the oldest age groups where a sizable proportion of the population is living in institutions. Second, it might seem logical to express mortality rate in institutions (where available) relative to numbers of residents. This would certainly be appropriate if we were interested in processes within institutions. Here, however, we have used mortality reports as a surrogate (lower bound) for first-time admissions, and the mortality rate, as with admissions, is based on the number of persons living in the community. Third, the preparation of the data has involved imputation in many cases, the basis for which is described in the country reports (see the Appendices) and often relies on evidence from other countries. This has possibly meant that the results are more similar between countries than is the case in reality.

Standard errors for the coefficients are generated by the estimation process. Because observations of health transitions are not independent, but are clustered as a result of repeated observations (up to seven) of transitions for each individual, robust estimation methods are used as provided by STATA. This leads to an increase in the standard error of reported coefficients. Although standard errors are also generated for the admissions functions, we do not cite them. These are principally a consequence of the failure of the smoothing model to fit the observed data precisely, not of sampling error.

Standard errors for the estimated transition probabilities are, however, rather more difficult and can only be estimated by bootstrapping procedures. Given that a routine procedure for this does not exist within standard software without additional programming, estimation of standard errors is postponed to an addendum.

7. Results and conclusions

7.1 Format of results

Country-by-country results leading to the transition rate formulae are presented in the Appendices. Countries are presented according to the standard ECHP order. As far as data permits, the following tables are presented for each country:

1. annual mortality rates per 1,000 from the ECHP, compared with that estimated for persons living in private households from population mortality data, including an estimation of those;
2. post-stratification (mortality) weights;
3. the number of completed transitions and weighted, average annual transition rates for self-reported health from the ECHP;
4. the same for those reporting a hampering health condition;
5. probit formulae coefficients for estimating transition probabilities for self-reported health for the ECHP;
6. the same for those reporting a hampering health condition;

7. estimated numbers and rates (per 1,000 of the living population) in age/gender groups of long-stay residents, admissions, mortalities and discharges to health-care institutions of those aged 65, for a mid-year during the ECHP survey; and
8. probit formulae for admission or mortality transition probabilities or both (expressed in terms of population living in the community) in age/gender groups.

The method of generating transition probabilities from probit formulae was described in section 6.3, but for convenience these calculations are included in an Excel spreadsheet that is an addendum to this report. They are presented for ages 16-95, but it should be noted that the oldest age reported for any country in the ECHP is 91, so beyond this point they are extrapolated and of doubtful value. Because a different formula has been used above and below 65, in some cases there is a noticeable discontinuity in the trend at this point, especially for transitions to poorer states of health. It would be possible in principle to further smooth this.

The formulae for health-care institutionalisation are for ages 65-95. Although they generally fit well into the grouped age data provided, there is a tendency for the estimated rates to accelerate at the top ages and these figures should not be extrapolated.

7.2 Concluding remarks on the ECHP

The purpose of this Work Package has been to provide estimates of the transition rates between states of health, institutionalisation and mortality. As such it is primarily a descriptive analysis not designed to yield conclusions of theoretical or policy significance. These will follow when the present results are incorporated in other stages of the AHEAD programme. Nevertheless, we have been able to make a number of observations of a methodological nature, which hopefully will be of use if the ECHP health variables are used further and perhaps to successor surveys of this type.

The estimation of transition rates was complicated by four things: the apparent differential attrition from the sample according to health state; the major shortfall in the reporting of mortality and institutionalisation; and the lack of full harmonisation among countries in the treatment of the key health questions.

An important result of this work has been to show that the well-attested health differentials in attrition can be largely eliminated if mortality itself is regarded as a health state, rather than as simply attrition, and the sample is adjusted to allow for the shortfall in mortality. We have demonstrated how the latter can be achieved at least for those countries where reporting mortality appears to have been reasonably complete, using the method of post-stratification on the basis of population data. The method does rely on an assumption that the individuals for whom a mortality report is made are properly representative (in terms of their prior health) in respect of those who were simply lost, and of that we cannot be certain. Inverse Probability Weighting proved not particularly fruitful in this context, but perhaps we may be reassured by its failure to suggest that substantial reweighting is necessary. The lack of information on institutionalisation was much more problematic, and we have lent our voice to the many arguing that more attention should be paid to this in future longitudinal surveys concerned with health.

The problems of lack of harmonisation have been well-attested. As a result of the fact that individual national data units (NDUs) have considerable autonomy in practice, there has been distinct divergence in questionnaire content and survey design among countries (Nicoletti & Peracchi, 2004, p. 4). As has been repeatedly demonstrated (Bajekal, 2004; Wilson et al., 2004) responses on health status may be exceptionally sensitive to such variation. We took this further in our earlier report showing that for health transitions, differences cannot be attributed solely to differences in interpretation of the position of cutpoints in the same underlying health

continuum invoked by the exact presentation of the health question, but are more fundamental. Awareness of such sensitivity is probably one of the reasons for what might appear to be excessive national stubbornness on the wording of the questions (for example, by France regarding self-assessed health or by the UK BHPS regarding a hampering health condition). Many of the ECHP component parts had a pre-history in those countries and the experts have struggled to keep the questions constant over time, thus sacrificing a certain degree of comparability over space.

Eurostat and the European Commission have been acutely aware of all such problems. From the start of the panel, discussion on problems concerning harmonisation, attrition and data quality have been central to managing the panel (see the CIRCA web-site devoted to this). When it became clear that the initial design of a single 'pre-harmonised' survey could not be carried forward, the Commission funded the major investigation project "CHINTEX", which has allowed a series of distinguished and objective statisticians across Europe to look at the degree to which the 'post-harmonisation' has been successful.[23]

Despite these problems, comparisons of the results for different countries do show some regularities. The fact that a partially ordered-probit function has provided a suitable fit for all countries is itself significant. The structure of the coefficients shown in Tables 5 and 6 of each country report (where possible) shows some regularities. In most cases these are not only ordered along rows, as they must be, but also down columns, i.e. across the formulae for starting health states, in a fairly similar way. This appears to suggest that although we were obliged to abandon the fully ordered-probit function it would still be possible to devise a more condensed summary of the transition rates across countries than the separate partially ordered probit. In the earlier report it was suggested that, for example, a modification of the fully ordered model to allow for persistence in reporting health as being unchanged from wave to wave might be useful. Such suggestions remain to be investigated.

For all countries and all starting states of health there is nearly always a pronounced age gradient in the response, with younger persons more likely to report recovery or retention of a good health state and older persons a decline or retention of a bad health state. The same is true for both health measures, but for all countries the age gradient is more pronounced for persons above 65 than for those below. Another result common across countries is that for persons over 65, the age gradient tends to be most pronounced for those who are initially in good health.

Perhaps surprisingly, gender is rarely that significant to transition rates between states of health, although there are some exceptions. If there is a general trend, it is that the gender coefficients tend to be positive at initial good states of health and negative at bad states of health. This implies women are more likely to decline from good states of health, but men are more likely to decline or die once in a bad state of health. This result is tentative, however.

7.3 Concluding remarks on the survey of institutionalisation

These data show noticeable convergence in the proportion of older persons in health-care institutions and in the turnover rates, at least for the countries of north-western Europe for which we have data. Italy stands out as an exception. Where there are differences in rates, these seem more pronounced at older ages: thus Holland and Belgium's comparatively high rates are largely owing to particularly high numbers of the very old, when compared with England, Ireland and Finland.

[23] See the website of the Federal Statistical Office of Germany (http://www.destatis.de/chintex).

The data show a general pattern of lower institutionalisation than previous authoritative reports (see for example, OECD, 2000, Jacobzone et al., 2000, Grammenos, 2003 and AARP, 2004). These sources themselves had underscored the difficulty of consistent estimation, with which we would concur. We have hinted that this may sometimes reflect a shift in forms of housing, such as the development of sheltered housing, rather than genuine de-institutionalisation. While institutional estimates by census and population register may be under-estimates, the trends should be revealing nonetheless. These do support the suggestion of lower institutionalisation rates than in the past. The need for internationally comparable data remains strong and despite best efforts we can only have moderate confidence in the new data on turnover. In a report for the Commission's Directorate-General for Employment and Social Affairs on the feasibility of compiling such data from existing national sources, Grammenos (2003) concluded that this was not possible. The study directed by Pacolet for the EU in 1998 and 1999 (Pacolet et al., 1998 and 1999) surveyed each country in detail, with a country expert producing a separate paper and two EU-wide compilations. Yet without internationally agreed definitions and standards, such reviews will not bring us near enough to the goal. International comparison is exceptionally valuable in a period of rapid change, when learning could occur from other national experience, such as extensive de-institutionalisation. It is hampered by this basic barrier.

An example of this difficulty is discussed in the country report on Germany, which is the widespread reporting of the German figure for institutional residence of the 65+ group as 6.8%. This oft-repeated figure is said to have come originally from the major international comparison to date, through the OECD. In a thorough study for the European Commission of EU elder care in the 1990s, including residential placement, Pacolet and colleagues (1998 and 1999) compiled tables for the proportion of those aged 65+ in each category reported by national experts. Pacolet did not try to draw a line between these types, in the absence of information allowing this. Moreover, the final tables report beds or places per 100, as opposed to individuals. Others, basing themselves largely on Pacolet, have reported quite different totals. The unusual difficulty in the case of Germany, as discussed in the country report, is the problem of allocating 'multi-level homes' to either the institutional or the sheltered housing sector, since they span the range.

The most widely-known of the international 'league tables' on institutionalisation, which acknowledges its debt to Pacolet, is the important series of papers by Jacobzone (and also in Jacobzone et al., 2000) for the OECD (see 1998, 1999 and 2000 for example). Other comprehensive and valuable surveys have, in turn, reported the apparently authoritative OECD figures (for example, Grammemos, 2003) as more or less definitive, and this entire process has added an appearance of solidity to what are either fragile estimates or estimates in which the definitions are not known to be comparable. This elevation in status has occurred even though both Grammemos and the Directorate-General have stressed the problems of comparability, and the OECD has certainly insisted on this in numerous studies.

Some of the figures compiled by the OECD on institutional residence may be overstated, such as the German ones, clearly including a range of sheltered housing and said to have places for 2.74% of the elderly population in Germany in 1992. This would still be in the 'private household' sector. On the other hand, underestimation is also fully possible in international tables. In Eurostat's *Health Statistics* (2002a), a number of countries reported only their intensive nursing care and so are quite incompatible with others. At the present time there appears to be no single 'OECD estimate', as the serious working papers conflict with the OECD health data reports. The OECD and Eurostat have been in the very front line in attempting harmonisation of these statistics, as they have been for statistics in general.

The OECD's "Long-Term Care Study", originally due to report in 2004, has been delayed in appearance several times, presumably because of just such difficulties as we have outlined. In presenting the latest results, the director of this study (Huber, 2005) outlined an ambitious

agenda for the future, which included the drafting of refined definitions, the processing of a questionnaire that had been sent to countries in order to better comprehend the nature of long-term care industries and the exploration of other possibilities for producing comparable data. The OECD's emphasis is very much on expenditure, it would appear, and therefore the distinction of the institutional from the community population is not the priority. A number of Framework programmes, including this one and its predecessor AGIR (Schulz, 2004) are exploring or have explored long-term care within the EU. If we are to understand the very dramatic changes that appear to be happening across Europe with respect to institutionalisation, there is much that remains to be done. We hope that the survey presented here and its results, together with the material collected with the assistance of the AHEAD partners, can play a role in advancing this work.

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Appendices

Country Reports

These Appendices contain details of the key health transition data and the available institutional data for each of the ECHP participating countries. Depending on the quality of the available data for each country, the analysis described in the text has been undertaken. This includes a model for estimating annual transition rates:

i) between each state of self-rated health, including mortality (for individuals resident in a private household), estimated separately for persons under and over 65;

ii) between each state of hampering health conditions, including mortality (for individuals resident in a private household), estimated separately for persons under and over 65; and

iii) for those transitioning from private households to long-stay health-care institutions, with inferences about the rate from such institutions to mortality, for persons over 65.

Countries are presented in the same order in which they are numbered in the ECHP. As far as practical, a common format has been adopted throughout. See the main text for a summary of which analyses have been practical for each country.

An attached Excel spreadsheet presents the resulting age-specific estimates of these transition rates from the models, for each country.

Appendix A1. Germany

A1.1 ECHP notes

The German implementation of the ECHP was, in the end, based on data 'cloned' from the longer-running national longitudinal household survey (in English the Socio-Economic Panel Study or SOEP), which is conducted by the DIW – one of the partners in the AHEAD project. Initially, a parallel ECHP panel was begun. But, as in Great Britain, after three years the parallel study was abandoned and the national longer-running panel provides 'post-harmonised' data, albeit retrospectively. The process of conversion was much more intensive and demanding than originally anticipated and questions remain (Guenther, 2002). For the present enquiry, the parallel ECHP original presents problems. Ages over 70 were coded as 70, thus missing one of the key subgroups for our analysis. The question on hampering health condition was not asked in either survey in wave 1, so effectively there is only one transition available from the parallel survey. Results for the self-reported health question differ quite significantly between the surveys, with those in the parallel study reporting much more positively. As a result, it was decided to exclude the ECHP parallel survey from the present analysis. SOEP had 14,000 eligible respondents in total. Of the 12,200 interviewed at wave 1, 67% were also interviewed at wave 8, one of the lowest loss rates. Table 2 of the main report shows that the average loss rate of 'completed' health transition information from one wave to the next was low at just 7.5%.

A1.2 Post-stratification weights

The German data are distinguished by good reporting of mortalities. A total of 598 mortalities were reported from the SOEP during the study, although the person's age was unknown in 28 cases. Table A1.1 shows the mortality rates for six broad age and gender groups calculated from the German ECHP (SOEP only, all waves pooled, weighted with Eurostat weights), based on persons whose age and survival status were known between each pair of waves. Alongside them are actual population mortality rates for Germany.

No estimates are available for mortalities in institutions and so there is no direct means of establishing the mortality rate among private households, at least for persons over 65. Yet in the case of Germany we consider it reasonable to assume that mortalities were reliably reported in the SOEP – that the individuals who died were not over-represented among those lost at successive waves. If the sample mortality rates as reported by the SOEP are approximately right for those in Germany not living in a long-term health-care institution, then no post-stratification by mortality is necessary and Table A1.2 is omitted.

We are prepared to make this assumption for three reasons. First, the reported annual (weighted) mortality rate of 1.2% is one of the highest of all the ECHP countries, suggesting that there is at least less under-reporting than elsewhere. Second, the SOEP on which the German ECHP is based is a well-established, high-quality longitudinal survey, unlike most countries, which were starting from scratch. It had one of the lowest attrition rates, with just 2% of the original sample ending up 'lost'. An analysis of the German SOEP (Heller & Schnell, 1995) studied "The Invisible Choir" of those who had died in some detail. The SOEP itself announced a plan (Schupp & Wagner, 2002, p. 9) to uncover previously unreported mortalities through investigation of local mortality registers, as Germany has no single central mortality register.

The third reason is a little more complicated and relies on evidence about the prevalence of institutional care presented in section A1.4. This has the following implication. If the annual mortality rate among persons aged 65+ in long-stay health-care institutions is 25% of the prevalence rate, then it can be shown that the German ECHP data would be accurately reflecting

population mortality rates in private households. This figure applies not just in total, but in most age/gender bands (except for men aged 65-74, where the shortfall of reported mortalities is a little higher). An institutional mortality rate of 25% is plausible, for countries where it is known it tends to be about 30 to 40%. We think it can be accepted for this purpose. Because the great majority of mortalities at all but the very top age groups occur among persons formerly living in private households, the estimated mortality rate in private households is not unduly sensitive to assumptions about mortalities in institutions, and even if the ratio of mortalities to residents was 10% higher, it would have only a small effect on the figures presented in Tables A1.3-A1.6, at least for persons under 75.

A1.3 Transition rates based on the ECHP

Tables A1.3 and A1.4 show overall, annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights. These rates exclude transitions to long-stay health care and so should be regarded as conditional on no such transition (this only makes a real difference for older persons).

These are followed in Tables A1.5 and A1.6 by probit functions obtained by robust ordered-probit analysis conditional on starting health (i.e. separately calculated for each starting health state), using age and gender as predictors, pooling across waves of the ECHP again with Eurostat weights and post-stratification by mortality. Section 6 of the report describes this methodology and how to use the formulae to predict age-/gender-/country-specific transition probabilities. Standard errors use robust estimation to allow for the repeated measurements on individuals. The gender coefficient applies to women as opposed to men. The α coefficients represent boundary points on the normal distribution between outcome health states. Coefficients shown asterisked are *not* statistically significant (5%, robust test).

A1.4 Information about institutionalisation

Transitions to institutions may have been reasonably well-covered in the SOEP earlier, but this is not the case in the ECHP dataset. There may be individual studies of further use that were not accessible to us. We know that Klein (1998) in a study (the Altenheim Survey) of some 5,000 persons reports further on the socio-economic correlates of transition to institutionalisation, using as well the SOEP, but we do not have access to the original article. Schulz (2004) summarises the findings of Klein's earlier (1996) work (event history analysis).

The AGIR 5th Framework Programme project that covered long-term care (Schulz, 2004) was able to provide us with a time-series for residence in long-term care, shown in Table A1.7.[24] The basic source for the data is the German *Bundesministerium für Gesundheit*, which since 1997 has reported beneficiaries of the new long-term insurance. We are not aware of alternate estimates, although the German Micro-Census of 1999 revealed slightly higher figures (about 10% above these). The prevalence rates seem slightly low, but are entirely in line with those reported by others who also use the same data (e.g. Vollmar, 2000 and Rothgang in PSSRU DP 1840, 2003) and have not, to our knowledge, been widely questioned. These figures will, however, omit those paying for entirely private care.

The data are also compatible with some, but not all interpretations in international data, a number of which reported '6.8%' for Germany (see for example OECD, 2003; Jacobzone et al., 2000; the Bertelsmann Foundation International Reform Monitor, 2005).

[24] This was supplied by AHEAD partner Erika Schulz (DIW) along with other useful data.

A1.5 Deriving an age/gender model for institutional admission rates

Neither the DIW nor the Long-Term Insurance Authorities[25] provide any incidence data, whether in the form of institutional admissions or mortalities, and we have been unable to find even partial information. Lacking any data on transition admissions, mortalities and discharges, this is not possible. Table A1.8 is omitted.

A1.6 Germany tables

Table A1.1. Annual mortality rates per 1,000, from the ECHP and in the population as a whole

	ECHP[1]		Population[2]	
	Men	Women	Men	Women
Below 65	5.0 (122)	2.6 (64)	4.4	2.1
65-74	34.2 (97)	13.9 (56)	33.9	17.9
75+	90.7 (95)	64.6 (136)	113.1	88.4

[1] Eurostat weights are used Figures in brackets are reported numbers of mortalities on which the rate is based.

[2] Calculated from Eurostat, New Cronos database, 1997 data. Note that the figures given in this table have not been adjusted to reflect an estimate of mortalities in the community alone, in the absence of any indication about mortalities or admissions to care in Germany at this time. A sensitivity analysis was done, estimating such mortalities as 20%, 30% and 40% of the institutional population, and is available on request.

Table A1.2. (Omitted – see text)

Table A1.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled, SOEP only)

(a) Men under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	3502	45	47	7	1	0
Good	14608	10	68	20	3	0
Fair	9493	2	26	58	14	0
Bad/very bad	3940	1	8	31	58	2

(b) Women under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	3094	46	45	7	2	0
Good	14050	8	65	23	4	0
Fair	10330	1	27	55	16	1
Bad/very bad	4967	1	9	31	58	1

[25] See the website http://www.bmgs.bund.de/downloads/TabGesamt-April-2004.pdf.

(c) Men over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	88	40	41	18	1	0
Good	863	3	46	41	7	3
Fair	1991	1	14	63	19	3
Bad/very bad	1279	0	3	24	61	12

(d) Women over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	113	34	42	14	7	2
Good	102	6	41	42	8	2
Fair	2767	0	13	61	23	2
Bad/very bad	2347	0	2	22	69	6

Table A1.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled, SOEP only)

(a) Men under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	19018	87	11	1	0
Some	6056	34	57	9	0
Severe	1530	7	28	62	3

(b) Women under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	18450	84	14	1	0
Some	7319	31	59	9	1
Severe	1617	8	31	60	1

(c) Men 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	1137	61	33	4	2
Some	1771	18	66	13	3
Severe	746	5	21	60	14

(d) Women 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	1556	60	35	4	1
Some	2493	16	65	16	2
Severe	1229	2	24	65	9

Table A1.5. Ordered-probit formulae coefficients for annual transition probabilities for self-reported health from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	0.160	1.639	2.395	3.324	0.009	0.001*
	(0.077)	(0.084)	(0.096)	(0.184)	(0.002)	(0.051)
Good	-0.664	1.410	2.551	3.694	0.017	0.107
	(0.041)	(0.043)	(0.049)	(0.096)	(0.001)	(0.023)
Fair	-1.280	0.334	1.977	3.636	0.020	0.041*
	(0.058)	(0.054)	(0.057)	(0.091)	(0.001)	(0.028)
Bad/very bad	-1.331	-0.187	0.940	3.491	0.025	-0.060
	(0.114)	(0.102)	(0.106)	(0.131)	(0.002)	(0.048)

(b) Persons 65 and over

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	2.218	3.372	4.147	4.858	0.033*	0.263*
	(1.325)	(1.313)	(1.294)	(1.281)	(0.017)	(0.239)
Good	0.758	2.381	3.723	4.437	0.034	-0.084*
	(0.417)	(0.410)	(0.413)	(0.434)	(0.006)	(0.074)
Fair	-1.084	0.450	2.253	3.501	0.021	0.054*
	(0.277)	(0.285)	(0.287)	(0.291)	(0.004)	(0.051)
Bad/very bad	-1.067	0.033	1.280	3.374	0.027	-0.090*
	(0.387)	(0.369)	(0.369)	(0.380)	(0.005)	(0.069)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A1.6. Ordered-probit formulae coefficients for annual transition probabilities for a hampering health condition from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	1.889	2.915	3.529	0.014	0.036*
	(0.050)	(0.080)	(0.099)	(0.002)	(0.040)
Some	0.500	2.311	3.612	0.020	0.043*
	(0.071)	(0.078)	(0.118)	(0.001)	(0.034)
Severe	-0.445	0.722	3.136	0.022	-0.130*
	(0.247)	(0.245)	(0.274)	(0.003)	(0.080)

(b) Persons 65 and over

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	2.391	3.757	4.311	0.030	-0.032*
	(0.439)	(0.451)	(0.475)	(0.006)	(0.073)
Some	1.816	3.774	4.861	0.038	0.007*
	(0.321)	(0.326)	(0.325)	(0.004)	(0.053)
Severe	0.407	1.679	3.608	0.032	-0.141*
	(0.410)	(0.416)	(0.427)	(0.005)	(0.089)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A1.7. Estimated numbers of residents in institutions who are beneficiaries of long-term care, Germany (1999), per 1,000 population alive in age/gender group

Age	Men	Women
65 – 74		
75 +		
Total numbers	*84,516*	*403,248*

Source: Calculated from Schulz (2003).

Table A1.8. (Omitted – see text)

Appendix A2. Denmark

A2.1 ECHP Notes

Denmark had a sample of about 6,500 individuals. Statistics Denmark reported a substantial effort to track the ECHP panel (Eurostat, 1996), but the out-turn for mortality appears somewhat uneven by age. In some age groups, there are significantly more mortalities reported than would be expected given population statistics.

The newly institutionalised population was also reported with the highest frequency of any country, although we suspect the rate is still well below the likely true figure. In other respects, response rates were average. Some 52% of the 5,900 persons interviewed in the first wave were also interviewed in the last. The average loss rate of health transition information from one wave to the next was 12% (see Table 2 of the main report).

A2.2 Post-stratification weights

A total of 366 mortalities were reported during the study, although the person's age was unknown in 66 cases. Table A2.1 shows the mortality rates for six broad age and gender groups calculated from the Denmark ECHP (all waves pooled, weighted with Eurostat weights), based on persons whose age and survival status were known between each pair of waves. Alongside them are the actual population mortality rates in total from Eurostat New Cronos Database.

No estimates are available for mortalities in institutions and so there is no direct means of establishing the mortality rate among private households, at least for persons over 65. As explained in section A2.4, however, since there is a good prevalence data and other information about institutions, along with the recognition that reporting of the ECHP in Denmark is generally very good with a low drop-out rate, we have decided to approximate mortality rates in institutions to compute the expected true rate in the ECHP. For countries offering a similar type of institutional health care for older persons, the annual mortality rate is typically in the range of 30 to 40% of the number of residents. Therefore the consequences of assuming either a 30 or 40% ratio of mortalities to residents has been examined, which will provide a range (hopefully, limits) to the transition probabilities. It is assumed that the ratio (30 or 40%) applies equally at all ages among older persons, although in reality mortality rates are likely to be higher at the upper ages. Table A2.1 shows the expected true mortality rate in the ECHP sample under each of these assumptions (the 30% variant and the 40% variant). This demonstrates the surplus of mortalities particularly in the 65-74 age group, although for other groups there is actually a shortfall. Table A2.2 shows the resulting post-stratification weights, which are the same for both health measures.

A2.3 Transition rates based on the ECHP

Tables A2.3 and A2.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for persons in the community by gender and broad age band, using the ECHP with Eurostat weights. Those for persons over 65 are shown with the 30% variant assumption: the 40% assumption makes no more than 1% difference to any of the transition rates shown in these tables. These rates exclude transitions to long-stay health care, and thus should be regarded as conditional on no such transition (this only makes a real difference for older persons).

These are followed in Tables A2.5 and A2.6 by probit functions obtained by a robust ordered-probit analysis conditional on starting health (i.e. calculated for each starting health state

separately), using age and gender as predictors, pooling across waves of the ECHP again with Eurostat weights and post-stratification by mortality. Section 6 of the report describes this methodology and how to use the formulae to predict age-/gender-/country-specific transition probabilities. Standard errors use robust estimation to allow for the repeated measurements on individuals. The gender coefficient applies to women as opposed to men. The α coefficients represent boundary points on the normal distribution between outcome health states. Coefficients shown asterisked are *not* statistically significant (5% level, robust test).

For persons over 65, the formulae for the two variant versions are shown separately. Surprisingly, these predict rather more difference than might be expected given that the averages in Tables A2.3 and A2.4 are very similar no matter which variant is used. In general the 40% variant, which predicts a higher proportion of mortalities in institutions, tends to predict a lower probability of mortality and a greater probability of recovery from each starting health state. Predicted transition rates are typically up to 3% different between variants, although for the 'younger' elderly, those just over 65, it is sometimes higher. This might be a distortion arising from the assumption that the mortality rate in institutions is the same at all ages.

A2.4 Information about institutionalisation

Published Danish data on residents are not normally broken down by gender, although they are broken down by age. Fortunately, AGIR was able to collect such data, which is shown in Table A2.7. The historic position of Denmark as a 'high institution' country has been subject to change, with the development of sheltered housing in particular. The Danes are officially proud that no new conventional nursing home has been built for 20 years (Colmorten et al., 2003, p. 10; NOSOSCO, 2002, p. 209). This decrease is reflected in an institutional rate that went from 5.3% in 1990 to 3.1% in 2003. A mean value for the ECHP years is used here, for comparability with other countries, but it should be appreciated that the steep trend means this is a historical figure only.

The major concern about under-estimation in this data refers primarily to the inability to confirm that the growing sheltered housing sector is adequately represented in the ECHP. Although the boundary between sheltered housing and residential care was established by legislation in 1987, we understand from Statistics Denmark that doctors who record place of mortality do not appreciate the difference between homes on either side of the 'institutional border', which suggests the extent of the possible problem. The rise in sheltered housing over the last decade exactly matches the fall in residential care, and because of this Danish statistics have been criticised as misleading (Lewinter, 2004). The same issue may well apply to other the ECHP countries.

A2.5 Deriving an age/gender model for institutional admission rates

Unfortunately, there is no data available on turnover, to the best of our knowledge (and our contact at Statistics Denmark). The latter attributes this to the responsibility lying with municipalities for this care. With no information on turnover there is no basis for such a model. For this reason, Table A2.8 is omitted.

A2.6 Denmark tables

Table A2.1. Annual mortality rates per 1,000, from the ECHP, in the population as a whole and estimated for persons previously living in private households

	ECHP[1]		Population[2]		Household pop. (30% variant)		Household pop. (40% variant)	
	Men	Women	Men	Women	Men	Women	Men	Women
Below 65	2.7 (36)	2.1 (29)	4.1	2.0	3.4	2.7	3.4	2.7
65-74	36.8 (60)	21.8 (36)	36.0	23.1	31.0	18.2	30.2	17.5
75+	68.1 (77)	42.2 (62)	11.0	86.0	91.8	60.2	87.8	54.0

[1]Eurostat weighted. Figures in brackets are reported numbers of mortalities on which the rate is based.

[2] The source for this data is Statistics Denmark (1994-2001 annual average).

Table A2.2. Post-stratification (mortality) weights

(a) For self-reported health, 30% variant

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 65	1.2718	1.2718	0.9994	0.9994
65-74	0.8415	0.8345	1.0067	1.0043
75+	1.3482	1.4280	0.9711	0.9774

(b) For self-reported health, 40% variant

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 65	1.2718	1.2718	0.9994	0.9994
65-74	0.8240	0.8051	1.0074	1.0050
75+	1.2942	1.2792	0.9955	0.9983

(c) For a hampering health condition, 30% variant

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 65	1.3707	1.3707	0.9992	0.9992
65-74	0.9023	0.7415	1.0039	1.0076
75+	1.4023	1.4698	0.9680	0.9759

(d) For a hampering health condition, 40% variant

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 65	1.3707	1.3707	0.9992	0.9992
65-74	0.8835	0.7154	1.0046	1.0083
75+	1.3462	1.3167	0.9923	0.9968

Table A2.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	5962	72	25	3	0	0
Good	3479	36	51	12	1	0
Fair	1360	10	27	53	9	1
Bad/very bad	311	4	5	41	46	4

(b) Women under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	5271	71	25	3	1	0
Good	3537	33	51	14	2	0
Fair	1633	9	27	54	10	1
Bad/very bad	558	2	7	34	53	4

(c) Men over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	513	51	35	10	1	3
Good	772	18	50	23	4	5
Fair	703	5	23	50	15	7
Bad/very bad	292	0	7	23	56	13

(d) Women over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	449	46	37	13	2	1
Good	830	19	51	23	5	2
Fair	874	4	19	54	17	5
Bad/very bad	464	1	4	25	59	11

Note: Tables (c) and (d) were prepared with the 30% variant, but the transition rates shown are not significantly changed in the 40% variant.

Table A2.4 Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	7784	93	5	1	0
Some	988	40	50	9	1
Severe	255	13	36	49	2

(b) Women under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	7440	91	8	1	0
Some	1462	37	54	9	0
Severe	417	8	37	52	4

(c) Men 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	1143	79	12	4	5
Some	429	26	49	19	7
Severe	267	8	22	60	10

(d) Women 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	1125	78	16	4	2
Some	585	27	52	17	4
Severe	408	7	16	65	11

Note: Tables (c) and (d) were prepared with the 30% variant, but the transition rates shown are not significantly changed in the 40% variant.

Table A2.5. Ordered-probit formulae coefficients for annual transition probabilities for self-reported health from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	1.013 (0.055)	2.241 (0.057)	3.067 (0.077)	3.630 (0.126)	0.012 (0.001)	0.029* (0.031)
Good	0.146 (0.064)	1.614 (0.068)	2.727 (0.077)	3.442 (0.115)	0.012 (0.001)	0.091 (0.034)
Fair	-0.548 (0.109)	0.448 (0.112)	2.102 (0.123)	3.272 (0.145)	0.017 (0.002)	0.048* (0.057)
Bad/very bad	-1.293 (0.369)	-0.679 (0.353)	0.555 (0.365)	2.469 (0.355)	0.012* (0.006)	0.084* (0.112)

(b) Persons 65 and over (30% variant)

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	1.602 (0.548)	2.663 (0.551)	3.432 (0.556)	3.670 (0.559)	0.022 (0.008)	0.051* (0.093)
Good	0.753 (0.367)	2.168 (0.368)	3.103 (0.363)	3.521 (0.358)	0.023 (0.005)	-0.090* (0.066)
Fair	-0.152 (0.379)	0.899 (0.378)	2.335 (0.382)	3.136 (0.376)	0.021 (0.005)	0.041* (0.069)
Bad/very bad	0.133 (0.628)	1.063 (0.600)	2.014 (0.611)	3.886 (0.614)	0.036 (0.008)	-0.055* (0.103)

(c) Persons 65 and over (40% variant)

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	1.585 (0.545)	2.648 (0.549)	3.425 (0.554)	3.701 (0.558)	0.022 (0.008)	0.052* (0.093)
Good	0.683 (0.363)	2.100 (0.365)	3.046 (0.360)	3.481 (0.355)	0.022 (0.005)	-0.092* (0.065)
Fair	-0.262 (0.377)	0.790 (0.375)	2.235 (0.379)	3.063 (0.375)	0.019 (0.005)	0.034* (0.069)
Bad/very bad	-0.030 (0.622)	0.903 (0.594)	1.976 (0.604)	3.763 (0.609)	0.034 (0.008)	-0.065* (0.102)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A2.6. Ordered-probit formulae coefficients for annual transition probabilities for a hampering health condition from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	1.960 (0.071)	2.918 (0.083)	3.476 (0.107)	0.011 (0.002)	0.145 (0.039)
Some	0.342 (0.108)	1.974 (0.113)	3.211 (0.154)	0.014 (0.002)	0.051* (0.065)
Severe	-0.517 (0.325)	1.203 (0.327)	3.196 (0.352)	0.024 (0.006)	0.209* (0.129)

(b) Persons 65 and over (30% variant)

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	2.836 (0.422)	3.498 (0.418)	3.863 (0.418)	0.028 (0.006)	-0.046* (0.073)
Some	0.808 (0.495)	2.186 (0.493)	3.096 (0.489)	0.020 (0.007)	-0.089* (0.082)
Severe	0.221 (0.592)	1.003 (0.586)	2.914 (0.585)	0.021 (0.008)	0.113* (0.103)

(c) Persons 65 and over (40% variant)

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	2.784 (0.418)	3.415 (0.415)	3.793 (0.415)	0.027 (0.006)	-0.048* (0.073)
Some	0.714 (0.490)	2.096 (0.493)	3.033 (0.486)	0.019 (0.007)	-0.094* (0.081)
Severe	0.095 (0.587)	0.879 (0.581)	2.821 (0.581)	0.019 (0.008)	0.106* (0.103)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A2.7. Estimated average numbers of long-stay residents in residential care institutions (excluding sheltered housing and related residences), per 1,000 of the population 65+, Denmark 1994-2001

	Men	Women
65-74	8.9	9.2
75+	49.3	85.3
Average number	*8319*	*22252*

Source: Schulz (2004) and Statistics Denmark.

Table A2.8. (Omitted – see text)

Appendix A3. The Netherlands

A3.1 ECHP Notes

The Netherlands implementation of the ECHP included 13,500 individuals. Of the 9,400 interviewed in the first wave, 56% were interviewed in the last wave, an average attrition rate. For both self-reported health and a hampering health condition, the response rate was 90% (this is the proportion of achieved responses, including mortality, from all planned interviews, excluding wave 1 when the hampering health condition question was omitted). There was an average loss of 11% in health transition information (see Table 2 of the main report).

A3.2 Post-stratification weights

The Netherlands implementation of the ECHP did not distinguish mortalities or institutionalisation from other forms of loss from the sample. As a result, it is not possible to post-stratify or to undertake the main analysis of this report. Tables A3.1 and A3.2 are omitted.

A3.3 Transition rates based on the ECHP

Tables A3.3 and A3.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights. Yet these tables exclude transitions to both mortality and long-stay health care, and so should be regarded as conditional on no such transitions. These tables have been included for completeness, but are of limited usefulness particularly for persons over 65 and cannot be compared with other countries.

A3.4 Information about institutionalisation

Very full sources of published information on prevalence exist from Statistics Netherlands, from population registers and the Virtual Census, as well as from AWZB, the administration board for care assessment.[26] Numbers and rates are variously broken down by year, type of institution[27] (nursing homes and homes for the elderly), detailed by age/gender group and dependency tier. The proportion of persons over 65 who are permanent residents was unusually high by European standards as a result of post-war policies (Van Ewijk, 2002, p. 23), but a concerted policy has seen it fall over the last decade to about three-quarters of its former level, and still declining (Netherlands Ministry of Health, 2001). To be comparable with other countries we have undertaken analysis for just one year, 1998, in the middle of the ECHP survey, but the trend must be noted as it will affect future predictions. The two sources of information report rather different totals. For the year 2000, Statistics Netherlands reports 137,000 long-stay elderly residents while AWZB reports 176,000.[28] It is believed that the

[26] Much data was supplied to us by Esther Mot, Central Planning Bureau of the Netherlands, to whom we express our thanks. Full tables are available from the authors. See Statistics Netherlands (retrieved from www.statline.nl); see also the virtual census (retrieved from http://www.cbs.nl/en/publications/articles/general/census-2001/census-2001.htm); further, AWZB data may be found on-line (retrieved from http://www.socialestaat.nl/scp/publicaties/boeken/9037701027/Intramurale_AWBZ_voorziening.pdf).

[27] Specifically, these are the smaller nursing-home sector (*verpleeghuizen*) and the larger sector for those less dependent (*verzorgingshuizen*). Statistics Netherlands translates this latter type as "homes for the elderly".

[28] Dutch care expert Van Ewijk (2002, p. 8) comments that "As stated before, national comparable data are [hard] to find. Authoritative reports from Statistics Netherlands, the Ministry of Health, Welfare and Sports, OSA and Prismant are presenting different figures."

former more accurately represents permanent residents and matches figures from the 2001 Virtual Census, so our estimates have been based on this. Nevertheless, in other countries the population register approach does lead to an undercount (see Belgium and Finland), although Statistics Netherlands does not express concern about this. As a detailed age/gender breakdown is not available in annual Statistics Netherlands reports, it has been assumed that the distribution of the Virtual Census applied similarly in 1998.

The information on turnover is available only using a similar methodology to that of the AWZB prevalence statistics and includes numbers of new admissions to elderly persons homes, first-time admissions to nursing homes, numbers of mortalities from both types of institutions and discharges from nursing homes. Paradoxically, numbers of admissions have been rising while numbers of residents have fallen. In 1998 there were reported to be 26,000 new admissions to elderly person's homes and 43,000 first-time admissions to nursing homes. Numbers of mortalities from the two types of institutions is given as 22,000 and 24,000 respectively; thus, there are substantial numbers of discharges particularly from nursing homes. It is not known how long those discharged were residents and there is no breakdown by age or gender.

A3.5 Deriving an age/gender model for institutional admission rates

Two measures of turnover are developed; the number of new/first-time admissions and the number of mortalities among persons in institutions. As the difference between these is accounted for by discharge persons who will have been in care for an unknown period, these two figures represent bounds on the total new demand for long-stay institutional health care during a year. Three assumptions are necessary to produce turnover measures comparable with estimates of residents, none of which are entirely satisfactory but are the best we can do. First, we have assumed the available turnover figures are comparable with the AWZB prevalence figures and therefore will need to be deflated to match the more reliable Statistics Netherlands figures on numbers of permanent residents. Second, in order to derive a breakdown of admissions by age and gender, data from elsewhere were used. The age/gender-specific ratios of admissions to residents in England (see section A9) were applied to the age/gender-specific numbers of residents in the Netherlands and then scaled over all age/gender groups so that the ratio matches the actual ratio in the Netherlands This procedure is given some credence in that the overall ratio of admissions to residents are very similar in England and the Netherlands. Third, with no highly comparable data on mortalities, we have simply assumed that the ratio of mortalities to admissions is the same in each age/gender group as it is overall. This will only be approximately true if, as in England, average survival following admission is quite short.

The resulting estimates are shown in Table A3.7. Note that the admissions rates in this table are based on the total population, including existing residents.

A smoothed probit function by age for the first-time admission rates (expressed in terms of the proportion of persons of that age group still living in private households) is shown in Table A3.8. Functions for men and women are shown separately: that for men does not require a term in age-squared, although there is no simple pattern of differences between the genders as there is for other countries. The function for women fits the data of Table A3.8 much more closely than does the function for men. As a result of the simplified methodology, the mortality rate can be estimated as 66% of the first-time admissions rate, at each age. No standard errors are given as these estimates are not derived by sampling.

A3.6 The Netherlands tables

Table A3.1 (Omitted – see text)

Table A3.2. (Omitted – see text)

Table A3.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	5214	55	42	3	0
Good	13057	16	73	10	1
Fair	3570	3	36	55	6
Bad/very bad	559	2	10	41	47

(b) Women under 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	4525	48	48	4	0
Good	14535	14	73	13	1
Fair	4963	3	33	56	8
Bad/very bad	1039	1	10	39	50

(c) Men over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	362	43	51	5	0
Good	1808	9	65	25	1
Fair	1579	1	23	66	10
Bad/very bad	257	0	6	41	53

(d) Women over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	334	45	49	5	1
Good	2061	6	66	26	2
Fair	2168	1	18	70	11
Bad/very bad	500	0	4	38	58

Notes: Weighted using Eurostat weights; excludes mortalities.

Table A3.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)		
Initial health	N	None/slight	Some	Severe
None/slight	15989	93	6	1
Some	2149	39	50	11
Severe	872	17	28	56

(b) Women under 65

		Final health (row %)		
Initial health	N	None/slight	Some	Severe
None/slight	16925	91	7	2
Some	2985	39	49	13
Severe	1377	16	30	54

(c) Men 65 and over

		Final health (row %)		
Initial health	N	None/slight	Some	Severe
None/slight	2214	85	12	3
Some	778	27	52	21
Severe	436	8	32	60

(d) Women 65 and over

		Final health (row %)		
Initial health	N	None/slight	Some	Severe
None/slight	2506	78	17	5
Some	1094	30	48	22
Severe	715	9	26	64

Notes: Weighted using Eurostat weights; excludes mortalities.

Table A3.5. (Omitted – see text)

Table A3.6. (Omitted – see text)

Table A3.7. Estimated numbers of long-stay residents, first-time admissions and mortalities in health-care institutions, the Netherlands (1998), per 1,000 population alive in age/gender group

	Men			Women		
Age	Residents	Admissions	Mortalities	Residents	Admissions	Mortalities
65 – 69	8	2	1	9	3	2
70 – 74	14	7	5	21	8	5
75 – 79	31	13	9	55	25	16
80 – 84	78	45	30	144	67	44
85 – 89	195	104	69	306	127	84
90 – 94	348	122	81	497	177	117
95 +	517	125	83	651	206	136
Total numbers	*33209*	*15578*	*10323*	*115615*	*47214*	*31286*

Table A3.8. Probit formulae for first-time admission probabilities (persons 65 and over)

	Based on admission		
	α_1	Age	Age-squared
Men	-8.674	0.08552	-
Women	-6.314	0.01709	0.00052

Appendix A4. Belgium

A4.1 ECHP Notes

There were no special problems with the data from Belgium, which had a starting sample of 7,500. Of the 6,700 interviewed in wave 1, a slightly below average 52% were interviewed at wave 8. There was an average 11% loss rate in health transition information between the waves (see Table 2 of the main report).

A recent report on quality issues in the Belgian panel (De Keulenaer, 2004) did not report any other concerns than that of selective attrition by socio-economic status. The pattern of causes of attrition (non-contact or refusal) was found to be exceptionally complex and thus identifying a pattern that is itself a challenge.

A4.2 Post-stratification weights

Belgium shared in the general problem of under-reporting mortalities. A total of 249 mortalities were reported during the study, although the person's age was unknown in 28 cases. Table A4.1 shows the mortality rates for six broad age and gender groups calculated from the Belgium ECHP (all waves pooled, weighted with Eurostat weights), based on persons whose age and survival status were known between each pair of waves. Alongside them are the actual population mortality rates first in total from the Eurostat New Cronos database and (for persons over 65) as we estimate would have been expected for a household-based population only. The latter figure is adjusted to allow for mortalities among those who would have been living in a health-care institution at the time of the previous the ECHP survey wave and are therefore excluded from the survey. Section A4.4 provides details of the institutional data that was used for this purpose. The divergence between these figures and the observed the ECHP rates demonstrate the shortfall in mortalities in the ECHP in Belgium.

The method of construction of weights to adjust for the shortfall in mortalities is explained in Box 1 of the report. There was rather limited information on turnover in institutions to make the institutional adjustment to mortality rates (see Box 2 of the main report) and some approximation was required (see section A4.4). Because of the different availability of data for the two health measures, somewhat different the weights are required (Table A4.2). The expected and actual mortalities are very small and not much different for those under 65 in Belgium, so reweighting has been limited to persons over 65. A significant factor for Belgium is that nearly one quarter of the total mortalities were reported during the first year, when the question on hampering health condition was not asked.

A4.3 Transition rates based on the ECHP

Tables A4.3 and A4.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights. These rates exclude transitions to long-stay health care and so should be regarded as conditional on no such transition (this only makes a real difference for older persons).

These are followed in Tables A4.5 and A4.6 by probit functions obtained by robust ordered-probit analysis conditional on starting health (i.e. calculated for each starting health state separately), using age and gender as predictors, pooling across waves of the ECHP again with Eurostat weights and post-stratification by mortality. Section 6 of the report describes this methodology and how to use the formulae to predict age-/gender-/country-specific transition probabilities. Standard errors use robust estimation to allow for the repeated measurements on

individuals. The gender coefficient applies to women as opposed to men. The α coefficients represent boundary points on the normal distribution between outcome health states. Coefficients shown asterisked are not statistically significant (5% level, robust test).

A4.4 Information about institutionalisation

Sources of information on prevalence exist, from the insurance agency RIZIV/INAMI, and AHEAD partner Windy Vandevere has supplied us with a thorough data set on this. (The AGIR database also contains relevant data.) A question of completeness arises, however. Numbers of residents reported on the population register in 2000 are 16% below those from insurance records at the same time (Abramowska et al., 2004). The insurance records for 2000 agree reasonably with the 1997 AGIR database estimates, but these are substantially greater than for earlier years, probably owing to the inclusion of more types of institutions.

Information on turnover is considerably more limited. Admission rates of long-stay residents to care homes for elderly persons (known as 'ROBs' are available from a Sentinel survey in 1994 (Devroey et al., 2002), annual rates being 6.37 per 1,000 for men aged 60+ and 12.93 per 1,000 for women aged 60+. This corresponds to a rate of 28% per annum. (Nevertheless, ROBs only represent about three-quarters of all residents.) Another unpublished study by RIZIV, the results of which were transmitted to us by Windy Vandevere, has estimated a mortality rate among residents of all types of health-care institutions for older persons as being 26% per annum of existing residents in 2001. These figures seem consistent and do imply that few new admissions leave.

A4.5 Deriving an age/gender model for institutional admission rates

Estimates of prevalence are based on the 1997 AGIR database figures. As these were supplied in coarse age groups, both genders combined, they were split into finer age groups and gender pro-rata with figures from the 2000 insurance record. Admissions rates from a 1994 survey (by gender) were split among age groups using prevalence information from 1995 on residents. As the ratio of admissions to residents varies considerably by age, the age-specific rates were derived from the England dataset (see section A9), scaled so the overall number matched the known total admissions in Belgium. As the overall ratio of admissions to residents is similar in Belgium and England, the scaling factors are close to 1, giving some extra confidence in this procedure. Age/gender rates residents and long-stay admissions to institutions for Belgium in 1997 derived by these methods are shown in Table A4.7. Note that the admissions rate in this table is based on the total population, including existing residents.

A smoothed probit function by age for the admission rates (expressed in terms of the proportion of persons of that age group still living in private households), based on these figures, is shown in Table A4.8. As there is an interaction between age and gender, functions for men and women are shown separately. Age-squared as well as age is used in these formulae as it provides a better fit. No standard errors are given as these estimates are not derived by sampling.

A4.6 Belgium tables

Table A4.1. Per 1,000, from the ECHP, in the population as a whole and estimated for persons previously living in private households

	ECHP[1]		Population[2]		Household population	
	Men	Women	Men	Women	Men	Women
Below 65	3.3 (49)	1.4 (22)	3.8	1.7	3.8	1.7
65-74	17.2 (36)	8.2 (21)	32.4	15.1	30.6	13.2
75+	45.8 (53)	22.5 (40)	107.7	83.0	95.9	59.0

[1] Eurostat weighted. Figures in brackets are reported numbers of mortalities on which the rate is based.

[2] The source for this data is Eurostat New Cronos Database (1994-2001 annual average).

Table A4.2. Post-stratification (mortality) weights

(a) For self-reported health

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 65	1.0000	1.0000	1.0000	1.0000
65-74	1.5943	1.5005	0.9884	0.9956
75+	1.7614	2.1275	0.9561	0.9677

(b) For a hampering health condition

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 65	1.0000	1.0000	1.0000	1.0000
65-74	1.5356	1.5352	0.9891	0.9954
75+	2.1283	2.6789	0.9468	0.9622

Table A4.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	3894	63	34	3	0	0
Good	6936	18	71	10	0	0
Fair	1889	4	36	51	7	1
Bad/very bad	419	1	9	34	52	4

(b) Women under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	3344	60	37	3	0	0
Good	7692	15	72	13	1	0
Fair	2968	3	33	56	7	0
Bad/very bad	546	1	8	45	44	2

(c) Men over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	245	45	42	8	2	4
Good	1260	7	67	22	1	3
Fair	1052	0	25	59	11	6
Bad/very bad	285	1	4	31	48	16

(d) Women over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	242	42	49	7	1	2
Good	1411	7	62	27	2	2
Fair	1631	1	20	64	12	3
Bad/very bad	510	0	5	31	55	9

Table A4.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	n	None/slight	Some	Severe	Deceased
None/slight	9594	95	3	1	0
Some	760	45	43	11	0
Severe	356	19	23	54	4

(b) Women under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	10582	95	4	1	0
Some	941	37	52	11	0
Severe	390	17	29	52	2

(c) Men 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	1618	82	11	3	4
Some	443	35	43	18	4
Severe	304	16	21	48	15

(d) Women 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	2081	83	11	5	2
Some	562	34	42	21	2
Severe	522	14	17	59	10

Table A4.5. Ordered-probit formulae coefficients for annual transition probabilities for self-reported health from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	0.637	2.209	3.020	3.461	0.009	0.077*
	(0.067)	(0.078)	(0.103)	(0.172)	(0.001)	(0.042)
Good	-0.327	1.871	3.164	3.826	0.015	0.140
	(0.046)	(0.050)	(0.064)	(0.096)	(0.001)	(0.025)
Fair	-1.124	0.410	2.151	3.185	0.015	0.072*
	(0.090)	(0.084)	(0.096)	(0.117)	(0.002)	(0.043)
Bad/very bad	-1.660	-0.657	0.665	2.672	0.017	-0.205
	(0.227)	(0.209)	(0.207)	(0.232)	(0.004)	(0.095)

(b) Persons 65 and over

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	1.531	2.957	3.527	3.689	0.024	-0.073*
	(0.827)	(0.824)	(0.815)	(0.809)	(0.011)	(0.130)
Good	0.136	2.171	3.401	3.631	0.022	0.044*
	(0.365)	(0.376)	(0.377)	(0.380)	(0.005)	(0.057)
Fair	-1.104	0.679	2.459	3.217	0.019	-0.005*
	(0.339)	(0.333)	(0.332)	(0.323)	(0.004)	(0.056)
Bad/very bad	-1.925	-0.976	0.323	1.911	0.010*	-0.104
	(0.706)	(0.671)	(0.664)	(0.646)	(0.009)	(0.102)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A4.6. Ordered-probit formulae coefficients for annual transition probabilities for a hampering health condition from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	2.264	2.915	3.529	0.014	0.036*
	(0.074)	(0.080)	(0.099)	(0.002)	(0.040)
Some	0.284	1.742	3.329	0.010	0.110*
	(0.144)	(0.155)	(0.248)	(0.003)	(0.070)
Severe	-0.539	0.232	2.360	0.009	-0.085*
	(0.247)	(0.245)	(0.274)	(0.004)	(0.107)

(b) Persons 65 and over

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	3.372	3.943	4.416	0.034	-0.080*
	(0.423)	(0.421)	(0.415)	(0.006)	(0.066)
Some	1.711	2.867	4.031	0.029	-0.031*
	(0.557)	(0.553)	(0.527)	(0.008)	(0.083)
Severe	0.149	0.752	2.411	0.016	-0.038*
	(0.564)	(0.562)	(0.558)	(0.007)	(0.109)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A4.7. Estimated numbers of long-stay residents and admissions of health-care institutions, Belgium (1997), per 1,000 population alive in age/gender group

	Men		Women	
Age	Residents	Admissions	Residents	Admissions
65 – 69	8	2	7	2
70 – 74	15	4	19	5
75 – 79	33	12	58	16
80 – 84	67	23	127	38
85 – 89	161	66	283	81
90 – 94	310	126	503	144
95 +	601	174	730	191
Total numbers	*22,154*	*7,715*	*81,723*	*23,163*

Table A4.8. Probit formulae for admission probabilities (persons 65 and over)

	Based on admission		
	α_1	Age	Age-squared
Men	-0.20027	-0.12913	0.00132
Women	0.81619	-0.16319	0.00161

Appendix A5. Luxembourg

A5.1 ECHP Notes

Like Germany and Great Britain, Luxembourg combined a special purpose survey with an existing national longitudinal survey (PSELL) as the small (2,000 respondents) special purpose survey had been abandoned after three waves. Nevertheless, the larger (7,000 respondents) PSELL survey omitted the health questions. With such limited data on health transitions, Luxembourg has been excluded from this report.

Appendix A6. France

A6.1 ECHP Notes

France used a different form of the 'hampering health condition' questions from the ECHP two-part question. As a result, there is no category for chronic ill-health with little or no hampering effect, and in general it seems likely that the distribution over the remaining categories will differ from that of other countries. France included 15,700 persons. Of the 14,300 interviewed at wave 1, 57% were still interviewed at wave 8. Table 2 of the main report shows an average 10% loss rate for self-assessed health and 9% for a hampering health condition between survey waves.

A particular problem presented by the French sub-sample is the exceptionally low reporting of mortalities: 322 mortalities were reported of which age was unknown in 24 cases. Overall, this is equivalent to 0.4% per annum, and is low particularly for women (Table A6.1). For this reason it is considered unsafe to attempt a post-stratification adjustment to compensate for the shortfall in mortalities, and Table A6.2 is omitted. As a consequence, it is not possible to undertake the full health transitions analysis. Tables A6.3 and A6.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights. These tables exclude transitions to both mortality and long-stay health care, and so should be regarded as conditional on no such transitions. These tables have been included for completeness, but are of limited usefulness and cannot be compared with other countries.

A6.2 Information about institutionalisation

French institutional data has been collected at regular intervals in the past through special surveys (EPHA), but these have included the *foyers-logements*, which the French statistical agency INSEE classifies as sheltered housing. Possibly as a result of this, France has been considered a country with a high rate of institutionalisation. In late 1998, however, with a follow-up in late 2000, a special enquiry – the handicap and disability (HID) study – devoted some of its attention to those in institutions, which were strictly defined to exclude the *foyers*, as INSEE was conducting the study rather than a departmental ministry. AHEAD partner Jérôme Wittwer has provided us with data from this enquiry. Of the 15,000 individuals interviewed, Wittwer reports that close to 70% were interviewed in the second wave. About 5% were completely lost, as it was not known if they had died, returned home, or gone to another institution without a record.

The follow-up nonetheless allows the estimate of a lower-bound (as we would stress) for the institutional mortality rate, shown in Table A6.7. The mortality rate shown seems low by comparison with rates in other countries, particularly as the *foyers-logements* were excluded. It is possible that a disproportionate number of mortalities were lost at follow-up, and mortality registers were not, we understand, checked. Because of this uncertainty, no attempt has been made to model institutional turnover rates from the HID data and thus Table A6.8 is omitted.

It should be noted that the *foyers-logements* are frequently small flats with their own kitchen. Thus it corresponds to international (not yet uniform) definitions of sheltered housing. If the figures presented here are compared with later French data on individuals in '*établissements pour les personnes âgées*', caution is necessary, as these will often, again, include those in such housing, particularly if a health agency is responsible (e.g. Mesrine, 2003). A further difficulty for international comparisons is that later data seems to have moved the lower age limit to 75.

A number of French studies have already drawn conclusions from this data. Mormiche (2001) noted that the follow-up permitted the calculation that one-sixth of those dying in metropolitan

France in the two-year interval had been in institutions. This is not, in fact, a high figure as Mormiche seems to imply, but at the low end of estimates we have for other northern European countries from the present enquiry. Mormiche notes that by age 90 there is no mortality difference between the community and institutions.

A6.3 France tables

Table A6.1. Annual mortality rates per 1,000, from the ECHP, in the population as a whole and estimated for persons previously living in private households

	ECHP[1]		Population[2]	
	Men	Women	Men	Women
Below 65	2.2 (67)	0.6 (22)	4.01	1.66
65-74	12.2 (48)	5.5 (24)	27.0	11.9
75+	46.7 (88)	14.7 (49)	93.7	73.3

[1]Eurostat weighted. Figures in brackets are reported numbers of mortalities on which the rate is based.

[2]The source for this data is WHO (1996-97 annual average).

Table A6.2. Post-stratification (mortality) weights (not applicable)

Table A6.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	4890	43	48	8	1
Good	14868	12	67	20	1
Fair	7274	4	37	52	7
Bad/very bad	1315	2	10	35	53

(b) Women under 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	4348	40	49	10	1
Good	15385	11	67	21	1
Fair	9054	3	24	55	8
Bad/very bad	1862	1	9	42	48

(c) Men over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	267	30	1	16	2
Good	1753	5	52	40	3
Fair	2892	1	19	66	14
Bad/very bad	872	0	4	39	57

(d) Women over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	208	20	54	22	4
Good	1923	4	53	39	4
Fair	4039	1	15	68	16
Bad/very bad	1390	0	3	43	54

Table A6.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	20153	92	6	2
Some	2182	47	38	15
Severe	1457	15	22	63

(b) Women under 65

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	21348	93	5	2
Some	2486	43	41	15
Severe	1590	15	24	61

(c) Men 65 and over

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	2505	77	18	5
Some	1283	28	46	26
Severe	1178	7	22	71

(d) Women 65 and over

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	2981	74	19	7
Some	1758	26	49	25
Severe	1666	7	22	71

Table A6.5. (Omitted – see text)

Table A6.6. (Omitted – see text)

Table A6.7. Annual mortality rate within French institutions (%)

Age group	Men	Women	Total
60-69	9.36	3.84	6.86
70-79	13.39	10.84	11.79
80-89	24.70	16.20	17.99
90-99	29.57	23.45	24.40
100+	69.34	36.39	38.62
Overall	*19.11*	*16.81*	*17.41*

Source: HID inquiry database, 1998-2000, supplied by Jérôme Wittwer.

Table A6.8. (Omitted – see text)

Appendix A7. The United Kingdom

A7.1 ECHP Notes

Several serious problems arise regarding the consistency and interpretation of the British data concerning health, which are supplied to the ECHP as 'clone' data from the British Household Panel Survey (BHPS). A trial of three waves of parallel household surveys, national and the ECHP, showed this was too much of a strain, with high non-response rates, and as a result the sample size was reduced by about a half from the fourth wave forward.

Two operational conclusions emerge from this. First, for self-assessed health, a difference of wording in the BHPS corresponding to wave 6 of the ECHP produced very different frequencies from other years. Second, for a hampering health condition, the category 'to some extent' hampered was only used in the parallel survey and then again in just wave 6 of the BHPS. The effect of this was to seriously change the distribution (numbers in both the 'not hampered' and 'severe hampered' categories were much reduced when a 'to some extent' option was offered).

In consequence a decision was made to limit the analysis of the UK sample as follows: i) by excluding wave 6, thus losing two sets of transitions; ii) by excluding the data from the parallel survey for a hampering health condition. The resulting definition of a hampering health condition omits the 'to some extent' category, and on the evidence of the UK parallel survey, results for this health definition will be incompatible with other countries.

With these exclusions, the effective sample size was 9,500 individuals. Of the 8,300 persons interviewed at wave 1, 75% were again interviewed at wave 8, the highest retention rate for any country. This resulted in a low average of just 5% of health transition information being lost between waves (see Table 2 of the main report).

A7.2 Post-stratification weights

A total of 338 mortalities were reported throughout the study, although the person's age was unknown in 19 cases. As with some other countries, the number of reported mortalities is much less than might be expected given national mortality rates.[29] Table A7.1 shows the mortality rates for eight broad age and gender groups calculated from the UK and the ECHP (all waves pooled, including the data that is excluded from the health analysis, weighted with Eurostat weights). It is based on individuals whose age and survival status were known between each pair of waves. Alongside them are the actual population mortality rates, first in total from the Eurostat New Cronos Database and (for persons over 65) and second those as we estimate would have been expected for a household-based population only. The latter figure is adjusted to allow for persons who die who would have been living in a health-care institution at the time of the previous ECHP survey wave, and are therefore excluded from the survey. Section A7.4 provides details of the institutional data that was used for this purpose.

The method of construction of weights to adjust for the shortfall in mortalities is explained in section 3.5 of the report. These weights allow for the different availability of data for the two health measures, and so the weights are somewhat different. The weights are shown for the two health factors in Table A7.2. These weights are calculated excluding all transitions involving wave 6 and, for a hampering health condition, the non-BHPS survey, for the reasons explained above.

[29] Yet many more mortalities are reported in analyses of the BHPS. This implies that survival information was obtained for BHPS that was not incorporated in returns to ECHP. Regrettably it has not been practical to return to the original BHPS for this analysis.

A7.3 Transition rates based on the ECHP

Tables A7.3 and A7.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights. These rates exclude transitions to long-stay health care, and so should be regarded as conditional on no such transition (this only makes a real difference for older persons).

They are followed in Tables A7.5 and A7.6 by probit functions obtained by robust ordered-probit analysis conditional on starting health (i.e. calculated for each starting health state separately), using age and gender as predictors, pooling across waves of the ECHP (except wave 6) again with Eurostat weights and post-stratification by mortality. Section 6 of the report describes this methodology and how to use the formulae to predict age-/gender-/country-specific transition probabilities. Separate formulae are used for persons above and below 65: a consequence is a discontinuity in predicted values around 65. The gender coefficient applies to women as opposed to men. A gender difference in rates is more pronounced in the UK than in most other countries, but it does not always act the same way. Men in good health are more likely to stay that way, but when in bad health are more likely to die. The α coefficients represent boundary points on the normal distribution between outcome health states. Standard errors use robust estimation to allow for the repeated measurements on individuals. Coefficients shown asterisked are *not* statistically significant (5% level, robust test).

A7.4 Information about institutionalisation

National information about the provision of long-term health care provision is available from two sources: the 2001 census and annual national accounts compiled from the returns of registered care homes and related institutions. The latter is produced separately for England, Scotland, Wales and Northern Ireland and separately for different types of institutions according to the registering authority: the returns are similar but not identical (a complication prior to 2003 is caused by double-counting institutions registered with more than one authority). For convenience, the present study has focused solely on England for establishing rates of institutionalisation. The registration returns reported by the Department of Health returns for England (see for example DH, 1997a and 1997b) distinguish long and short stay residents, type of institution and type of care, count annual admissions as well as numbers on a census date, with a coarse age breakdown (although none by gender). But there is no information on discharge, which is available in some other countries. The returns were changed, however, after 1997 and poorly completed for a couple of years, particularly regarding information on individuals not supported by the state (about one-quarter of the total).

Two large national surveys conducted in 1996 provide useful supporting information. The first (Netten et al., 2001) includes information on around 12,000 residents of all types of care homes for older persons in England, while the second (Bebbington et al., 2001) followed 2,500 first-time, newly admitted, publicly supported long-stay residents over 65 through to their mortality (or 3.5 years, if sooner). Although this latter study omitted the minority of self-supporting residents, the first survey had indicated a similar rate of admissions and health (Bebbington et al., 1997). In total, this collection of information for England is much fuller than was available for any other country and provided the basis for some assumptions that were necessary in order to make progress with countries where only more limited data was available. These are discussed in detail in section 5 of the main report.

Numbers in total are taken from the 2001 census (of health-related institutions). This source includes minor institutions, all UK states comparably, avoids double-counting and provides a full age-gender breakdown; thus it is simpler to use than a compilation of registration

information. Also, about 8% more residents are identified by the census than from the total of the registration records. In principle it would be possible to estimate numbers annually from the registration records, although the total number is reasonably stable. For the years 1994-2001, the English registration statistics show that the total number of long-stay residents over 65 in health-care institutions rose by 2% per annum to a peak around 1998 and fell back slightly thereafter.

Complete admissions statistics are available only for 1996. Using the surveys, this is also the only year for which we can distinguish first-time long-stay admissions from all long-stay admissions. This is important as about two-thirds of admissions are transferred from other institutions – most following acute or short-term care but many already in a long-term placement. In consequence, there is a mismatch in the years for which the best data is available on numbers and admissions. Because the total number of residents reported in the 2001 census for England is 10% higher than the estimated number of long-stay residents in the main types of institutions in 1996, we have assumed numbers of admissions should be uplifted by a similar proportion. (From the observation in the previous paragraph we assume this is probably owing to data recording differences, gaps and omissions in the registration returns, and only partly the result of a real increase in numbers.) On this basis we estimate a total of 140,000 first-time long-stay admissions in the UK. The derived figures are attributed to 2001.[30]

A7.5 Deriving an age/gender model for institutional admission rates

The age/gender breakdown of residents is from the 2001 census, while that for admissions is taken from rates in the admissions survey (Bebbington et al., 2001). Resulting rates (per 1,000 population) for 2001 are shown in Table A7.7.

A smoothed probit function by age for the admission rates is shown in Table A7.8. This rate is based on the estimated number remaining in private households. As there is an interaction between age and gender (the rate rises more rapidly with age for women), functions for men and women are shown separately. Age-squared as well as age is used in these formulae as it provides a better fit. No standard errors are shown as these estimates are only partly derived by sampling.

Note that mortality rates for all persons who have been admitted must be similar to this admission rate, since it is first-time admissions only, and Bebbington et al. (2001) showed that once admitted as a long-stay resident, few persons return permanently to private households thereafter. People will be older at mortality, but as the average life expectancy on admission is only about 30 months, the age differential in rates is small.

A7.6 UK tables

Table A7.1. Annual mortality rates per 1,000, from the ECHP, in the population as a whole and estimated for persons previously living in private households

	ECHP[1]		Population[2]		Household population	
	Men	Women	Men	Women	Men	Women
Below 45	0.4 (8)	0.5 (10)	1.4	0.5	1.4	0.5
45-64	4.0 (42)	2.5 (28)	7.6	3.4	7.6	3.4
65-74	17.4 (68)	9.1 (40)	35.2	21.1	32.1	18.3
75+	29.0 (63)	13.0 (50)	106.4	84.4	93.0	61.6

[1]Eurostat weighted. Figures in brackets are the reported numbers of mortalities on which the rate is based.
[2] The source for this data is the New Cronos database, GB (1994-2001 annual average).

[30] The 1996 estimate of first-time admissions to institutions is from Bebbington et al. (1997).

Table A7.2. Post-stratification (mortality) weights

(a) For self-reported health

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 45	2.0681	0.9705	0.9993	1.0000
45-64	1.6919	1.7773	0.9969	0.9985
65-74	1.9590	1.9331	0.9840	0.9911
75+	3.1348	5.0976	0.9347	0.9498

(b) For a hampering health condition

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 45	3.5167	0.7200	0.9990	1.0000
45-64	1.6333	1.6206	0.9970	0.9987
65-74	2.1052	1.8286	0.9829	0.9916
75+	3.2737	4.6813	0.9335	0.9509

Table A7.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves except 6, pooled)

(a) Men under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	5707	63	31	5	1	0
Good	8640	20	64	14	2	0
Fair	3244	5	34	48	11	1
Bad/very bad	1193	2	11	29	54	3

(b) Women under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	5587	60	32	6	1	0
Good	10440	17	64	16	3	0
Fair	4417	5	37	46	12	0
Bad/very bad	1688	2	15	31	50	2

(c) Men over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	759	52	36	8	2	2
Good	1756	14	60	20	3	3
Fair	1236	3	27	51	13	6
Bad/very bad	485	0	6	25	47	20

(d)Women over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	761	50	38	8	2	3
Good	2329	10	61	22	4	3
Fair	1838	2	22	53	18	5
Bad/very bad	825	1	8	28	53	10

Table A7.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	n	None/slight	Some	Severe	Deceased
None/slight	10195	96	-	4	0
Some	-	-	-	-	-
Severe	1023	26	72	-	2

(b) Women under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	11844	95	-	5	0
Some	-	-	-	-	-
Severe	1408	32	-	67	1

(c) Men 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	1899	84	-	13	3
Some	-	-	-	-	-
Severe	546	24	-	63	13

(d) Women 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	2329	83	-	14	3
Some	-	-	-	-	-
Severe	1009	23	-	72	5

Note: The category 'some' is not used in the BHPS sample (as used in this analysis). Data from the UK parallel survey (waves 2 and 3) is excluded.

Table A7.5. Ordered-probit formulae coefficients for annual transition probabilities for self-reported health from the ECHP (all waves except 6, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	0.264	1.490	2.221	3.143	-0.001*	0.078
	(0.045)	(0.046)	(0.055)	(0.138)	(0.001)	(0.027)
Good	-0.779	1.064	2.097	3.444	0.002	0.108
	(0.032)	(0.033)	(0.037)	(0.116)	(0.001)	(0.019)
Fair	-1.093	0.311	1.733	3.141	0.013	-0.002*
	(0.053)	(0.050)	(0.054)	(0.085)	(0.001)	(0.029)
Bad/very bad	-1.284	-0.246	0.699	2.880	0.019	-0.107
	(0.106)	(0.100)	(0.101)	(0.121)	(0.002)	(0.053)

(b) Persons 65 and over

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	1.955	3.110	3.687	3.924	0.026	0.007*
	(0.664)	(0.658)	(0.634)	(0.614)	(0.009)	(0.078)
Good	0.515	2.302	3.220	3.644	0.023	0.079*
	(0.323)	(0.326)	(0.320)	(0.310)	(0.004)	(0.045)
Fair	-0.629	0.705	2.131	2.962	0.017	-0.076*
	(0.319)	(0.318)	(0.316)	(0.308)	(0.004)	(0.054)
Bad/very bad	-1.250	-0.285	0.738	2.244	0.017	-0.285
	(0.525)	(0.506)	(0.505)	(0.495)	(0.007)	(0.089)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A7.6. Ordered-probit formulae coefficients for annual transition probabilities for a hampering health condition from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	Age (years)	Gender
None/slight	2.381	3.622	0.015	0.113
	(0.067)	(0.080)	(0.001)	(0.037)
Severe	0.336	3.229	0.022	-0.217
	(0.142)	(0.187)	(0.003)	(0.067)

(b) Persons 65 and over

Initial health	α_1	α_2	Age (years)	Gender
None/slight	3.977	4.882	0.040	0.025*
	(0.393)	(0.386)	(0.005)	(0.063)
Severe	0.612	2.795	0.020	-0.210
	(0.503)	(0.497)	(0.007)	(0.098)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A7.7. Estimated numbers of long-stay residents and first-time admissions of health-care institutions, England (2001), per 1,000 population alive in age/gender group

	Men		Women	
Age Group	Residents	Admissions	Residents	Admissions
65 – 69	8	2	7	2
70 – 74	13	7	14	5
75 – 79	24	10	34	15
80 – 84	43	25	76	35
85 – 89	94	48	167	61
90 – 94	182	55	306	80
95 +	262	49	461	83
Total	*91110*	*41267*	*282612*	*99835*

Table A7.8. Probit formulae for admission probabilities (persons 65 and over)

	Based on admission		
	α_1	Age	Age-squared
Men	-10.406	0.15376	-0.00062
Women	-11.822	0.17929	-0.00069

Appendix A8. Ireland

A8.1 ECHP Notes

Ireland had by far the largest drop-out rate of any national sample. The overall sample size was 11,200, and of the 9,900 persons interviewed at wave 1, only 31% remained by wave 8. As a result there was, at 16%, one of the highest losses of health transition information between waves.

A8.2 Post-stratification weights

As elsewhere mortalities were under-reported. A total of 308 mortalities were reported during the study, although the person's age was unknown in 6 cases that must be excluded from this analysis. Table A8.1 shows the annual mortality rates for six broad age and gender groups calculated from the Ireland ECHP (all waves pooled, weighted with Eurostat weights), based on those whose age and survival status were known between each pair of waves. Alongside them are the actual population mortality rates in total from the WHO mortality database, and then (for persons over 65) those as we estimate would have been expected for a household-based population only. The latter figure is adjusted to allow for those who die who would have been living in a health-care institution at the time of the previous ECHP survey wave and therefore excluded from the survey. Section A8.4 provides details of the institutional data that was used for this purpose. The divergence between these figures and the observed rates highlight the shortfall in mortalities in the ECHP in Ireland for older persons, but the figure is within the limits for which we can undertake post-stratification.

The method of construction of weights to adjust for the shortfall in mortalities is explained in section 3.5 of the report. Health data was well completed in the Ireland ECHP, and there is no need, as elsewhere, to allow for the different availability of data for the two health measures. The weights are shown in Table A8.2.

A8.3 Transition rates based on the ECHP

Tables A8.3 and A8.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights. These rates exclude transitions to long-stay health care and so should be regarded as conditional on no such transition (this only makes a real difference for older persons).

These are followed in Tables A8.5 and A8.6 by probit functions obtained by robust ordered-probit analysis conditional on starting health (i.e. calculated for each starting health state separately), using age and gender as predictors, pooling across waves of the ECHP again with Eurostat weights and post-stratification by mortality. Section 6 of the report describes this methodology and how to use the formulae to predict age-/gender-/country-specific transition probabilities. The reader is reminded these probabilities exclude transitions to long-stay health-care institutions, i.e. they must be regarded as conditional on no such transition between waves. There are standard errors using cluster estimation of standard errors to allow for the repeated measurements on individuals. The gender coefficient applies to women as opposed to men. The α coefficients represent boundary points on the normal distribution between outcome health states. Coefficients shown asterisked are not statistically significant (5% level, robust test). Gender differences are rarely significant.

A8.4 Information about institutionalisation

Ireland historically had a high rate of institutionalisation, once 7% of those aged 65+, but now about 5%, which has been connected with the pattern of Irish emigration that left elderly dependents behind. Irish *Long-Stay Activity Statistics*, published annually by the Irish Department of Health and Children and available from 1997, provides considerable data on Irish residents in long-stay care, admissions and mortalities. There appears to have been a slow growth in numbers during the ECHP years, but as with other countries this report does not consider trends and focuses on the data for 1997 and 1998. Admissions and mortalities are not broken down by age and gender. A more serious difficulty is that the counts of turnover probably include temporary stays. We infer this from the high turnover rate and the large numbers of residents who are discharged back to their homes.

Despite these difficulties, modest assumptions allow reasonable estimation. Yet as the *Long-Stay Statistics* are gathered by questionnaire, it was necessary to allow for non-response. Other agencies (the Scottish Executive and the Italian ISTAT) have a sophisticated algorithm for this, but as this was absent in the Irish data, we have used a simple grossing-up. In years where the response rate was very low (even below 50%) it is probably better to use other years rather than this data. The statistical reports themselves indicated such years and the reasons (administrative reorganisation).

In the absence of reliable information on long-stay admission, we have examined information on discharge. The distribution of discharges by place of discharge is provided. As mentioned, most are back to private households, consistent with the assumption about short-stay admissions. As numbers are fairly static, annual admissions and discharges of long-stay residents should be roughly equal. We think that (as in England) comparatively few mortalities would be of short-stay residents and therefore this will be an indicator of turnover of first-time long-stay admissions, self-adjusting for transfers between institutions. It is reported that in both 1997 and 1998 the overall mortality rate in long-stay institutions was about 39%. Using the logic described in section 5.4 of the main report we have chosen to regard this as the best available indicator of turnover of long-term care, and probably a lower bound on the true rate. A small proportion of discharges are to a hospital, possibly for terminal care. If allowance is made for these the turnover rate might be a little higher.

A8.5 Deriving an age/gender model for institutional admissions rates

As no information is provided regarding the age and gender of those die, for the purposes of calculating Table A8.7 we have assumed the breakdown will be similarly distributed as in England, since the overall rate is similar (and rather different from Finland, the only other country for which a detailed breakdown is available). A further assumption is that mortalities and discharges of long-stay residents under 65 are likely to be small, so that the total mortalities can be split among those aged 65+. Age-/gender-specific estimates of residents and long-stay admissions to institutions for Ireland in 1997-98 derived by these methods are shown in Table A8.7.

This table is based on the assumption that admissions and discharges of long-stay residents will be similar in number, and on the argument in the previous section that these can be measured by mortalities among residents. If, as was argued, it would be appropriate to include some of the persons discharged to acute hospitals, then the overall turnover might be up to 40% higher. Again, we have no better assumption than that the uplift would apply equally to all age/gender groups.

A smoothed probit function by age for the admission rates (expressed in terms of the proportion of persons of that age group still living in private households), based on the figures of Table

A8.7, is shown in Table A8.8. As there is an interaction between age and gender, functions for men and women are shown separately. Age-squared as well as age is used in these formulae as it provides a better fit. No standard errors are shown as these estimates are not derived by sampling.

A8.6 Ireland tables

Table A8.1. Annual mortality rates per thousand, from the ECHP, in the population as a whole, and estimated for persons previously living in private households

	ECHP[1]		Population[2]		Household population	
	Men	Women	Men	Women	Men	Women
Below 65	1.6 (31)	1.5 (29)	3.3	1.7	3.3	1.7
65-74	18.3 (42)	8.1 (20)	37.7	21.3	33.9	18.4
75+	75.8 (110)	43.1 (70)	118.4	89.9	98.1	62.3

[1]Eurostat weighted. Figures in brackets are reported numbers of mortalities on which the rate is based.

[2] The source for this data is the Ireland Department of Health & Children (1997-98 annual average).

Table A8.2. Post-stratification (mortality) weights

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 65	2.1100	1.1100	1.0000	1.0000
65-74	1.8547	2.2662	0.9841	0.9897
75+	1.2947	1.4460	0.9758	0.9799

Table A8.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	8606	71	25	3	0	0
Good	5758	35	53	11	0	0
Fair	1790	12	32	48	8	1
Bad/very bad	362	5	11	42	37	5

(b) Women under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	8457	72	24	4	0	0
Good	5669	34	53	11	1	0
Fair	2057	13	32	48	6	0
Bad/very bad	338	4	12	40	41	3

(c) Men over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	648	48	38	11	1	2
Good	1270	20	54	21	2	3
Fair	1086	4	26	55	8	7
Bad/very bad	244	2	6	26	40	26

(d) Women over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	641	51	37	11	1	1
Good	1293	17	53	27	2	2
Fair	1261	5	22	55	13	5
Bad/very bad	335	0	7	39	41	12

Table A8.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	11521	95	4	1	0
Some	1132	37	53	9	1
Severe	346	14	31	52	4

(b) Women under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	11565	94	5	1	0
Some	1194	40	52	7	1
Severe	262	20	32	47	2

(c) Men 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	1832	82	12	2	4
Some	602	33	52	10	6
Severe	237	10	28	40	22

(d) Women 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	1871	81	16	2	2
Some	762	27	55	14	4
Severe	275	7	26	51	16

Table A8.5. Ordered-probit formulae coefficients for annual transition probabilities for self-reported health from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	0.982	2.212	3.100	3.730	0.012	-0.008*
	(0.042)	(0.047)	(0.064)	(0.125)	(0.001)	(0.028)
Good	0.170	1.752	2.874	3.421	0.014	0.015*
	(0.050)	(0.052)	(0.069)	(0.107)	(0.001)	(0.030)
Fair	-0.582	0.460	2.055	3.187	0.014	-0.056*
	(0.107)	(0.111)	(0.126)	(0.169)	(0.002)	(0.052)
Bad/very bad	-0.606	0.128	1.359	2.979	0.025	0.028*
	(0.230)	(0.236)	(0.234)	(0.289)	(0.005)	(0.113)

(b) Persons 65 and over

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	1.981	3.126	4.007	4.197	0.029	-0.098*
	(0.608)	(0.612)	(0.625)	(0.630)	(0.009)	(0.088)
Good	1.326	2.833	3.992	4.304	0.030	0.063*
	(0.369)	(0.377)	(0.394)	(0.400)	(0.005)	(0.059)
Fair	0.132	1.266	2.828	3.457	0.024	0.032*
	(0.462)	(0.443)	(0.451)	(0.468)	(0.006)	(0.066)
Bad/very bad	-0.850	0.077	1.335	2.529	0.023	-0.331
	(0.663)	(0.628)	(0.647)	(0.653)	(0.009)	(0.128)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A8.6. Ordered-probit formulae coefficients for annual transition probabilities for a hampering health condition from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	2.178	2.987	3.703	0.013	0.045*
	(0.064)	(0.074)	(0.099)	(0.001)	(0.038)
Some	-0.033	1.604	2.608	0.007	-0.117*
	(0.145)	(0.161)	(0.182)	(0.003)	(0.069)
Severe	-0.427	0.513	2.493	0.015	-0.203*
	(0.292)	(0.291)	(0.311)	(0.006)	(0.133)

(b) Persons 65 and over

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	3.087	3.910	4.189	0.030	-0.020*
	(0.401)	(0.404)	(0.412)	(0.005)	(0.070)
Some	0.394	1.904	2.616	0.012*	0.073*
	(0.593)	(0.601)	(0.629)	(0.008)	(0.090)
Severe	0.341	1.353	2.689	0.024	-0.167*
	(0.750)	(0.767)	(0.760)	(0.010)	(0.130)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A8.7. Estimated numbers of long-stay residents and turnover of health-care institutions, Ireland (1997-98), per 1,000 population alive in age/gender group

	Men		Women	
Age	Residents	Turnover	Residents	Turnover
65 – 69	9	2	8	2
70 – 74	20	9	18	6
75 – 79	42	16	46	18
80 – 84	92	48	114	48
85 – 89	147	70	175	66
90 – 94	283	89	322	103
95 +	407	90	486	138
Total numbers	*7,139*	*3,017*	*14,219*	*5,229*

Notes: Rates are averaged for 1997 and 1998. Turnover is calculated on the basis of mortalities, age/gender breakdown uses assumptions described in the text. Turnover rates could be up to 40% higher, depending on outcome of discharges from institutions to hospital (see text).

Table A8.8. Probit formulae for admission probabilities (persons 65 and over)

	Based on mortalities		
	α_1	Age	Age-squared
Men	-13.729	0.23026	-0.00102
Women	-11.711	0.17238	-0.00061

Appendix A9. Italy

A9.1 ECHP Notes

There were no special problems with data from Italy, which has an attractively large sample of 19,800. As response to the ECHP was formally compulsory in Italy (Peracchi, 2002) attrition problems were much less than elsewhere, and uniquely almost none of sample ended up being reported 'lost'. Of the 17,700 persons interviewed at wave 1, an above-average 60% were still interviewed at wave 8. Some 8% of health transition information was lost between waves (see Table 2 of the main report). The number of reported mortalities was close to those expected once allowance was made for institutionalisation (see Table A9.1).

A9.2 Post-stratification weights

Because the mortality rate was similar to that expected, post-stratification weights were not used (note Table A9.2 is omitted). The information from which mortality rates were adjusted to allow for institutionalisation is discussed in section A9.4.

A9.3 Transition rates based on the ECHP

Tables A9.3 and A9.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights. These rates exclude transitions to long-stay health care, and so should be regarded as conditional on no such transition (this only makes a real difference for older persons).

These are followed in Tables A9.5 and A9.6 by probit functions obtained by robust ordered-probit analysis conditional on starting health (i.e. calculated for each starting health state separately), using age and gender as predictors, pooling across waves of the ECHP again with Eurostat weights. Section 6 of the report describes this methodology and how to use the formulae to predict age-/gender-/country-specific transition probabilities. Standard errors use robust estimation to allow for the repeated measurements on individuals. The gender coefficient applies to women as opposed to men. The α coefficients represent boundary points on the normal distribution between outcome health states. Coefficients shown asterisked are not statistically significant (5% level, robust test).

A9.4 Information about institutionalisation

AHEAD partner Stefania Gabriele supplied the detailed tables listed in the Box A9 below (which are available for further analyses). The data cover 1999 and 2000. Note that the 'census date' is 31 December of each year. We believe the only comparable Italian data of any sort prior to this has been the 1991 census, which is also reported here.

Box A9. Tables supplied for Italy

i) Adults (aged 15-64)

Table 1 – Long-stay adult residents in health and social care establishments, by year, gender, citizenship and geographical region

Table 2 – Long-stay adult residents in health and social care establishments, per 10,000 inhabitants (of the same age groups), year, gender and geographical region

Table 3 – Long-stay adult residents in health and social care establishments, by type of establishment and age groups (year 2000)

Table 4 – Long-stay adult residents in health and social care establishments, by year, gender, citizenship and kind of problem

Table 5 – Long-stay adult disabled residents in health and social care establishments, by type of establishment and geographical region (year 2000)

ii) Elderly (aged 65 and over)

Table 6 – Long-stay elderly residents in health and social care establishments, by year, gender and geographical region

Table 7 – Long-stay elderly residents in health and social care establishments, per 10,000 inhabitants (of the same age groups), year, gender and geographical region

Table 8 – Long-stay elderly residents in health and social care establishments, by year, gender and health status

Table 9 – Long-stay elderly residents in health and social care establishments, by year, gender and age groups

Table 10 – Long-stay elderly admitted in health and social care establishments, by type of establishment, gender and geographical region (year 2000)

Table 11 – Long-stay elderly discharged in health and social care establishments, by type of establishment, gender and geographical region (year 2000)

Table12 – Long-stay elderly who deceased in health and social care establishments, by type of establishment, gender and geographical region (year 2000)

Table 13 – Long-stay elderly residents in health and social care establishments, by type of establishment, nature of institution and geographical region (year 2000)

Table 14 – Long-stay elderly residents in health and social care establishments, by type of establishment and payment conditions (year 2000)

The overall prevalence rate for the elderly (65+) in institutions remains low: from these data it was 2.04% nationally at the 31 December 2000 census date. The data indicate a decline from 1999 when the rate was 2.14% (ISTAT, 2001). This would represent a 5% annual decline, but reporting uncertainties of the type discussed in section 5.2 of the report in relation to administrative data gained by polling methods suggest that some caution is needed in drawing conclusions from this.

A particular issue for Italy is the very large geographical variation. In the north, in 2000 the prevalence rate among persons aged 65 and over in long-term care institutions was 3.04% compared with 1.45% in the central region and 0.92% in the south (ISTAT, 2001). Italy's present prevalence of institutionalisation, which if viewed as a national whole, reflects the familial pattern that is much discussed in the literature. In the north prevalence is now

approaching that of northern Europe. Some questions have been raised about the apparent high level of non-dependency in Italian care homes. This may in part be a legacy of the 'workhouse' phase of development of institutions for the elderly. Therefore understanding the future of institutionalisation is important for forecasting long-term care needs and costs.

Whether there is increased or decreased institutionalisation in Italy has been the source of some discussion. Preliminary census data utilised by Tomassini et al. (2004) indicate a reduction in the proportion of older women in institutional care in Italy between the 1991 and 2001 censuses. Our examination of the 2001 census results reveal some need for care. In particular, the substantial 'non-permanent' component of the elderly in institutions who have been there at least 271 days to date (but less than 365) suggests that it might be helpful to clarify the rules for permanent residence in long-term care and whether these have changed over the decade. There are, however, other pieces of evidence on factors that could encourage some relief of pressure for institutionalisation. Further, "The Italian LTC has been characterised by the significant growth of another formal service in the last decade: private home care for frail older people" (Lamura, 2004).

Data on residents in health and social care establishments in 1999 and 2000 were collected by survey in 2000 (postal questionnaire) and carried out by ISTAT, the Italian Institute for National Statistics. Adjustment was made for the considerable non-response rate that characterises this type of care home survey. The range of establishments listed in this data appears to exclude private households by the definitions of ISTAT (the ECHP National Data Unit). Nevertheless, it is not certain that all individuals resident in institutions (in particular medical establishments giving long-term care) are included. The list of tables shows that Italy has rather more information on turnover than most countries, although with little age breakdown. This data suffers from a number of problems of the type outlined in section 5 of the report. There are a wide variety of homes, which serve different purposes and have different historical origins. A few still represent the history of the care home from its workhouse origins. Others are designed as an alternative to hospitals for what we might designate as medium-term care. We cannot assume that admissions to such establishments would fall within the definition of 'permanent' as employed by the ECHP. About equal numbers are reported as discharged alive and deceased, and it is possible that the mortality rate, which is about half that of the admissions rate, may be more indicative of the turnover of permanent residents. It appears that about 10% of the mortalities of elderly persons in Italy are accounted for by the reported mortality rate in institutions, and this has been used as the basis of estimating the likely mortality rate of persons living in the community, corresponding to the ECHP sample.

The ISTAT data may usefully be compared with the results of the 2001 census. From this is seems that the number of reported residents is somewhat below the figures produced by the ISTAT questionnaire. This would be consistent with the assumption that ISTAT counts do include temporary stays.

A9.5 Deriving an age/gender model for institutional admission rates

Numbers of residents were supplied in coarser age groups than requested (65-74 and 75+). These numbers were split into the finer age groups of the estimates shown in Table A9.7 using the relative proportions in each age group in England, for men and women separately.

As explained in the previous subsection, data on incident rates is more limited, although both admissions and discharge/mortality rates are available. Only total overall numbers were provided by gender, with no indication of age distribution. For the reasons given we have prepared estimates based on both admissions and mortalities, as these should provide bounds on 'permanent' admissions in the ECHP sense. Estimates in each age group were obtained by the

procedure described for Belgium (see section A4.5, except that the average of English and Finnish turnover rates were used). This procedure was repeated for both admissions and mortalities and for men and women separately.

A smoothed probit function by age for each of the admission and mortality rates is shown in Table A9.8. In consequence of the procedures used for estimating age-specific rates, these functions are probably more similar to those for other countries than might have been the case if age-specific data had been available. Nevertheless, the overall rates will reflect Italian data. As there is an interaction between age and gender (the rate rises more rapidly with age for men), functions for men and women are shown separately, and a term in age-squared improves the estimate. No standard errors are shown, as these estimates were not derived by sampling.

A9.6 Italy tables

Table A9.1. Annual mortality rates per 1,000, from the ECHP, in the population as a whole and estimated for persons previously living in private households

	ECHP[1]		Population[2]		Household population	
	Men	Women	Men	Women	Men	Women
Below 65	2.9 (126)	1.6 (62)	3.4	1.5	3.4	1.5
65-74	24.2 (132)	10.4 (74)	21.1	14.3	25.4	11.5
75+	91.0 (247)	59.3 (239)	82.9	75.1	89.6	62.3

[1]Eurostat weighted. Figures in brackets are the reported numbers of mortalities on which the rate is based.

[2] The source for this data is the Eurostat New Cronos Database (1994-2001 annual average).

Table A9.2. (Not relevant for Italy)

Table A9.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	9,781	54	39	6	1	0
Good	20,181	16	65	17	1	0
Fair	9,770	6	35	52	6	0
Bad/very bad	2,366	1	10	27	58	3

(b) Women under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	7,584	52	40	7	1	0
Good	20,173	13	66	20	1	0
Fair	11,958	4	32	57	7	0
Bad/very bad	3,002	1	9	26	63	1

(c) Men over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	250	31	38	24	4	4
Good	1,662	6	50	36	6	2
Fair	3,396	1	17	59	19	4
Bad/very bad	2,529	0	3	20	67	10

(d) Women over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	163	23	43	28	5	1
Good	1,601	4	44	42	10	1
Fair	4,104	1	15	61	21	2
Bad/very bad	3,653	0	3	20	70	7

Table A9.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	32,539	97	2	1	0
Some	1,624	45	45	9	1
Severe	821	23	23	50	4

(b) Women under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	32,873	96	3	1	0
Some	1,728	46	42	11	0
Severe	863	22	29	46	3

(c) Men 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	4,582	83	10	3	4
Some	1,176	35	43	17	6
Severe	937	13	18	56	15

(d) Women 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	5,209	82	11	5	2
Some	1,441	36	41	20	3
Severe	1,443	14	16	59	11

Table A9.5. Ordered-probit formulae coefficients for annual transition probabilities for self-reported health from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	0.769	2.173	3.230	4.065	0.021	0.0776
	(0.038)	(0.042)	(0.058)	(0.103)	(0.001)	(0.025)
Good	-0.157	1.832	3.215	4.236	0.023	0.133
	(0.026)	(0.028)	(0.035)	(0.073)	(0.001)	(0.015)
Fair	-0.614	0.820	2.679	4.090	0.023	0.151
	(0.044)	(0.045)	(0.050)	(0.074)	(0.001)	(0.021)
Bad/very bad	-1.243	-0.281	0.648	3.118	0.019	-0.007*
	(0.122)	(0.112)	(0.113)	(0.127)	(0.002)	(0.045)

(b) Persons 65 and over

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	3.127	4.235	5.339	5.810	0.052	0.020*
	(0.644)	(0.651)	(0.672)	(0.670)	(0.009)	(0.133)
Good	0.912	2.657	3.980	4.900	0.035	0.092*
	(0.301)	(0.308)	(0.316)	(0.321)	(0.004)	(0.055)
Fair	-0.178	1.151	2.882	4.078	0.029	-0.002*
	(0.202)	(0.203)	(0.207)	(0.213)	(0.003)	(0.035)
Bad/very bad	-0.930	0.007	1.124	3.288	0.025	-0.093
	(0.253)	(0.221)	(0.225)	(0.231)	(0.003)	(0.042)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A9.6. Ordered-probit formulae coefficients for annual transition probabilities for a hampering health condition from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	2.935	3.546	4.158	0.025	0.033*
	(0.053)	(0.057)	(0.069)	(0.001)	(0.026)
Some	0.549	1.900	3.143	0.014	-0.043*
	(0.120)	(0.126)	(0.151)	(0.002)	(0.052)
Severe	-0.570	0.155	2.039	0.005*	-0.107*
	(0.168)	(0.168)	(0.164)	(0.003)	(0.075)

(b) Persons 65 and over

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	4.043	4.608	5.097	0.042	-0.055*
	(0.219)	(0.221)	(0.223)	(0.003)	(0.041)
Some	1.196	2.328	3.311	0.021	-0.047*
	(0.325)	(0.323)	(0.334)	(0.004)	(0.059)
Severe	0.768	1.356	3.072	0.025	-0.110*
	(0.331)	(0.333)	(0.339)	(0.004)	(0.065)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Data excludes admissions to a health-care institution.

Table A9.7. Estimated numbers of long-stay residents, admissions and discharges by mortality from health-care institutions, Italy (1997), per 1,000 population alive in age/gender group

	Men			Women		
Age	Residents	Admissions	Mortalities	Residents	Admissions	Mortalities
65 – 69	4	1	1	3	1	0
70 - 74	7	4	2	6	2	1
75 – 79	11	5	3	9	4	2
80 – 84	25	14	7	29	13	7
85 – 89	35	21	11	50	21	11
90 – 94	68	32	17	98	39	20
95 +	100	38	20	164	61	31
Total	*50930*	*25470*	*13362*	*165197*	*67185*	*34542*

Table A9.8. Probit formulae for transition probabilities (persons 65 and over)

	Based on admission			Based on mortalities		
	α_1	Age	Age squared	α_1	Age	Age squared
Men	-8.396	0.1045	-0.0004	-8.486	0.1044	-0.0004
Women	-7.773	0.0764	-0.0001	-8.088	0.0827	-0.0002

Appendix A10. Greece

A10.1 ECHP Notes

Greece had a comparatively large sample of 14,300 individuals. Of the 12,500 who were interviewed at wave 1, an above average 60% were interviewed in the final wave. The average loss rate of health transition information was 9.5% (see Table 2 of the main report).

A10.2 Post-stratification weights

A total of 595 mortalities were reported during the study, although the person's age was unknown in 22 cases. Mortality reporting was good up to wave 5, but fell off in the last three waves. Table A10.1 shows the mortality rates for eight broad age and gender groups calculated from the Greece ECHP (all waves pooled, weighted with Eurostat weights), based on those whose age and survival status were known between each pair of waves. Alongside them are the actual population mortality rates. Since the number of mortalities in long-stay institutions must be small in Greece (see section A10.4), these rates can be compared directly with those from the household-based ECHP sample. The divergence between them highlights the shortfall in mortalities in the ECHP in Greece.

The method of construction of weights to adjust for the shortfall in mortalities is explained in section 3.5 of the report. The weights are shown for the two health factors in Table A10.2.

A10.3 Transition rates based on the ECHP

Tables A10.3 and A10.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights. These rates exclude transitions to long-stay health care, but as has been explained these are quite small.

These are followed in Tables A10.5 and A10.6 by probit functions obtained by robust ordered-probit analysis conditional on starting health (i.e. calculated for each starting health state separately), using age and gender as predictors, pooling across waves of the ECHP again with Eurostat weights and post-stratification by mortality. Section 6 of the report describes this methodology and how to use the formulae to predict age-/gender-/country-specific transition probabilities. Standard errors use robust estimation to allow for the repeated measurements on individuals. The gender coefficient applies to women as opposed to men. The α coefficients represent boundary points on the normal distribution between outcome health states. Coefficients shown asterisked are not statistically significant (5% level, robust test).

A10.4 Information about institutionalisation

Greece is still marked by a very low reliance on formal residential care (Mestheneos et al., 2004; Lamura, 2003), which is described as a combination of a strong emphasis on familial values and an absence of appropriate facilities, in part owing to very strict licensing requirements. The common estimate is that 1% of the 65+ population are in permanent institutional long-term care. There is an acknowledged grey sector in small hotels, which are de facto care homes, but this would by its very nature not show up in official data, even in the census. Such residents are likely to remain recorded as living at their previous address.

In consequence, as the level of prevalence is so low, we can be reasonably certain that turnover of long-stay residents is also very low, and for Greece represents that it is possible to disregard the institutional sector in terms of its impact on mortality rates in private households.

A10.5 Deriving an age/gender model for institutional admission rates

With no information on rates of entry or discharges/mortalities, no analysis of transitions to long-term health-care provision has been undertaken for Greece. Tables A10.7 and A10.8 are omitted.

A10.6 Greece tables

Table A10.1. Annual mortality rates per 1,000, from the ECHP, in the population as a whole and estimated for persons previously living in private households

	ECHP[1]		Population[2]	
	Men	Women	Men	Women
Below 45	1.1 (17)	0.2 (4)	1.4	0.5
45 - 64	5.2 (64)	2.3 (27)	7.6	3.4
65 - 74	21.4 (107)	7.4 (45)	27.7	15.1
75+	61.8 (172)	32.5 (137)	98.2	87.4

[1]Eurostat weighted. Figures in brackets are reported numbers of mortalities on which the rate is based.

[2] The source for this data is the WHO, Mortality and Population (1996-97 annual average).

Table A10.2. Post-stratification (mortality) weights

(a) For self-reported health

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 45	1.0663	2.0241	1.0000	0.9997
45 - 64	1.3618	1.3564	0.9980	0.9991
65-74	1.1915	1.9373	0.9954	0.9927
75+	1.3856	2.4303	0.9675	0.9468

(b) For a hampering health condition

	Deceased		Not deceased	
	Men	Women	Men	Women
Below 45	1.0297	2.2105	1.0000	0.9997
45 - 64	1.3492	1.6798	0.9980	0.9986
65-74	1.2306	1.9619	0.9947	0.9926
75+	1.4929	2.4771	0.9653	0.9460

Table A10.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	15016	82	15	3	1	0
Good	5625	42	47	9	2	0
Fair	2144	20	26	43	11	1
Bad/very bad	1078	7	12	23	55	3

(b) Women under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	14909	80	16	3	1	0
Good	6780	35	51	11	3	0
Fair	3015	15	28	45	11	1
Bad/very bad	1315	7	14	28	50	1

(c) Men over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	669	36	40	16	6	1
Good	2024	12	53	26	7	2
Fair	2397	4	20	54	18	4
Bad/very bad	1624	3	8	23	56	10

(d) Women over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	446	335	41	19	4	2
Good	2195	7	50	31	9	2
Fair	3689	3	16	57	19	3
Bad/very bad	2301	1	8	29	53	9

Table A10.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	n	None/slight	Some	Severe	Deceased
None/slight	17863	96	3	1	0
Some	952	46	40	13	1
Severe	796	20	16	60	4

(b) Women under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	19204	95	4	1	0
Some	1350	40	45	14	1
Severe	815	29	22	47	2

(c) Men 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	3575	78	11	8	3
Some	1091	35	41	21	4
Severe	1029	18	20	49	13

(d) Women 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	4589	75	14	8	3
Some	1444	36	40	21	3
Severe	1305	23	17	51	9

Table A10.5. Ordered-probit formulae coefficients for annual transition probabilities for self-reported health from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	2.183	3.167	3.846	4.537	0.033	0.124
	(0.039)	(0.042)	(0.052)	(0.080)	(0.001)	(0.022)
Good	1.211	2.739	3.596	4.516	0.031	0.175
	(0.055)	(0.060)	(0.067)	(0.095)	(0.001)	(0.025)
Fair	0.259	1.104	2.481	3.748	0.023	0.079
	(0.110)	(0.113)	(0.118)	(0.146)	(0.002)	(0.038)
Bad/very bad	-1.201	-0.565	0.192	2.374	0.008	-0.198
	(0.177)	(0.174)	(0.173)	(0.176)	(0.003)	(0.062)

(b) Persons 65 and over

Initial health	Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	Very good	1.293	2.378	3.164	3.861	0.024	-0.007*
		(0.543)	(0.547)	(0.553)	(0.563)	(0.008)	(0.081)
Good	Good	1.360	2.990	4.011	4.885	0.036	0.164
		(0.250)	(0.254)	(0.256)	(0.257)	(0.003)	(0.042)
Fair	Fair	0.410	1.483	3.054	4.110	0.030	0.052*
		(0.203)	(0.203)	(0.205)	(0.203)	(0.003)	(0.035)
Bad/very bad	Bad/very bad	0.385	1.288	2.229	3.944	0.035	-0.047*
		(0.253)	(0.247)	(0.247)	(0.246)	(0.003)	(0.044)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Note: Standard errors of coefficients are shown in brackets.

Table A10.6. Ordered-probit formulae coefficients for annual transition probabilities for a hampering health condition from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	3.121	3.636	4.468	0.031	0.089
	(0.064)	(0.068)	(0.087)	(0.001)	(0.030)
Some	0.299	1.549	3.000	0.008	0.104*
	(0.150)	(0.153)	(0.203)	(0.003)	(0.060)
Severe	-0.693	-0.161	1.925	0.003*	-0.307
	(0.186)	(0.185)	(0.178)	(0.003)	(0.075)

(b) Persons 65 and over

Initial health	Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	None/slight	3.281 (0.226)	3.800 (0.226)	4.485 (0.227)	0.035 (0.003)	-0.060* (0.039)
Some	Some	1.435 (0.339)	2.513 (0.339)	3.628 (0.328)	0.025 (0.005)	-0.043* (0.052)
Severe	Severe	1.158 (0.318)	1.703 (0.320)	3.253 (0.321)	0.028 (0.004)	-0.159 (0.056)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Note: Standard errors of coefficients are shown in brackets.

Table A10.7. (Not available for Greece as rates presumed small)

Table A10.8. (Not available for Greece as rates presumed small)

Appendix A11. Spain

A11.1 ECHP Notes

Spain had the largest sample of 20,100 individuals, but the attrition rate was a little above average. Of the 17,900 who were interviewed at wave 1, 51% were interviewed at wave 8. An average of 12% of health transition information was lost between waves (see Table 2 of the main report).

Spain reported 750 mortalities of which age was unknown in 55 cases. Overall, this is equivalent to 0.7% per annum (Table A11.1). Because this is so much lower than the likely true rate, and the attrition rate is so high, it is considered unsafe to attempt a post-stratification adjustment to compensate for the shortfall in mortalities. Moreover, the institutional data is inadequate to enable us to estimate the expected mortality rate among persons in the ECHP sample. Table A11.2 is omitted. As a consequence, it is not possible to undertake the full health transitions analysis. Tables A11.3 and A11.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights. These tables exclude transitions to both mortality and long-stay health care, however, and thus should be regarded as conditional on no such transitions. These tables have been included for completeness, but are of limited usefulness and cannot be compared with other countries. Tables A11.5 and A11.6 are omitted.

A11.2 Information about institutionalisation

Three sources have come to our attention. First, an original estimate for prevalence in detail for 1998 (Casado-Marín & López i Casasnovas, 2001, pp. 116-17) was called to our attention by AHEAD partner Namkee Ahn (FEDEA). It is an estimate obtained by combining the Residence Register records and a publication by the Ministry of Health (see Table A11.7).

The reason for the combination is that the overall number of beds is available in the IMSERSO reports, but no breakdown is given by age and gender. On the other hand, the population register provides detail by age and gender, which the authors believe to be substantially under-estimated for reasons similar to those described in section 5 of the main report.

The authors do assume 100% bed occupancy (and we would have to add, by permanent residents, if we wanted to use these figures for comparability with the ECHP). Ahn considers that this assumption is probably not far short of the truth given the very large excess demand in Spain.

Second, there was a PSSRU-led study for the European Commission for a breakdown by gender and age for Spain, for residential usage of the over-65s. This study (Paxto & Cost i Font in Comas-Herrera et al., 2003) reports a slightly different overall figure, using much the same data as the study just identified. The authors state that the number of persons (not places) in care homes was provided by IMSERSO, MTAS (2002), while the distribution by age and gender of persons in institutions in 1996 was provided by Spain's National Statistics Institute, INE (1998). The overall prevalence they conclude is the best estimate for institutional residence is reported as 2.83% in 1998 and 3.2% in 2000.

Third, IMSERSO (Observatorio De Personas Mayores, IMSERSO, 2001) estimate 3.19 for places per 100 persons over 65, broadly in line with the other estimates.

It is clear from this that Spanish data is being developed at a pace that leads us to expect better information in the not very distant future. In the interim, however, the uncertainty about the

prevalence of long-stay residents and the complete absence of data on turnover has led us to the conclusion that a detailed analysis is not possible at present. Table A11.8 is omitted.

A11.3 Spain tables

Table A11.1. Per 1,000, from the ECHP and in the population as a whole

	ECHP[1]		Population[2]	
	Men	Women	Men	Women
Below 65	2.5 (103)	1.0 (42)	3.8	1.3
65-74	19.5 (104)	9.5 (60)	28.7	12.8
75+	52.7 (169)	46.7 (217)	96.5	74.6

[1]Eurostat weighted. Figures in brackets are reported numbers of mortalities on which the rate is based.

[2] The source of this data is Eurostat New Cronos Database (1994-2001 annual average).

Table A11.2. Post-stratification (mortality) weights (not applicable)

Table A11.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	7675	39	54	6	1
Good	18118	21	65	12	2
Fair	5408	8	41	39	12
Bad/very bad	1923	3	14	35	48

(b) Women under 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	6926	39	54	6	1
Good	18201	20	66	13	2
Fair	6498	6	38	43	13
Bad/very bad	2812	2	12	32	54

(c) Men over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	417	21	56	20	4
Good	2446	9	54	30	7
Fair	2913	2	25	52	21
Bad/very bad	1887	1	9	31	59

(d) Women over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	332	18	51	24	7
Good	2504	7	50	34	9
Fair	3998	1	20	51	28
Bad/very bad	3506	1	6	31	62

Table A11.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	24679	96	3	1
Some	1636	47	31	22
Severe	993	23	33	44

(b) Women under 65

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	25197	95	4	1
Some	2227	49	38	13
Severe	897	22	38	40

(c) Men 65 and over

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	4392	81	14	5
Some	1328	43	36	21
Severe	759	27	27	46

(d) Women 65 and over

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	5209	75	17	8
Some	2154	42	38	20
Severe	1348	24	28	48

Table A11.5. (Omitted – see text)

Table A11.6. (Omitted – see text)

Table A11.7. Elderly population (rates in parenthesis) who live in long-term care institutions (1998)

Age	Men	Women
65-69	8817 (0.94)	13555 (1.25)
70-74	9185 (1.22)	18438 (1.95)
75-79	8884 (1.78)	24271 (3.29)
80-84	10303 (3.74)	34853 (6.95)
85+	13912 (7.76)	56141 (13.97)
Overall	*51101 (1.93)*	*147257 (4.00)*

Source: Modelled from Residence Register Records (for age and gender) and Ministry of Health data (for overall totals).

Table A11.8. (Omitted – see text)

Appendix A12. Portugal

A12.1 ECHP Notes

Portugal had a sample of 13,400 individuals. Of the 11,600 interviewed at wave 1, 70% were still interviewed at wave 8, the second highest retention rate of all countries. Just 6% of health transition information was lost between waves (see Table 2 of the main report). Portugal is noteworthy for the low self-reported health ratings, with remarkably few persons describing their health as "very good".

A12.2 Post-stratification weights

Portugal reported 768 mortalities of which age was unknown in 38 cases. Table A12.1 shows the rates by age and gender. For persons under 65, the mortality rate within the ECHP appears to be close to the likely expected rate for this sample, and no adjustment of mortality is necessary. For older persons we think it is probably below the true rate, as with the majority of countries. Yet the unusual nature of institutions in Portugal and the lack of information on turnover means there is no basis for estimating the actual mortality rate within the ECHP sample and thus undertaking a post-stratification adjustment to compensate for the shortfall in mortalities. As a consequence, it is not possible to undertake the full health transitions analysis for persons over 65. Table A12.2 is omitted.

A12.3 Transition rates based on the ECHP

Tables A12.3 and A12.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for persons in the community by gender and broad age band, using the ECHP with Eurostat weights. Parts (c) and (d) of these tables exclude transitions to both mortality and long-stay health care, however, and thus should be regarded as conditional on no such transitions. These parts of the table have been included for completeness, but are of limited usefulness and cannot be compared with other countries

These are followed in Tables A12.5 and A12.6 by probit functions obtained by robust ordered-probit analysis conditional on starting health (i.e. calculated for each starting health state separately), using age and gender as predictors, pooling across waves of the ECHP again with Eurostat and post-stratification weights. But only part (a) of these tables – persons under 65 – has been calculated. Section 6 of the report describes this methodology and how to use the formulae to predict age-/gender-/country-specific transition probabilities. Standard errors use robust estimation to allow for the repeated measurements on individuals. The gender coefficient applies to women as opposed to men. The α coefficients represent boundary points on the normal distribution between outcome health states. Coefficients shown asterisked are not statistically significant (5% level, robust test).

A12.4 Information about institutionalisation

Portugal had some 50,000 persons aged 65+ living in collective institutions at the time of the 2001 census (INE, 2001; Nabare, 2004). The figures are shown in Table A12.7. This seems high by southern European standards although the majority are in institutions offering primarily social support.[31] The description of these institutions elsewhere strongly suggests that they have a mixed care and welfare function, as does even the name. A recent EU programme, including the recent EUROFAMCARE survey (Sousa & Figueiredo, 2004, pp. 36-7) has called these

[31] This is terms as "Apoio Social". We have also read the term "Centres for Social Support".

institutions "Old People's Homes" but noted that only the majority, not all of the residents, are old. The description they provide indicates, for example, that few of these institutions will accept persons who are bed-ridden and that they prefer persons with low incomes lacking family support. These are institutions that might correspond to sheltered housing elsewhere, but are not necessarily as expensive and residents do not always have high health needs. But this remains speculative, and we hope that more direct evidence may be brought to bear on this in future.

The population in all institutions is even more mixed, as it includes, for Portugal, a fairly substantial proportion of elderly persons in religious institutions.

Regrettably, we lack an AHEAD partner in Portugal who might be able to clarify this, but it means that assumptions about institutions that have been adopted for other countries might be inappropriate here. There is no information on turnover.

A12.5 Deriving an age/gender model for institutional admission rates

With no information on rates of entry or discharges/mortalities, no analysis of transitions to long-term health-care provision has been undertaken for Portugal. Tables A12.7 and A12.8 are omitted.

A12.6 Portugal tables

Table A12.1. Annual mortality rates per 1,000, from the ECHP, and in the population as a whole

	ECHP[1]		Population[2]	
	Men	Women	Men	Women
Below 65	4.0 (128)	1.5 (59)	4.9	1.8
65-74	24.9 (126)	14.4 (71)	35.7	17.8
75+	69.7 (186)	46.5 (160)	121.6	96.7

[1]Eurostat weighted. Figures in brackets are reported numbers of mortalities on which the rate is based.

[2] The source for this data is WHO Mortality Database (1996-97 annual average).

Table A12.2. Post-stratification (mortality) weights (not applicable)

Table A12.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	1436	38	54	7	2	0
Good	14871	4	78	15	2	0
Fair	7022	1	26	64	9	0
Bad/very bad	3077	0	4	23	71	2

(b) Women under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	976	38	52	8	1	0
Good	13367	3	75	19	2	0
Fair	9044	1	23	64	12	0
Bad/very bad	4691	0	4	23	72	1

(c) Men over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	25	-	-	-	-
Good	1042	0	53	37	10
Fair	2811	0	10	66	23
Bad/very bad	3055	0	2	16	82

(d) Women over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	14	-	-	-	-
Good	690	1	37	46	17
Fair	3322	0	7	64	29
Bad/very bad	9030	0	1	15	84

Table A12.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	18853	94	4	2	0
Some	1927	30	57	12	1
Severe	1457	13	21	64	2

(b) Women under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	19261	93	5	2	0
Some	2689	33	54	13	0
Severe	1681	14	22	63	1

(c) Men 65 and over

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	3381	81	12	7
Some	1309	24	58	18
Severe	1219	15	18	67

(d) Women 65 and over

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	3924	76	15	9
Some	2008	22	58	19
Severe	1825	13	19	68

Table A12.5. Ordered-probit formulae coefficients for annual transition probabilities for self-reported health from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	0.100	1.768	2.600	3.733	0.014	0.028*
	(0.121)	(0.128)	(0.155)	(0.244)	(0.004)	(0.080)
Good	-0.893	1.864	3.049	4.229	0.026	0.172
	(0.040)	(0.045)	(0.053)	(0.095)	(0.001)	(0.026)
Fair	-1.459	0.347	2.317	3.953	0.023	0.114
	(0.073)	(0.066)	(0.074)	(0.106)	(0.001)	(0.031)
Bad/very bad	-2.059	-0.962	0.144	3.048	0.016	-0.078*
	(0.151)	(0.128)	(0.129)	(0.143)	(0.002)	(0.054)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets.

(b) Persons 65 and over (not available for Portugal)

Table A12.6. Ordered-probit formulae coefficients for annual transition probabilities for a hampering health condition from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	2.548	3.156	4.082	0.024	0.100
	(0.067)	(0.071)	(0.088)	(0.001)	(0.034)
Some	0.051	1.663	3.127	0.013	-0.124
	(0.109)	(0.111)	(0.158)	(0.002)	(0.053)
Severe	-1.148	-0.425	2.166	0.000*	-0.087*
	(0.155)	(0.155)	(0.156)	(0.003)	(0.073)

* Denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets.

(b) Persons 65 and over (not available for Portugal)

Table A12.7. Estimated numbers of long-stay residents and turnover of health-care institutions, persons 65+, Portugal (2001), per 1,000 population alive in age/gender group

	Health institutions		Social support institutions		All institutions	
Age	Men	Women	Men	Women	Men	Women
65-69	1	1	3	3	4	6
70-74	1	1	5	8	6	11
75-79	0	1	10	20	11	24
80-84	1	2	18	45	21	52
85+	1	1	31	93	35	107
Overall	1	1	9	21	11	26

Source: Calculated from 2001 Census, Portugal, "*Recenseamento da população e da habitação. Lisboa: Instituto Nacional de Estatística*" (retrieved from: http://www.ine.pt/prodserv/quadros/mostra_pdf.asp?link=./283/040/001/pdf/cenProv_qdr.pdf&detalhe=Tema:C;Subtema:02;Pub:283;Periodo:040;Cap:001;Quadro:001;Opera:Visualizacao - .PDF).

Table A12.8. (Not available for Portugal)

Appendix A13. Austria

A13.1 ECHP Notes

Austria took part from wave 2 of the ECHP forward with a sample of 8,600 individuals. Of the 7,400 persons who were interviewed at wave 2, 59% were still interviewed at wave 8. Table 2 of the main report shows the average loss rate of 'completed' health transition information from one wave to the next was 10%.

Austria reported 276 mortalities of which age was unknown in 15 cases. This is well below the likely true rate. This factor, along with the high attrition rate and the lack of information on institutions needed to estimate the true likely mortality rate in the Austrian the ECHP, means that a post-stratification adjustment to compensate for the shortfall in mortalities cannot be undertaken and Table A13.2 is omitted. As a consequence, it is not possible to undertake the full health transitions analysis. Tables A13.3 and A13.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for persons in the community by gender and broad age band, using the ECHP with Eurostat weights. These tables exclude transitions to both mortality and long-stay health care, however, and thus should be regarded as conditional on no such transitions. These tables have been included for completeness, but are of limited usefulness and cannot be compared with other countries.

A13.2 Information about institutionalisation

No information was available for Austria on either the prevalence or turnover of long-stay care in institutions. Data were identified by our AHEAD partners,[32] which give information on those awarded eligibility for long-term care allowances by dependency level, but these cannot readily be partitioned into domiciliary and home care without further information. We understand that data sources may have been identified that will assist in future. The comparative sources have rather widely varying reports, as they do for Germany. The standard OECD estimate of the proportion of Austrians aged 65+ in institutional care has been 4.9% and is indicated (Jacobzone et al., 2000, p. 90) to come from Pacolet et al. (1998). This figure is for 1992, out of the time-period of the ECHP. In fact, 4.9% would have been a low rate; it is the lowest in Jacobzone et al. (2000) among the countries for which they provide statistics.

A13.3 Austria tables

Table A13.1. Annual mortality rates per 1,000, from the ECHP and in the population as a whole

	ECHP[1]		Population[2]	
	Men	Women	Men	Women
Below 65	2.9 (55)	1.1 (19)	3.8	1.6
65-74	13.9 (33)	10.8 (26)	32.5	17.0
75+	61.5 (64)	29.8 (64)	106.9	87.3

[1] Eurostat weighted. Figures in brackets are reported numbers of mortalities on which the rate is based.

[2]The source for this data is the WHO Mortality Database (1996-97 annual average).

[32] More specifically they were provided by Maria Hofmarcher and Monika Reidel, Institute for Advanced Studies, Vienna.

Table A13.2. Post-stratification (mortality) weights (not applicable)

Table A13.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	5447	71	26	3	0
Good	5785	24	63	12	1
Fair	2250	6	33	52	9
Bad/very bad	581	3	12	40	45

(b) Women under 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	5232	67	30	3	0
Good	6218	23	64	12	1
Fair	2345	5	35	50	10
Bad/very bad	627	3	12	33	52

(c) Men over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	159	33	58	8	1
Good	1025	8	60	28	4
Fair	994	1	24	59	15
Bad/very bad	515	0	5	25	70

(d) Women over 65

		Final health (row %)			
Initial health	N	Very good	Good	Fair	Bad/very bad
Very good	109	30	59	10	2
Good	1165	4	61	30	6
Fair	1619	1	20	60	19
Bad/very bad	847	0	5	32	63

Table A13.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	12156	95	4	1
Some	1479	44	47	9
Severe	421	15	39	46

(b) Women under 65

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	12575	95	4	1
Some	1389	46	46	8
Severe	459	15	29	56

(c) Men 65 and over

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	1618	83	13	4
Some	656	31	49	20
Severe	417	12	25	63

(d) Women 65 and over

		Final health (row %)		
Initial health	N	None	Some	Severe
None/slight	2093	80	15	5
Some	1025	31	50	19
Severe	625	7	26	67

Appendix A14. Finland

A14.1 ECHP Notes

Finland did not participate in the first two waves of the ECHP, as it joined the EU in 1995. Data is therefore only available for six waves. The total sample size was 9,200. Despite the late entry the attrition rate was comparatively high: of the 8,200 interviewed at wave 3, 55% were interviewed at wave 8. Around 10% of the interviewed sample in each wave did not provide an answer to the self-assessed health question. As a consequence, Finland had the highest loss of health transition information for self-assessed health between waves, at 17%. The loss rate for a hampering health condition was lower, at 14%. The number of reported mortalities was far below expected. In total there were 134 reported, of which the age was unknown in 30 cases. Hardly any mortalities were reported in the last two waves, and in fact 40% of all reported mortalities were in wave 6. Overall, the shortfall in mortalities was particularly acute for persons over 65. Details are shown in Table A14.1.

A14.2 Post-stratification weights

Because mortalities were so inadequately reported, it was not considered practical to undertake post-stratification for persons over 65. The consequence is the omission of this age group from the analysis of transitions. The numbers are, however, less deficient for those under 65, and to allow for the under-reporting, post-stratification weights of 1.54 are used for self-reported health and 1.67 for a hampering health condition. No distinction is made between genders. Table A14.2 is omitted.

A14.3 Transition rates based on the ECHP

Tables A14.3 and A14.4 show overall annual average health transition rates, by self-reported health and a hampering health condition respectively, for people in the community by gender and broad age band, using the ECHP with Eurostat weights and in the case of parts (a) and (b), post-stratification to compensate for the shortfall in mortalities. Parts (c) and (d) of these tables exclude transitions to both mortality and long-stay health care, however, and thus should be regarded as conditional on no such transitions. These parts of the table have been included for completeness, but are of limited usefulness and cannot be compared with other countries

These are followed in Tables A14.5 and A14.6 by probit functions obtained by robust ordered-probit analysis conditional on starting health (i.e. calculated for each starting health state separately), using age and gender as predictors, pooling across waves of the ECHP again with Eurostat and post-stratification weights. Yet only part (a) of these tables – persons under 65 – has been calculated. Section 6 of the report describes this methodology and how to use the formulae to predict age-/gender-/country-specific transition probabilities. Standard errors use robust estimation to allow for the repeated measurements on individuals. The gender coefficient applies to women as opposed to men. The α coefficients represent boundary points on the normal distribution between outcome health states. Coefficients shown asterisked are not statistically significant (5% level, robust test).

A14.4 Information about institutionalisation

The Finnish data provided by AHEAD partner, Hannu Piekkola, based on population registers, were outstandingly detailed for the years 2000 and 2001. The data collected include transfers

from a private residence to a long-term care institution, which is coded by the population register and available to us for the years 2000 and 2001, as well as the numbers of residents in those institutions.

Statistics Finland notes, however, that they believe there is an undercount by the population register method for admissions date. We have noted elsewhere that typically it may be some months before events are reported to the national register. If a move to a health-care institution is followed by mortality within a few months, it is likely that the move will never be reported. Moreover, registration may be maintained at an earlier residence, as Van Oyen (2000) reported for Belgium. Indeed, these numbers did not correspond at all with overall estimates by the Finnish STAKES, or with the AGIR database, which also relies on STAKES. Therefore an adjustment has been made, to increase the overall total by 46%. Accordingly, and in the absence of more detailed information, figures in each age/gender category have been uplifted by this amount. Even so, it should be noted that the ratio of reported annual admissions to residents is 26%, one of the lowest of any country reported here, which might imply that admissions are still under-reported in relation to numbers of residents.

A.14.5 Deriving an age/gender model for institutional admission rates

Numbers of residents and admissions were supplied in age and gender bands as requested. These are shown in Table A14.7, which includes the uplift to each group to allow for under-reporting.

A smoothed probit function by age for the admission rates in 2000 is shown in Table A14.8. As there is an interaction between age and gender (the rate rises more rapidly with age for women), functions for men and women are shown separately. Unlike most other countries, a term in age-squared does not improve the estimate and is omitted. No standard errors are shown, as these estimates were not derived by sampling.

A14.6 Finland tables

Table A14.1. Annual mortality rates per 1,000, from the ECHP, in the population as a whole, and estimated for persons previously living in private households

	ECHP[1]		Population[2]	
	Men	Women	Men	Women
Below 65	1.8 (27)	0.8 (12)	4.4	1.7
65+	18.1 (38)	11.5 (27)	59.9	47.1

[1]Eurostat weighted. Figures in brackets are reported numbers of mortalities on which the rate is based.

[2] The source for this data is the WHO, Mortality Tables (1996-97). As a result of the immense gap between the expected and actual levels we did not attempt to estimate the effect of institutional mortalities on the older group.

Table A14.2. (Omitted – see text)

Table A14.3. Raw number of transitions and weighted average annual transition rates for self-reported health from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	2370	58	38	4	0	0
Good	5119	14	69	15	1	0
Fair	2803	2	27	64	7	1
Bad/very bad	468	0	7	39	53	1

(b) Women under 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	2399	52	44	4	0	0
Good	6239	14	70	15	0	0
Fair	3122	2	27	63	7	0
Bad/very bad	515	0	7	46	47	0

(c) Men over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	72	48	33	19	0	-
Good	376	6	51	39	4	-
Fair	837	1	15	70	14	-
Bad/very bad	277	0	1	39	60	-

(d) Women over 65

		Final health (row %)				
Initial health	N	Very good	Good	Fair	Bad/very bad	Deceased
Very good	75	33	52	14	1	-
Good	386	7	49	40	4	-
Fair	1047	1	12	72	15	-
Bad/very bad	349	0	1	38	61	-

Notes: Parts (a) and (b) are weighted using Eurostat and post-stratification weights. Parts (c) and (d) use Eurostat weights only and omit mortalities.

Table A14.4. Raw number of transitions and weighted average annual transition rates for a hampering health condition from the ECHP (all waves, pooled)

(a) Men under 65

		Final health (row %)			
Initial health	n	None/slight	Some	Severe	Deceased
None/slight	10364	91	8	1	0
Some	2054	38	51	11	0
Severe	703	11	36	50	3

(b) Women under 65

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	10167	89	10	1	0
Some	2375	33	56	11	0
Severe	694	12	37	51	0

(c) Men 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	796	72	21	7	-
Some	606	28	49	23	-
Severe	445	8	30	62	-

(d) Women 65 and over

		Final health (row %)			
Initial health	N	None/slight	Some	Severe	Deceased
None/slight	838	71	22	7	-
Some	723	20	61	19	-
Severe	473	6	26	66	-

Table A14.5. Ordered-probit formulae coefficients for annual transition probabilities for self-reported health from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	α_4	Age (years)	Gender
Very good	0.690	2.314	3.317	4.089	0.014	0.129
	(0.085)	(0.094)	(0.144)	(0.225)	(0.002)	(0.050)
Good	-0.347	1.782	3.092	4.054	0.019	0.018*
	(0.056)	(0.060)	(0.074)	(0.150)	(0.001)	(0.030)
Fair	-0.865	0.767	2.832	4.041	0.028	-0.013*
	(0.108)	(0.109)	(0.124)	(0.169)	(0.002)	(0.043)
Bad/very bad	-1.660	-0.657	0.665	2.672	0.017	-0.205
	(0.227)	(0.209)	(0.207)	(0.232)	(0.004)	(0.095)

* denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Predicted probabilities are conditional on not living in a health-care institution at the time of the survey.

(b) Persons 65 and over (omitted – see text)

Table A14.6. Ordered-probit formulae coefficients for annual transition probabilities for a hampering health condition from the ECHP (all waves, pooled)

(a) Persons under 65

Initial health	α_1	α_2	α_3	Age (years)	Gender
None/slight	2.008	2.968	3.744	0.018	0.050*
	(0.060)	(0.065)	(0.116)	(0.001)	(0.033)
Some	0.588	2.237	3.837	0.021	0.056*
	(0.092)	(0.098)	(0.151)	(0.002)	(0.047)
Severe	-0.461	0.708	2.986	0.015	-0.040*
	(0.218)	(0.226)	(0.250)	(0.004)	(0.089)

* denotes coefficients (age, gender) not statistically significant (5% level).

Notes: Standard errors of coefficients are shown in brackets. Predicted probabilities are conditional on not living in a health-care institution at the time of the survey.

(b) Persons 65 and over (omitted – see text)

Table A14.7. Estimated numbers of long-stay residents and admissions to health-care institutions, Finland, 2000, per 1,000 population alive in age/gender group

	Men		Women	
Age	Residents	Admissions	Residents	Admissions
65 – 69	9	2	7	1
70 - 74	15	4	16	4
75 – 79	28	7	40	11
80 – 84	53	15	87	23
85 – 89	102	34	188	49
90 – 94	200	59	325	94
95 +	290	93	511	158
Total	*7841*	*2232*	*27216*	*6379*

Source: Statistics Finland data collected by Hannu Piekkola.

Table A14.8. Probit formulae for admission probabilities (persons 65 and over)

	Based on admission	
	α_1	Age
Men	-6.624	0.055
Women	-7.433	0.066

Appendix A15. Sweden

A15.1 ECHP Notes

Sweden used its repeated annual "Level of Living" survey rather than a true longitudinal survey as its contribution to the ECHP, so no estimation of transitions is possible. Sweden is therefore not included in this analysis.