



# **INTERIM REPORT ON DEVELOPMENT OF THE INDEX OF WELL-BEING IN OLDER POPULATIONS**

**Global Aging Monitoring Project (GAMP)  
Population Reference Bureau  
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**Results are preliminary and subject to revision.**

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## Preface

Global population aging is a phenomenon that has no precedent in history. It represents both challenges and opportunities for countries at all stages of development. However, the lack of a standard summary measure of well-being for the older population hampers on-going assessments of the effects of policies and programs on the elderly and limits the ability of one country to learn from another's experience. To fill this gap, the Population Reference Bureau (PRB) and the Global Aging program at the Stanford Center on Longevity (SCL) have collaborated on creating the Index of Well-Being in Older Populations. We established an advisory committee with expertise in economics, global health, community health, survey methodology, social indicators, aging, and policy. This committee provided technical and substantive guidance in addressing data comparability issues, in developing the methodology for index construction, and in considering how to communicate with a policy audience.

The initial phases of the collaboration assessed the feasibility of looking at elderly well-being in countries throughout the world using existing cross-national databases maintained by the Organisation for Economic Co-operation and Development (OECD), the World Bank, the United Nations, and other agencies. However, lack of data harmonization among statistics prepared within different national systems quickly moved the team to look at survey data from which we might construct comparable metrics. With the assistance of the advisory committee, we identified and examined a comprehensive set of indicators for a diverse set of countries. After considering data constraints, the potential effect of cultural differences, and stages of economic development, we settled on a core set of outcome indicators and decided to compare a more homogeneous set of countries. The analysis described in this document—and the Index of Well-Being itself—is the result.

The Index of Well-Being will serve as a valuable tool for monitoring the overall status of older population groups across key outcomes and for making comparisons across countries, and eventually over time. It will thus facilitate deliberation on important issues confronting nations as the world's population ages. For example, individual countries will be able to consider questions such as: Along which dimension of well-being—e.g., material wealth, health, social engagement—are older populations faring best (worst)? In the United States, is economic well-being of the older population better than their well-being on health-related dimensions? Does the same hold for European countries when compared to the United States? How is the level of well-being among the elderly compared to that of the middle-aged? On which dimensions of well-being are older populations faring well or poorly across countries at similar levels of overall development? Are these differences in well-being associated with particular social characteristics of the elderly, or with differences in pension or health care systems that policy decisions can affect? Answers to these and other questions can both motivate and guide policy decisions that will improve the lives of older persons and societies in general. Having an overall measure of well-being, particularly one focused on outcomes, is an important and necessary first step in performing the analyses to address such questions about what determines how older populations are faring.

# Interim Report on Development of the Index of Well-Being in Older Populations

## Executive Summary

### ***About the Project***

In an effort to measure the overall well-being of older people across countries, this report chronicles the development of the new Index of Well-Being in Older Populations. After review of a comprehensive set of well-being indicators for countries across the world, our study team focused on outcome indicators for which comparable data were available for 12 study countries at similar levels of development. The resulting index focuses the discussion of elderly well-being on key outcomes and provides a user-friendly summary measure that decision-makers may use to assess the status of older populations.

### ***Domains and Methodology***

The index measures overall well-being of older populations across 13 different measures that cover four domains:

- Material Well-being
- Physical and Cognitive Well-Being
- Social Connectedness and Relationships
- Emotional Well-being

We use two approaches in measuring the relative well-being of the older population: a composite index and a composite ranking. In our first approach, we calculate a composite (summary) index as an average of sub-index scores across the four domains. We develop each domain's sub-index score by standardizing each country's indicator value relative to the U.S. value, summing the standardized values across indicators, and then normalizing on a scale from 0 to 100. The resulting score represents the proportion of the distance between the least favorable value and the best value among the study countries. The composite index score is the average of all the sub-index scores. Our second approach evaluates the relative positions of the countries based on a composite ranking. A country's composite ranking for each domain is the average of its rankings on each indicator in the domain. The overall composite ranking for any country is its average ranking across the four domains. We provide the composite index score and composite ranking for three age groups (50-64, 65-74, 75 and older) in each country.

### ***Index Results***

*Material Well-Being:* A country's relative standing in the material well-being domain generally improves for the older age groups. In this domain, the United States has the highest sub-index score for the 50-64 age group. Switzerland has the highest domain score for both the 65-74 and the 75 and older age groups.

*Physical and Cognitive Well-Being:* Most countries' relative standing in their levels of physical and cognitive well-being generally drops for the two older age groups. Switzerland has the highest physical and cognitive well-being score for each of the three age groups. Spain has the lowest sub-index score among the 65-74 and the 70 and older age groups.

*Social Connectedness and Relationships:* The sub-index score of countries in the social connectedness and relationships domain is generally lower for the two older age groups. For all age groups, the United States fares best on this domain. Italy ranks at the bottom for all three age groups.

*Emotional Well-being:* There is no clear age pattern in countries' relative standing in the emotional well-being domain. The United States has the highest emotional well-being score in all three age groups. Among adults under age 75, France scores the lowest for this domain.

*Composite Index:* Based on the composite index score, the Netherlands, Sweden, Switzerland, and the United States lead in the overall well-being of the older population in the 60-74 and 75 and older age groups. Italy and Spain consistently rank at the bottom for all age groups among this group of countries. Among countries with the same relative ranking based on the composite index score, the factors driving the relative ranking may or may not be the same.

*Composite Ranking:* A summary of the average ranking of each country across the four domains shows that no one country performs best in all four domains, nor does any country stand out as the worst performer. The countries tend to fall into tiers of performance, and they all have room for improvement.

### **Next Steps**

While we focused on documenting more technical aspects of the index construction in this report, one of our next steps is the substantive interpretation of the results. We are conducting a sensitivity analysis to determine the extent to which exclusion of the non-institutionalized population and proxy respondents in some surveys affects the findings. We will incorporate these results into the final project report.

The composite index developed to this point allows us to assess the overall well-being of older population groups of one country relative to others and to ascertain which factors contribute to a country's relative standing. Our results demonstrate that countries with similar overall levels of well-being among older adults may have different advantages and face different challenges to improving the overall status of their older populations. The composite rankings help make clear that no one country is best in every domain or on every indicator, suggesting that it is more helpful in policy and program planning to look at what factors are contributing to a country's relative standing than to be overly concerned with the overall index scores and rankings based on these scores.

The next challenge in advancing development of this index is to assess its performance among a more culturally and socioeconomically diverse set of countries. In order to move forward on this front, further data harmonization across countries is necessary. This includes careful attention to how survey samples are drawn, especially consideration of generalization to the entire older population of a country and not just to the non-institutionalized population. The extension of the analysis to multiple years would allow countries to chart changes in the well-being of their older populations and compare their progress relative to other nations at similar stages of development. Ultimately, comparable measurement of well-being in older populations over time and across countries will enhance our ability to monitor the effects of social, political, and policy changes on these groups.

## Interim Report on Development of the Index of Well-Being in Older Populations

### A. Background and Objectives

While population aging signifies a human success story reflecting achievements in lowering fertility and improving longevity, it also poses significant economic, social, and political challenges to nations. Without appropriate policy changes, population aging may have devastating consequences. These consequences include dramatic increases in health care costs, severely reduced economic growth, and serious strains on social insurance programs. But the extent to which these consequences become reality and the magnitude of their impact depends, in part, on how well individuals age. There is no comparable, standard set of indicators available to measure well-being of older populations across countries. Given the current trend of rapid population aging, the lack of a standard summary index of well-being for persons age 50 and older hampers on-going assessments of policies and programs aimed at helping individuals age well. In addition, the lack of comparable cross-national indicators inhibits countries' ability to learn from the experiences of one another.

To fill this gap, the Population Reference Bureau (PRB) and the Global Aging program at the Stanford Center on Longevity (SCL) are collaborating on the development of a composite index. The process of developing a composite index has necessarily required selection of indicators based on relevance, availability, and consistency across countries. In addition, after assessing the quality of the data and relationships among the indicators, we have reconsidered our earlier judgments in light of missing data, face validity, and the results of reliability and sensitivity analyses. We present the well-being of older people in three age groups—ages 50 to 64<sup>1</sup>, ages 65 to 74, and age 75 and older—measured across 12 countries for which we currently have comparable data.

Our main objective is to provide a user-friendly summary measure useful to decision-makers in two ways. First, this index allows stakeholders to monitor the well-being of older populations across key dimensions of well-being and facilitates the comparison of older persons' well-being across countries. The index can thus advance critical debate on important issues confronting nations as the world's population ages. Second, it also can help raise public awareness. The Index of Well-Being in Older Populations (IWOP) can both motivate and guide policy decisions that will improve the lives of older persons and of societies in general. As a measure that summarizes a complex and multi-dimensional issue, the index allows us to compare the well-being of older populations across countries at a single point in time. With repeated measurement, this index may also allow decision-makers to track progress over periods of time.

This report documents the approach taken in developing composite indices and composite rankings to assess the well-being of people age 50 and older, the data sources used, the problems encountered, and the limitations of the data. The next section outlines key issues in data selection and analysis. Section C describes the sub-categories or domains of the index. Section D presents preliminary country rankings based on index results. Section E follows with a discussion of the planned next steps. The Appendices provide more detailed technical information.

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<sup>1</sup>For the United States, the youngest age of the sample included for all indicators except one is 52.5. For the indicator on contact with children, the youngest age of the sample is 50.5.

## **B. Data and Methodology**

Multiple factors contribute to an individual's sense of well-being. Although ideas about what constitutes "well-being" vary across individuals and contexts, there is some consensus on the importance of several key domains. An extensive review by Cummins (1996; 1997a) of studies on subjective well-being indicates that most of the topic areas studied comprised a few specific domains of life. Among them, the following seven domains were consistently considered highly relevant to subjective well-being (Cummins 1996, 1997a; Land 2001):

- (1) Material well-being—e.g., command over material and financial resources and consumption
- (2) Health—e.g., health functioning, personal health
- (3) Safety—e.g., security from violence, personal control
- (4) Productive activity—e.g., employment, job, work, schooling
- (5) Place in community—e.g., socioeconomic status, community involvement, self-esteem, empowerment
- (6) Intimacy—e.g., relationships with family and friends
- (7) Emotional well-being—e.g., mental health, morale, spiritual well-being

Similar domains have been used to measure well-being for a variety of populations differing in age range and contexts (Cummins 1996, 1997b; Land 2001).

Researchers have identified a set of indicators for well-being and developed summary indices for various groups, populations, and countries. The Child Well-Being Index, the Human Development Index, and the index of Social Health are examples. However, there is no existing set of indicators or indices available to describe consistently the well-being of older populations across countries.

In the initial phases of this study, we assessed the feasibility of assembling indicators for as many countries as possible and examined the availability of a comprehensive set of indicators from the seven domains repeatedly used in studies of well-being. A lack of data comparability across countries prevented us from using administrative data. Survey data, however, offered the possibility of constructing comparable indicators. The indicators of well-being used in our composite index for older populations focus on key outcomes across four domains:

- Material well-being
- Physical and cognitive well-being
- Social connectedness and relationships
- Emotional well-being

These domains represent a critical set of outcomes for the elderly, and the indicators used were available for age-specific groups within the population, allowing us to consider age-dependent differences in outcomes among older adults. Indicators measuring well-being in each of these domains were largely constructed using survey data.

### **B.1. Data**

For these analyses, we selected survey datasets whose main components were designed to be comparable with Health and Retirement Surveys (HRS) conducted in the United States. We took this approach after considering the use of statistics from extant cross-national databases such as those statistics provided by the United Nations (UN) and the Organization for Economic Co-operation and Development (OECD). However, a meeting of experts reached the conclusion that the information in many of these databases was collected by individual countries based on each country's specific needs, severely limiting meaningful comparability across countries.

The use of data from comparable surveys helped to reduce inconsistency in cross-national measurement. Further, within these datasets, we selected the indicators that best facilitated cross-national comparisons. Nevertheless, inconsistent measurement across countries may still exist for a number of reasons. For example, slight differences in questionnaire wording may result in differences in how respondents answer.

Also, country surveys varied in whether or not they included the institutionalized population in their sampling frame or appropriately weighted their results to account for the older population residing in these institutions. (Appendices A and B provide a more detailed review of the data sources and indicator definitions.) Cultural and socioeconomic differences may also produce different responses when no underlying difference in well-being exists.

Our analysis focused on a select set of Western industrialized countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden, Switzerland, and the United States) and leaves out emerging markets that also conduct comparable surveys (such as South Korea and Mexico). This reduced the extent to which cultural differences may have influenced the findings across countries. The types of indicators that matter to the levels of well-being in old age also likely differ across countries with different levels of socioeconomic development. Restricting our analysis to the 12 countries listed above has afforded us the opportunity to examine how each indicator behaves in a more homogeneous sample of countries before expanding the analysis to a more diverse set of nations.

Despite our efforts to minimize inconsistencies in cross-national measurement due to variation in the survey questionnaires and potential cultural differences, readers should interpret the results of our analysis with caution. Small differences in results for indicators should not be treated as substantively significant. However, large differences—particularly in any sub-index and composite index—provide valuable information about the relative standing of these countries with respect to the well-being of older populations.

## **B.2. Analytic Approach**

### *Number of Indicators*

In constructing the summary index measure, there is a trade-off between the number of indicators that are consistently measured and interpretable across countries and the number of countries included in the analysis. The more indicators we use, the fewer the number of countries for which all the indicators are comparable, and vice versa.

We limit our indicators for the index strictly to outcomes that are measured consistently across countries and treat all other relevant indicators as contextual factors. In this report, we do not provide data on contextual factors. These data will be available in an online database upon completion of the project.

### *Age Groups*

Older adults are not a homogenous group. The extent to which particular indicators contribute to overall well-being may vary across different groups. Age is a particularly important consideration in measurement of material well-being. For example, it may affect eligibility for old age pensions and related services. Our analysis divides older adults into three age groups, ages 50-64, 65-74, and 75 and older, and constructs the index (and sub-indices) for each.<sup>2</sup> We employ the same set of indicators for all age groups so that we may directly compare the levels of well-being across age groups, which is one goal of this project. Applying a narrower set of indicators optimized for each age group would not allow for direct age group comparisons.

### *Institutionalization and Proxy Responses*

Our main goal is to describe the relative well-being of the older population in the countries studied, taking into account both older persons residing in the community and those living in institutions. However, not all the surveys sampled both older adults living in the community and those living in any type of institution. Moreover, the statistical weighting methodology developed for most of the surveys that exclude the institutionalized population do not calibrate survey results to account for exclusion of this group. Most institutionalized older adults live in long-term care facilities such as nursing homes and assisted living facilities and, thus, are likely less healthy than older persons living in the community. We can therefore generalize our results only to the

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<sup>2</sup> For the United States, the age ranges for the youngest group is either 50.5-64 or 52.5-64, depending on the indicators examined. The U.S. sample is, therefore, slightly older than other samples. We, however, expect the bias caused by the age differentials to be minimal.

community-dwelling older adults in their respective countries, as our findings underestimate the physical problems in the overall population. Sensitivity analyses currently underway will assess the direction and extent of the potential bias.

In addition, treatment of proxy respondents differs across the surveys. For example, the first wave of SHARE data used in the analysis did not allow proxy responses for some sections, including health. Because poor health is a common reason for having a proxy respondent, older adults with proxy responses are likely less healthy than those without. Not allowing for proxy respondents would therefore lead to underestimation of the physical problems in the SHARE samples. Nonetheless, our findings in the domain most likely affected by this issue—physical and cognitive well-being—are consistent with other research on reported variation in health outcomes in high-income countries (see interviews with Eileen Crimmins and Sam Preston at [www.prb.org](http://www.prb.org)).

## C. Domains and Indicators

Population aging is a global phenomenon with widespread implications for individual countries. The development of a common summary measure of well-being has the potential to assist countries in monitoring the health, financial status, and emotional state of older populations. In addition, careful comparisons across countries can provide insight into possible impacts of different policy choices. Incorporating the right set of measures into a composite index is critical to achieving a policy-relevant measure of overall well-being. We measure the well-being of older populations across four dimensions that represent necessary components of daily life: material well-being, physical and cognitive well-being, social connections and relationships, and emotional well-being:

- Material well-being indicators capture the extent to which the older population may be able to meet their needs for basic goods such as food and shelter.
- Physical and cognitive well-being indicators assess the ability to perform basic activities of daily living and the extent to which these abilities are impaired, with life expectancy being the most fundamental outcome at the population level.
- Involvement with family members, peers, community members, and local institutions contributes to life satisfaction, in addition to being associated with better health.
- Emotional health is closely tied to both physical health and social support.

The following sections summarize the concepts underlying each domain. Technical notes and definitions for the individual indicators are provided in the Appendices. We have drawn up the list of indicators for each domain in consultation with specialists in respective areas. We have chosen the domains that house the indicators on the basis of expert advice, a review of the literature, and a review of other composite indices (e.g., The Child Well-Being Index).

### C.1. Material Well-being

Demographic research indicates a strong relationship between the level of wealth and various indicators of well-being, including health and life satisfaction. We measure material well-being with the following indicators:

- Average personal income
- Average household income per capita
- Percent not in absolute poverty

Economic status in old age is largely determined by current and past employment characteristics. Sources of income vary across different groups (e.g., men and women, the young-old and the old-old) but generally include public and private pensions, savings, assets, and earnings for persons who remain economically active. Measuring income at both individual and household levels is important for older adults who may no longer be in the labor force yet live with others, thus, benefiting from income of household members and economies of scale. In addition, there is a positive association between education and income over an adult's lifetime. As a result education and occupational status, though not measured here, signal both current and long-term socioeconomic status.

Absolute poverty among older adults provides an assessment of whether income sources adequately meet the most basic human needs, such as food, clothing and shelter. While people of all ages are vulnerable to falling into poverty, older individuals may face greater difficulty in escaping poverty because of mandatory retirement ages, age discrimination, and physical limitations that may narrow employment opportunities.

The importance of each of these measures of well-being varies from country to country. For example, pension programs vary greatly across countries and so does the extent to which they replace pre-retirement income (Gruber and Wise 1999; Bloom et al 2007). The system of social safety nets available for the poor also varies greatly from country to country (World Bank Institute 2006).

## C.2. Physical and Cognitive Well-being

Health affects one's ability to care for oneself, to stay active and productive, and to live in the community. Poor health may also directly and indirectly diminish happiness and overall satisfaction in life (Easterlin, 2003). In order to get a picture of overall health in the older population, we assess self-reported health status, objective indicators of physical and mental health, and summary measures available at the population level. The indicators used are:

- Percent with no disability
- Percent with no difficulty taking medications
- Percent with good immediate or delayed recall
- Percent with no limitation in physical functioning (able to walk a short distance)
- Life expectancy at ages 50-54 65-69, or 75-79 (depending on the age group)
- Percent not obese

We measure dimensions of emotional health in a separate domain.

The major health issues older adults face are long term in nature—chronic diseases. Globally, chronic diseases already make up 87 percent of all the health issues facing adults age 60 and older (Lopez et al. 2006). Chronic diseases can result in functional difficulty and disability, which may affect one's ability to live independently. Nagi (1976, 1991) described a series of four steps as the pathway to declining physical functioning. It starts with the onset of disease, followed by impairment or the physiological manifestation of disease in multiple systems, which leads to functional limitations such as difficulty walking and grasping, with the final step being the onset of disability.

Disability is typically measured by one's ability to perform the Activities of Daily Living (ADLs), a set of basic daily activities necessary for self-care, such as bathing, dressing, eating, toileting, and transferring (Katz et al. 1963). By the time one has difficulty with ADLs, living at home safely without regular care giving help from others becomes nearly impossible. One cross-national study of disability as measured by key activities of daily living has found declining disability rates among older Europeans in some countries in the 1980s and 1990s (Aijanseppa et al. 2005). However, another study examining trends in a wider range of countries has found a more mixed pattern (Lafortune et al. 2007). Only five countries—Denmark, Finland, Italy, the Netherlands, and the United States—show clear evidence of a decline in disability among older adults within a decade.

The ability to live independently is typically measured with the Instrumental Activities of Daily Living (IADLs), a set of more complex activities than ADLs, such as preparing meals, using public transportation, shopping, using a telephone, managing finances, and managing medication (Lawton and Brody 1969). These tasks require higher levels of physical or mental abilities than those necessary to meet basic personal needs. For example, preparing meals requires planning the meal; gathering ingredients; opening cans, jars, and packages; using kitchen equipments safely; and so on. Managing medication requires keeping track of medications and taking prescribed dosages at correct times. Among the IADLs measured across surveys in different countries, taking medications is one measure that is consistently asked and that offers similar implications across a variety of cultural contexts.

Orientation (to time and place) and recall are two of the most common and important cognitive functions, as they both depend on learning and memory. Learning rates and short-term memory both decline with advancing age, though there is substantial individual variation (Selkoe 1992). Besides orientation and recall, other important cognitive abilities include executive function (planning, sequencing) and language.

Cognitive decline is first detectable in midlife but usually only through testing (Schaie 1989; Schaie 1994). Cognitive functioning in midlife is influenced by genes, childhood home environment, education, and occupation. Memory is often the first and most prominent function affected. In the United States, fewer than one in five people over age 65 experiences moderate to severe memory impairment. Among adults age 85 and older, the share is higher, but still less than half. About one-third suffer from moderate to severe memory impairment. Only a small minority of older adults progress to clinical dementia. In Europe, the prevalence of dementia is around 2 percent for persons ages 65 to 70 but reaches around 25 percent to 30 percent for

adults age 85 and older (Lobo et al. 2000). In a population-based study of elderly persons in Taiwan, researchers found that participating in social activities (playing games; volunteering; and participating in a religious group, clan association, or elder-based organization) seems to help preserve cognitive function (Glei et al. 2005).

Vast improvements in sanitation, nutrition, and medicine in the last half-century have led to large gains in life expectancies around the world. Life expectancies are projected to improve even further, though the mechanisms underlying the gains are not the same in different parts of the world. Reducing the rates of infectious diseases has the largest impact on improving life expectancies in less developed countries, which generally have high mortality and a large proportion of all deaths occurring among children. In contrast, reducing the rates of chronic diseases has the largest impact on longevity in more developed countries, which usually have low mortality and most deaths occurring among older adults (Deaton 2006). With future gains in life expectancy from infectious diseases expected to be much smaller than in the past, the largest gains will be in life expectancies at old ages.

Obesity has reached epidemic proportions in many countries and is a major contributor to the global burden of chronic disease and disability. The health consequences range from increased risk of premature death to serious chronic conditions that reduce the overall quality of life—including type II diabetes, cardiovascular disease, hypertension and stroke, and certain forms of cancer. In old age, the relationship between mortality and the Body Mass Index, a measure of total body fat, appears to be U-shaped (Heiat et al. 2001). Often among the older population, it is under nutrition that is associated with higher mortality. Although being modestly overweight may actually increase the odds of survival among older persons by providing nutritional reserves during recovery from illness (Flegal et al., 2005 and 2007), obesity is generally shown to elevate the risks of morbidity, functional limitations, and mortality (Alley & Chang 2007; Dolan et al. 2007; Flegal et al. 2005 and 2007, Jenkins 2004).

While the obesity rate is growing globally, there is substantial cross-national variation in both the rate and the extent of its association with other health outcomes, even within world regions. For example, a study of the older residents of selected urban areas in seven countries across Latin America and the Caribbean found the prevalence to vary between 13 percent and 22 percent, with Mexico and Barbados having the highest rates (Pelaez et al. 2003). Similarly, a study of older adults in selected European countries found the obesity rates among women to range from 12 percent for Switzerland to 26 percent for Spain (Andreyeva, Michaud, and van Soest 2005). The study found strong associations between obesity and major health risk factors, but it also found the extent to which obesity is associated with certain conditions—such as depression, heart disease and high cholesterol levels—varied substantially. These variations in obesity and related outcomes likely stem from cross-national differences in diet, behaviors, cultures, and genetics, though research has not identified the exact mechanisms.

### **C.3. Social Connectedness and Relationships**

The concepts of social connectedness and relationships refer to involvement with family members, peers, community members, and local institutions. Increased social connectedness—whether formal or informal—is related to better health and increased life satisfaction. In this study, we measure social connectedness and informal relationships through two indicators:

- Percent who participate in an economic or social activity (e.g., employment; community or religious organizations; social clubs; and/or volunteer work)
- Percent in contact with at least one child

There are various ways in which being socially connected in old age may be positively related to well-being. For example, social contacts gained from engaging in social activities have well-documented benefits for health (House, Landis, and Umberson 1988). Having a productive role as an employee or a volunteer may also provide emotional gratification and a sense of power and prestige that can have a positive impact on one's well-being (Moen et al. 1992). The mere physical activity required to participate in activities can also benefit health (Carlson, Seeman, and Fried 2000; Chambre 1987).

One way that individuals stay socially connected and productive in old age is by working for pay. The reasons one chooses to work in old age are varied, ranging from the intrinsic reward one gets from work to financial needs. Regardless, working is one important way in which older adults stay socially engaged. One study of adults ages 75 and over in the United States found that working for at least 100 hours during a 12-month period was associated with better self-rated health, lower disability, and mortality measured two years later (Luoh and Herzog 2002). Levels of labor force participation among older adults vary substantially across countries as they are influenced by institutional opportunities and constraints, such as mandatory retirement ages and work incentives in pension policies (Gruber and Wise 1999).

Volunteering is another popular way in which individuals stay socially connected in old age. Associations between volunteering and disability, psychological well-being, self-rated health, and mortality among older adults have been found in numerous studies in the United States (Luoh and Herzog 2002; Morrow-Howell et al. 2003; Thoits and Hewitt 2001; VanWilligen 2000). A few studies suggest that volunteering even a small amount of time has health benefits among older persons (Morrow-Howell et al. 2003; Musick and Wilson 2003; Van Willigen 2000). The levels of volunteering in old age vary substantially across countries. A study examining 11 European countries found that the percentage of adults age 50 and older who reported having volunteered during the month prior to the interview ranged from 21 percent for the Netherlands to around 3 percent for Greece and Spain, with an average of 10 percent across the 11 countries in the study (Hank and Stuck 2008).

Research suggests that embedded social networks have a protective influence on mental and physical health. Children typically make up the largest part of one's support system. Because of declining mortality, older adults today are much more likely to have all of their children survive them and to experience grandparenthood than their predecessors. They also have a better chance of growing old with their spouses, though increased divorce rates have offset this effect somewhat. The potential for "vertical" ties across generations have, therefore, greatly increased owing to declining mortality. At the same time, smaller family sizes due to declines in fertility have resulted in a reduced number of individuals in each generation and, thus, the potential number of "horizontal" ties has likely decreased. The extent to which the current cohorts of older adults experienced fertility decline, however, differs greatly across countries.

In the United States, family and friends supply most long-term care (LTC). Policies place primary responsibility for long-term care on the family, with formal services playing a supporting role (Davey et al. 2005). An estimated 29 million informal caregivers deliver more than \$300 billion in services in the United States (Arno 2006). Informal caregivers not only contribute to well-being of the individuals in their care, they also save governments money. According to a study by Yoo et al. (2004), presence of adult child caregivers is associated with up to \$3,830 less in LTC spending per year in countries that are members of OECD. These effects on spending vary across OECD countries and over time.

The impact on psychological well-being of having close relationships with adult children is widely reported (Koropecj-Cox 2002; Connidis and McMullin 1993; Silverstein and Bengston 1991; Umberson 1992). The levels of impact appear to be affected by expectations about the importance of children's role in old-age care and support, which vary across cultures. In Japan, a culture characterized by children's commitment to supporting their elderly parents, children are the most important social and emotional support. In this context, support from one's children is associated with positive mental health outcomes, more so than support from other sources—including spouses and friends (Okabayashi et. al, 2004). This contrasts with an earlier result from a study of older persons in the United States and India where emotional support from a spouse is more important in determining well-being than is similar support from one's children (Venkatraman, 1995).

#### **C.4. Emotional Well-being**

Emotional health varies with both physical health and social support. Indicators in this domain include:

- Percent with no report of depression (non-clinical)
- Suicide rate for older adults (transformed because a lower suicide rate represents a better outcome)

Depression is the most common type of psychiatric disorder in old age. Clinical depression affects 10 percent to 15 percent of the over-65 population in the United States (Beekman et al. 1999). The prevalence of major depression is substantially lower among older persons than in the younger population, but diagnostic tools generally do not take into account common causes of late-life depression, such as bereavement and coping with multiple chronic conditions.

Depression is also the most common reason for suicides among older adults, who generally make up a disproportionately large number of all suicides globally (Pearson and Conwell 1996). Social isolation, a sense of uselessness, financial hardship, chronic illness, and multiple losses of loved ones have all been identified as reasons for increases in suicide rates with age (Kennedy 1996; Stillion and McDowell 1996).

## D. Composite Index Results

The objectives that have guided the analyses described in this section are comparability across countries and ease of interpretation. We document the sources used in Appendix A. The sub-index tables in this section also show indicator estimates for each age group. The composite indices and indicator rankings within the domain for each age group also appear in this section. Most of the data sources we have used are available through the Internet, though it has been necessary to make special requests to access data for some countries.

The composite index and sub-indices estimated for each domain use only countries for which all applicable indicators are available. The index has been produced for the 12 developed countries listed in Section B using a standard analytical framework. The 13 indicators used to generate the overall index are based on quantitative data and have been drawn from national and international statistical sources.

The method used in determining our results produces relative scores. The first step in developing the sub-indices and composite index is to standardize the measurement of each indicator. Without standardization, it may not make sense to sum indicators within the same domain. In the material well-being domain, for example, some indicators are measured as percentages while others are measured in purchasing power parity dollars. Standardization measures each country's indicator value relative to a common point<sup>3</sup>, creating a common unit of measurement for all indicators. To create the sub-index for a domain, we sum the standardized score for each indicator and then use a min-max normalization to translate each country's result into a 0 to 100 scale. Both the standardization procedure and the min-max normalization maintain the relative position of each country's indicator value (sum of indicator values in a domain) with respect to the distribution of the values for other countries.<sup>4</sup> Appendix C contains more details on the re-scaling procedures.

For each sub-index score, 0 indicates that a country had the lowest score; and 100 indicates that it had the highest score. Within any domain and age group set, values between 0 and 100 identify the relative position of the country between the lowest and highest scoring countries. Thus, a country with a score of 33 has an outcome closer to the bottom scoring country than to the top scoring country for the set of values being compared. This country also scores substantively lower than a country with a score of 74, which has an outcome closer to the top scoring country than to the bottom scoring one. Because the scores produced are dependent on the set of indicator values being compared, caution needs to be exercised in comparing results both across age groups within each domain and across domains.

To assess overall well-being, we used two methods. The first averages the sub-index scores over the four domains, which allows us to display our results on the same 0 to 100 scale. While it is unlikely that a country has a composite score of either 0 or 100 for any of the age groups<sup>5</sup>, the general interpretation of the composite scores is the same as with the sub-index scores. That is a country with a score closer to 100 (e.g., 80) fares better in terms of overall well-being than one whose composite score is closer to 0 (e.g., 5). Readers should exercise similar caution in comparing results from the composite scores across age groups and domains as with comparing the sub-index scores.

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<sup>3</sup> In this case, we use the U.S. indicator value as the standard instead of using the mean for all the countries. This choice does not affect the relative position of the countries.

<sup>4</sup> The procedure used is somewhat similar but not identical to re-scaling a distribution of test scores such that the scores are distributed across a range of 0 to 100 points. Unlike test re-scaling procedures, our method does not select a mean score.

<sup>5</sup> A country would only have a composite score of 0 if it was the bottom scoring country across *all* four domains. Similarly, a country would have a composite score of 100 if it was the top scoring country across all four domains.

We also present a composite ranking for countries based on the average ranking across indicators.<sup>6</sup> First, each country's ranking within a domain is calculated as the average ranking of indicators within the domain. Second, the overall ranking is calculated as the average ranking across domains. This ordinal method of assessing the well-being of countries' older populations is less sensitive to outliers and tends to group countries into bands indicating similar levels of performance for groups of countries rather than identifying any single country as best. For all rankings, 1 (first) is the best/highest possible value and 12 (12th) would be the worst/lowest possible value. These composite rankings produce results that are not substantively different from the composite indices.

## **D.1. Sub-indices**

### *D.1.a. Material Well-being*

(Indicators: average personal income; average household income per capita; percent not in absolute poverty)

#### Age Group Comparison

A country's relative standing in the material well-being domain generally improves for the older age groups. There are exceptions: The levels decline in the United States and Denmark, and it remains noticeably low across all age groups in Italy, Greece, and Spain.

#### Notable Country-Specific Findings

- The United States has the highest sub-index score for the material well-being domain for the 50-64 age group. It has the highest levels of both personal income and household per capita income and one of the highest percentages of older adults not in absolute poverty (after Sweden and Denmark).
- Switzerland has the highest material well-being score for both the 65-74 and the 75 and older age groups. It ranks highest among the 12 countries on the two income indicators for both age groups. It also has the largest share of persons age 75 and older who were not in absolute poverty. Among persons ages 65-74, Switzerland ranks fourth on this latter measure—less than two percentage points below the highest-ranking country (Sweden).
- Among all three age groups, Greece and Spain fare particularly poorly in this domain—mostly because of their low score on all three indicators. While Italy also has relatively low levels of income, its higher standing on the absolute poverty measure sets it apart from Greece and Spain in the overall sub-index score.

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<sup>6</sup> Land, Lamb, and Zheng (forthcoming) apply the same method in an international comparison of child well-being.

**TABLE 1.1a. Material Well-Being Sub-Index, Older Adults Ages 50-64**

| Country       | SUB-INDEX SCORE | Average Personal Income (\$ PPP) | Average Household Income Per Capita (\$ PPP) | Percent Not In Absolute Poverty |
|---------------|-----------------|----------------------------------|--|---------------------------------|
| Austria       | 34              | 19,992                           | 23,651                                       | 85.5                            |
| Belgium       | 54              | 28,161                           | 27,557                                       | 86.2                            |
| Denmark       | 73              | 30,090                           | 29,833                                       | 96.7                            |
| France        | 44              | 25,246                           | 24,884                                       | 84.9                            |
| Germany       | 50              | 26,288                           | 28,541                                       | 84.9                            |
| Greece        | 1               | 16,390                           | 12,942                                       | 73.9                            |
| Italy         | 17              | 17,543                           | 17,061                                       | 81.3                            |
| Netherlands   | 53              | 25,054                           | 28,179                                       | 89.4                            |
| Spain         | 0               | 18,071                           | 14,281                                       | 69.7                            |
| Sweden        | 61              | 25,202                           | 25,902                                       | 96.8                            |
| Switzerland   | 66              | 30,018                           | 35,813                                       | 86.1                            |
| United States | 100             | 37,343                           | 47,984                                       | 92.2                            |

**TABLE 1.1b. Ranking on Material Well-Being Indicators, Older Adults Ages 50-64**

| Country       | AVERAGE RANKING ACROSS INDICATORS | RANKING Average Personal Income (\$ PPP) | RANKING Average Household Income Per Capita (\$ PPP) | RANKING Percent Not In Absolute Poverty |
|---------------|-----------------------------------|--|--|---|
| Austria       | 8                                 | 9  | 9  | 7                                       |
| Belgium       | 5                                 | 4  | 6  | 5                                       |
| Denmark       | 2                                 | 2  | 3  | 2                                       |
| France        | 7                                 | 6  | 8  | 8                                       |
| Germany       | 6                                 | 5  | 4  | 9                                       |
| Greece        | 12                                | 12                                       | 12   | 11                                      |
| Italy         | 10                                | 11                                       | 10   | 10                                      |
| Netherlands   | 6                                 | 8  | 5  | 4                                       |
| Spain         | 11                                | 10                                       | 11   | 12                                      |
| Sweden        | 5                                 | 7  | 7  | 1                                       |
| Switzerland   | 4                                 | 3  | 2  | 6                                       |
| United States | 2                                 | 1  | 1  | 3                                       |

**TABLE 1.2a. Material Well-Being Sub-Index, Older Adults Ages 65-74**

| Country       | SUB-INDEX SCORE | Average Personal Income (\$ PPP) | Average Household Income Per Capita (\$ PPP) | Percent Not In Absolute Poverty |
|---------------|-----------------|----------------------------------|--|---------------------------------|
| Austria       | 60              | 24,849                           | 26,599                                       | 93.0                            |
| Belgium       | 54              | 22,905                           | 25,304                                       | 91.6                            |
| Denmark       | 48              | 18,216                           | 22,544                                       | 96.1                            |
| France        | 70              | 29,012                           | 30,436                                       | 91.4                            |
| Germany       | 50              | 20,612                           | 25,088                                       | 92.2                            |
| Greece        | 0               | 13,015                           | 12,782                                       | 72.5                            |
| Italy         | 17              | 16,396                           | 16,665                                       | 78.6                            |
| Netherlands   | 68              | 25,033                           | 30,281                                       | 95.2                            |
| Spain         | 1               | 14,722                           | 13,732                                       | 69.8                            |
| Sweden        | 61              | 23,237                           | 25,845                                       | 96.6                            |
| Switzerland   | 100             | 36,282                           | 41,198                                       | 95.0                            |
| United States | 73              | 25,058                           | 36,240                                       | 92.8                            |

**TABLE 1.2b. Ranking on Material Well-Being Indicators, Older Adults Ages 65-74**

| Country       | AVERAGE RANKING ACROSS INDICATORS | RANKING Average Personal Income (\$ PPP) | RANKING Average Household Income Per Capita (\$ PPP) | RANKING Percent Not In Absolute Poverty |
|---------------|-----------------------------------|--|--|---|
| Austria       | 5                                 | 5  | 5  | 5                                       |
| Belgium       | 7                                 | 7  | 7  | 8                                       |
| Denmark       | 7                                 | 9  | 9  | 2                                       |
| France        | 5                                 | 2  | 3  | 9                                       |
| Germany       | 8                                 | 8  | 8  | 7                                       |
| Greece        | 12                                | 12                                       | 12   | 11                                      |
| Italy         | 10                                | 10                                       | 10   | 10                                      |
| Netherlands   | 4                                 | 4  | 4  | 3                                       |
| Spain         | 11                                | 11                                       | 11   | 12                                      |
| Sweden        | 4                                 | 6  | 6  | 1                                       |
| Switzerland   | 2                                 | 1  | 1  | 4                                       |
| United States | 4                                 | 3  | 2  | 6                                       |

**TABLE 1.3a. Material Well-Being Sub-Index, Older Adults Age 75 and Older**

| Country       | SUB-INDEX SCORE | Average Personal Income (\$ PPP) | Average Household Income Per Capita (\$ PPP) | Percent Not In Absolute Poverty |
|---------------|-----------------|----------------------------------|--|---------------------------------|
| Austria       | 80              | 22,542                           | 27,309                                       | 92.2                            |
| Belgium       | 76              | 22,754                           | 26,654                                       | 88.1                            |
| Denmark       | 54              | 16,936                           | 20,337                                       | 91.5                            |
| France        | 85              | 25,581                           | 28,799                                       | 87.4                            |
| Germany       | 59              | 17,376                           | 24,924                                       | 86.9                            |
| Greece        | 1               | 11,719                           | 11,073                                       | 58.5                            |
| Italy         | 30              | 16,133                           | 17,012                                       | 70.4                            |
| Netherlands   | 94              | 25,420                           | 29,689                                       | 96.8                            |
| Spain         | 0               | 12,373                           | 11,751                                       | 54.5                            |
| Sweden        | 66              | 20,711                           | 22,239                                       | 90.8                            |
| Switzerland   | 100             | 25,767                           | 32,488                                       | 97.5                            |
| United States | 68              | 19,152                           | 25,761                                       | 90.6                            |

**TABLE 1.3b. Rankings on Material Well-Being Indicators, Older Adults Age 75 and Older**

| Country       | AVERAGE RANKING ACROSS INDICATORS | RANKING Average Personal Income (\$ PPP) | RANKING Average Household Income Per Capita (\$ PPP) | RANKING Percent Not In Absolute Poverty |
|---------------|-----------------------------------|--|--|---|
| Austria       | 4                                 | 5  | 4  | 3                                       |
| Belgium       | 5                                 | 4  | 5  | 7                                       |
| Denmark       | 7                                 | 9  | 9  | 4                                       |
| France        | 4                                 | 2  | 3  | 8                                       |
| Germany       | 8                                 | 8  | 7  | 9                                       |
| Greece        | 12                                | 12                                       | 12   | 11                                      |
| Italy         | 10                                | 10                                       | 10   | 10                                      |
| Netherlands   | 2                                 | 3  | 2  | 2                                       |
| Spain         | 11                                | 11                                       | 11   | 12                                      |
| Sweden        | 6                                 | 6  | 8  | 5                                       |
| Switzerland   | 1                                 | 1  | 1  | 1                                       |
| United States | 6                                 | 7  | 6  | 6                                       |

#### *D.1.b. Physical and Cognitive Well-being*

(Indicators: percent with no disability; no difficulty taking medications; immediate and delayed recall; physical functioning—able to walk short distance; life expectancy at ages 50, 65, and 75; percent not obese)

#### Age Group Comparison

The relative standing of countries in their levels of physical and cognitive well-being generally drops after age 64. The proportion with disabilities, difficulties with recall, and difficulties walking a short distance increases in each older age group as life expectancy falls.

#### Notable Country-Specific Findings

- Switzerland has the highest physical and cognitive well-being score among all three age groups. In each group, it has the highest rank for at least three out of the six indicators and ranks no lower than fifth in all the others. Among the 50-64 age group, for example, Switzerland ranks first on no disability, life expectancy, and not obese; ranks among the leaders in terms of taking medications without difficulty and having no physical limitations; and ranks a close fourth on immediate and delayed recall.
- The United States has a low sub-index score among the 50-64 and the 65-74 age groups, putting it on par with countries such as Spain, Italy and Greece. Among adults ages 50-64, it scores last in three out of the six indicators (no difficulty taking medications, physical functioning and not obese) and also ranked second from the bottom in life expectancy. The U.S. fared better in the 65-74 age group ranking in the top half of countries on four of the six indicators, including having the second-highest percentage of persons with no disability.
- Among adults age 75 and older, Spain has the lowest physical and cognitive well-being score despite having the fourth highest life expectancy at age 75. It ranks 11th on physical functioning and last on the other four indicators.

**TABLE 2.1a. Physical and Cognitive Well-Being Sub-Index, Older Adults Ages 50-64**

| Country       | SUB-INDEX SCORE | Percent With No Disability | Percent With No Difficulty Taking Meds | Immediate and Delayed Recall: Percent With No/Mild Impairment | Percent With No Limitations in Physical Function | Life Expectancy at Ages 50-54 (Years) | Percent Not Obese |
|---------------|-----------------|----------------------------|--|---|--|---------------------------------------|-------------------|
| Austria       | 60              | 88.3                       | 99.8                                   | 78.9  | 96.2   | 31.9                                  | 76.6              |
| Belgium       | 46              | 85.7                       | 99.5                                   | 73.0  | 95.4   | 31.5                                  | 79.7              |
| Denmark       | 56              | 86.9                       | 99.6                                   | 85.9  | 96.4   | 30.5                                  | 84.8              |
| France        | 72              | 89.4                       | 99.7                                   | 67.0  | 97.1   | 32.9                                  | 82.4              |
| Germany       | 73              | 90.7                       | 99.6                                   | 83.4  | 95.7   | 31.6                                  | 83.8              |
| Greece        | 63              | 91.1                       | 99.2                                   | 74.3  | 96.4   | 31.9                                  | 79.6              |
| Italy         | 59              | 91.3                       | 98.9                                   | 57.0  | 95.0   | 32.9                                  | 81.8              |
| Netherlands   | 64              | 87.5                       | 99.8                                   | 80.4  | 95.5   | 31.6                                  | 84.0              |
| Spain         | 28              | 86.5                       | 99.1                                   | 43.4  | 93.9   | 32.7                                  | 74.2              |
| Sweden        | 82              | 89.7                       | 99.8                                   | 81.6  | 97.7   | 32.4                                  | 84.7              |
| Switzerland   | 100             | 93.0                       | 99.8                                   | 82.9  | 97.4   | 33.5                                  | 85.4              |
| United States | 0               | 88.4                       | 97.9                                   | 86.7  | 78.5   | 31.0                                  | 65.3              |

**TABLE 2.1b. Rankings on Physical and Cognitive Well-Being Indicators, Older Adults Ages 50-64**

| Country       | AVERAGE RANKING | RANKING Percent With No Disability | RANKING Percent With No Difficulty Taking Meds | RANKING Immediate and Delayed Recall: Percent With No/Mild Impairment | RANKING Percent With No Limitations in Physical Function | RANKING Life Expectancy at Ages 50-54 (Years) | RANKING Percent Not Obese |
|---------------|-----------------|------------------------------------|--|---|--|---|---------------------------|
| Austria       | 7               | 8                                  | 3  | 7   | 6  | (tie) 6                                       | 10                        |
| Belgium       | 9               | 12                                 | 8  | 9   | 9  | 10  | 8                         |
| Denmark       | 6               | 10                                 | 7  | 2   | 5  | 12  | 2                         |
| France        | 5               | 6                                  | 5  | 10  | 3  | (tie) 2                                       | 6                         |
| Germany       | 6               | 4                                  | 6  | 3   | 7  | (tie) 8                                       | 5                         |
| Greece        | 7               | 3                                  | 9  | 8   | 4  | (tie) 6                                       | 9                         |
| Italy         | 7               | 2                                  | 11   | 11  | 10   | (tie) 2                                       | 7                         |
| Netherlands   | 6               | 9                                  | 2  | 6   | 8  | (tie) 8                                       | 4                         |
| Spain         | 10              | 11                                 | 10   | 12  | 11   | 4   | 11                        |
| Sweden        | 3               | 5                                  | 1  | 5   | 1  | 5   | 3                         |
| Switzerland   | 2               | 1                                  | 4  | 4   | 2  | 1   | 1                         |
| United States | 9               | 7                                  | 12   | 1   | 12   | 11  | 12                        |

**TABLE 2.2a. Physical and Cognitive Well-Being Sub-Index, Older Adults Ages 65-74**

| Country       | SUB-INDEX SCORE | Percent With No Disability | Percent With No Difficulty Taking Meds | Immediate and Delayed Recall: Percent With No/Mild Impairment | Percent With No Limitations in Physical Function | Life Expectancy at Ages 65-69 (Years) | Percent Not Obese |
|---------------|-----------------|----------------------------|--|---|--|---------------------------------------|-------------------|
| Austria       | 51              | 80.5                       | 99.2                                   | 62.1  | 93.4   | 19.2                                  | 80.4              |
| Belgium       | 40              | 77.5                       | 99.5                                   | 54.6  | 91.0   | 18.9                                  | 80.6              |
| Denmark       | 39              | 81.5                       | 98.5                                   | 71.3  | 92.4   | 18.0                                  | 82.7              |
| France        | 53              | 80.2                       | 98.9                                   | 46.3  | 90.6   | 20.5                                  | 83.2              |
| Germany       | 39              | 82.6                       | 98.4                                   | 68.1  | 90.2   | 18.9                                  | 78.9              |
| Greece        | 15              | 75.4                       | 98.0                                   | 46.1  | 89.4   | 18.9                                  | 80.1              |
| Italy         | 28              | 81.3                       | 98.3                                   | 32.7  | 86.2   | 19.8                                  | 80.8              |
| Netherlands   | 48              | 81.2                       | 99.3                                   | 62.7  | 90.3   | 18.7                                  | 82.6              |
| Spain         | 0               | 74.1                       | 98.3                                   | 22.3  | 87.5   | 19.8                                  | 71.9              |
| Sweden        | 68              | 82.9                       | 99.4                                   | 68.4  | 95.2   | 19.3                                  | 84.1              |
| Switzerland   | 100             | 88.6                       | 100.0                                  | 71.6  | 96.5   | 20.4                                  | 86.1              |
| United States | 14              | 86.8                       | 97.8                                   | 76.6  | 71.4   | 18.8                                  | 69.3              |

**TABLE 2.2b. Rankings on Physical and Cognitive Well-Being Sub-Index and Indicators, Older Adults Ages 65-74**

| Country       | AVERAGE RANKING | RANKING Percent With No Disability | RANKING Percent With No Difficulty Taking Meds | RANKING Immediate and Delayed Recall: Percent With No/Mild Impairment | RANKING Percent With No Limitations in Physical Function | RANKING Life Expectancy at Ages 65-69 (Years) | RANKING Percent Not Obese |
|---------------|-----------------|------------------------------------|--|---|--|---|---------------------------|
| Austria       | 6               | 8                                  | 5  | 7   | 3  | 6   | 8                         |
| Belgium       | 7               | 10                                 | 2  | 8   | 5  | (tie) 7                                       | 7                         |
| Denmark       | 6               | 5                                  | 7  | 3   | 4  | 12  | 4                         |
| France        | 6               | 9                                  | 6  | 9   | 6  | 1   | 3                         |
| Germany       | 7               | 4                                  | 8  | 5   | 8  | (tie) 7                                       | 10                        |
| Greece        | 10              | 11                                 | 12   | 10  | 9  | (tie) 7                                       | 9                         |
| Italy         | 8               | 6                                  | 10   | 11  | 11   | (tie) 3                                       | 6                         |
| Netherlands   | 7               | 7                                  | 4  | 6   | 7  | 11  | 5                         |
| Spain         | 10              | 12                                 | 11   | 12  | 10   | (tie) 3                                       | 11                        |
| Sweden        | 3               | 3                                  | 3  | 4   | 2  | 5   | 2                         |
| Switzerland   | 1               | 1                                  | 1  | 2   | 1  | 2   | 1                         |
| United States | 8               | 2                                  | 9  | 1   | 12   | 10  | 12                        |

**TABLE 2.3a. Physical and Cognitive Well-Being Sub-Index, Older Adults Age 75 and Older**

| Country       | SUB-INDEX SCORE | Percent With No Disability | Percent With No Difficulty Taking Meds | Immediate and Delayed Recall: Percent With No/Mild Impairment | Percent With No Limitations in Physical Function | Life Expectancy at Ages 75-79 (Years) | Percent Not Obese |
|---------------|-----------------|----------------------------|--|---|--|---------------------------------------|-------------------|
| Austria       | 68              | 56.9                       | 97.4                                   | 42.9  | 81.0   | 11.8                                  | 86.0              |
| Belgium       | 39              | 51.5                       | 94.7                                   | 29.5  | 72.0   | 11.6                                  | 80.5              |
| Denmark       | 49              | 55.7                       | 91.8                                   | 44.0  | 77.1   | 11.2                                  | 88.0              |
| France        | 50              | 51.6                       | 91.2                                   | 27.3  | 70.5   | 13.0                                  | 85.0              |
| Germany       | 54              | 57.7                       | 94.5                                   | 44.9  | 71.8   | 11.6                                  | 84.3              |
| Greece        | 25              | 49.4                       | 92.3                                   | 23.5  | 67.2   | 11.3                                  | 82.1              |
| Italy         | 40              | 54.7                       | 92.0                                   | 14.4  | 69.2   | 12.3                                  | 85.1              |
| Netherlands   | 56              | 60.7                       | 94.9                                   | 39.7  | 74.5   | 11.4                                  | 86.7              |
| Spain         | 0               | 47.6                       | 88.3                                   | 7.0   | 65.0   | 12.2                                  | 67.1              |
| Sweden        | 48              | 55.4                       | 89.6                                   | 36.1  | 79.4   | 11.9                                  | 86.4              |
| Switzerland   | 100             | 75.2                       | 97.5                                   | 47.8  | 92.6   | 12.7                                  | 85.5              |
| United States | 58              | 74.0                       | 95.1                                   | 51.9  | 52.8   | 11.9                                  | 82.0              |

**TABLE 2.3b. Rankings on Physical and Cognitive Well-Being Indicators, Older Adults Age 75 and Older**

| Country       | AVERAGE RANKING | RANKING Percent With No Disability | RANKING Percent With No Difficulty Taking Meds | RANKING Immediate and Delayed Recall: Percent With No/Mild Impairment | RANKING Percent With No Limitations in Physical Function | RANKING Life Expectancy at Ages 65-69 (Years) | RANKING Percent Not Obese |
|---------------|-----------------|------------------------------------|--|---|--|---|---------------------------|
| Austria       | 4               | 5                                  | 2  | 5   | 2  | 7   | 4                         |
| Belgium       | 8               | 10                                 | 5  | 8   | 6  | 8   | 11                        |
| Denmark       | 6               | 6                                  | 9  | 4   | 4  | 12  | 1                         |
| France        | 7               | 9                                  | 10   | 9   | 8  | 1   | 7                         |
| Germany       | 6               | 4                                  | 6  | 3   | 7  | 8   | 8                         |
| Greece        | 10              | 11                                 | 7  | 10  | 10   | 11  | 9                         |
| Italy         | 8               | 8                                  | 8  | 11  | 9  | 3   | 6                         |
| Netherlands   | 5               | 3                                  | 4  | 6   | 5  | 10  | 2                         |
| Spain         | 11              | 12                                 | 12   | 12  | 11   | 4   | 12                        |
| Sweden        | 6               | 7                                  | 11   | 7   | 3  | 5   | 3                         |
| Switzerland   | 2               | 1                                  | 1  | 2   | 1  | 2   | 5                         |
| United States | 6               | 2                                  | 3  | 1   | 12   | 5   | 10                        |

#### *D.1.c. Social Connectedness and Relationships*

(Indicators: socially connected, that is participating in at least one economic or social activity such as employment, volunteer work, religious or social activities; contact with at least one child)

#### Age Group Comparison

The relative standing of countries in the social connectedness and relationships domain generally declines with age. The level is particularly low in Italy, Spain, and Austria across all age groups. It is low in Germany for the two younger age groups. On the other hand, Greece's relative standing in this domain improves significantly for adults age 75 and older.

#### Notable Country-Specific Findings

- For all age groups, the United States fares best in the social connectedness and relationships domain. It has the highest percentage of adults who are socially connected, and ranks in the top three for contact with children—regardless of age.
- Germany ranks nearly at the bottom of this domain among adults ages 50-64—despite ranking sixth on the social connectedness indicator. It has the lowest share of persons in this age group who had contact with children.

**TABLE 3.1a. Social Connectedness and Relationships Sub-Index, Older Adults Ages 50-64**

| Country       | SUB-INDEX SCORE | Percent Socially Connected | Percent Having Contact With Children |
|---------------|-----------------|----------------------------|--------------------------------------|
| Austria       | 24              | 66.0                       | 82.6                                 |
| Belgium       | 50              | 65.5                       | 87.8                                 |
| Denmark       | 78              | 82.0                       | 88.0                                 |
| France        | 67              | 69.4                       | 89.9                                 |
| Germany       | 15              | 75.0                       | 78.2                                 |
| Greece        | 40              | 72.7                       | 83.7                                 |
| Italy         | 0               | 52.1                       | 82.3                                 |
| Netherlands   | 60              | 77.1                       | 86.2                                 |
| Spain         | 24              | 61.9                       | 84.0                                 |
| Sweden        | 91              | 84.3                       | 89.9                                 |
| Switzerland   | 70              | 89.5                       | 84.2                                 |
| United States | 100             | 92.3                       | 89.1                                 |

**TABLE 3.1b. Rankings on Social Connectedness and Relationships Indicators, Older Adults Ages 50-64**

| Country       | AVERAGE RANKING ACROSS INDICATORS | RANKING Percent Socially Connected | RANKING Percent Having Contact With Children |
|---------------|-----------------------------------|------------------------------------|--|
| Austria       | 10                                | 9                                  | 10   |
| Belgium       | 8                                 | 10                                 | 5  |
| Denmark       | 4                                 | 4                                  | 4  |
| France        | 5                                 | 8                                  | 2  |
| Germany       | 9                                 | 6                                  | 12   |
| Greece        | 8                                 | 7                                  | 9  |
| Italy         | 12                                | 12                                 | 11   |
| Netherlands   | 6                                 | 5                                  | 6  |
| Spain         | 10                                | 11                                 | 8  |
| Sweden        | 2                                 | 3                                  | 1  |
| Switzerland   | 5                                 | 2                                  | 7  |
| United States | 2                                 | 1                                  | 3  |

**TABLE 3.2a. Social Connectedness and Relationships Sub-Index, Older Adults Ages 65-74**

| Country       | SUB-INDEX SCORE | Percent Socially Connected | Percent Having Contact With Children |
|---------------|-----------------|----------------------------|--------------------------------------|
| Austria       | 17              | 39.5                       | 84.0                                 |
| Belgium       | 27              | 39.2                       | 86.1                                 |
| Denmark       | 57              | 57.1                       | 89.2                                 |
| France        | 31              | 34.0                       | 87.7                                 |
| Germany       | 14              | 41.6                       | 82.9                                 |
| Greece        | 53              | 56.8                       | 88.5                                 |
| Italy         | 0               | 20.9                       | 83.5                                 |
| Netherlands   | 33              | 47.2                       | 85.8                                 |
| Spain         | 12              | 24.1                       | 85.5                                 |
| Sweden        | 45              | 49.5                       | 88.0                                 |
| Switzerland   | 42              | 61.2                       | 85.5                                 |
| United States | 100             | 85.5                       | 93.4                                 |

**TABLE 3.2b. Rankings on Social Connectedness and Relationships Indicators, Older Adults Ages 65-74**

| Country       | AVERAGE RANKING ACROSS INDICATORS | RANKING Percent Socially Connected | RANKING Percent Having Contact With Children |
|---------------|-----------------------------------|------------------------------------|--|
| Austria       | 9                                 | 8                                  | 10   |
| Belgium       | 8                                 | 9                                  | 6  |
| Denmark       | 3                                 | 3                                  | 2  |
| France        | 8                                 | 10                                 | 5  |
| Germany       | 10                                | 7                                  | 12   |
| Greece        | 4                                 | 4                                  | 3  |
| Italy         | 12                                | 12                                 | 11   |
| Netherlands   | 7                                 | 6                                  | 7  |
| Spain         | 10                                | 11                                 | 8  |
| Sweden        | 5                                 | 5                                  | 4  |
| Switzerland   | 6                                 | 2                                  | 9  |
| United States | 1                                 | 1                                  | 1  |

**TABLE 3.3a. Social Connectedness and Relationships Sub-Index, Older Adults Age 75 and Older**

| Country       | SUB-INDEX SCORE | Percent Socially Connected | Percent Having Contact With Children |
|---------------|-----------------|----------------------------|--------------------------------------|
| Austria       | 6               | 27.1                       | 79.8                                 |
| Belgium       | 28              | 27.1                       | 84.8                                 |
| Denmark       | 32              | 35.8                       | 84.1                                 |
| France        | 9               | 25.5                       | 80.9                                 |
| Germany       | 29              | 25.5                       | 85.3                                 |
| Greece        | 65              | 47.5                       | 89.4                                 |
| Italy         | 0               | 10.4                       | 81.6                                 |
| Netherlands   | 36              | 32.2                       | 85.6                                 |
| Spain         | 16              | 19.9                       | 83.4                                 |
| Sweden        | 33              | 30.5                       | 85.4                                 |
| Switzerland   | 34              | 40.1                       | 83.7                                 |
| United States | 100             | 79.5                       | 91.4                                 |

**TABLE 3.3b. Rankings on Social Connectedness and Relationships Indicators, Older Adults Age 75 and Older**

| Country       | AVERAGE RANKING ACROSS INDICATORS | RANKING Percent Socially Connected | RANKING Percent Having Contact With Children |
|---------------|-----------------------------------|------------------------------------|--|
| Austria       | 10                                | 8                                  | 12   |
| Belgium       | 7                                 | 7                                  | 6  |
| Denmark       | 6                                 | 4                                  | 7  |
| France        | 10                                | 9                                  | 11   |
| Germany       | 8                                 | 10                                 | 5  |
| Greece        | 2                                 | 2                                  | 2  |
| Italy         | 11                                | 12                                 | 10   |
| Netherlands   | 4                                 | 5                                  | 3  |
| Spain         | 10                                | 11                                 | 9  |
| Sweden        | 5                                 | 6                                  | 4  |
| Switzerland   | 6                                 | 3                                  | 8  |
| United States | 1                                 | 1                                  | 1  |

#### *D.1.d. Emotional Well-being*

(Indicators: percent not depressed, transformed suicide rate)

##### Age Group Comparison

There is no clear age pattern in countries' relative standing in the emotional well-being domain. The age-pattern varies substantially across countries.

##### Notable Country-Specific Findings

- The United States has the highest emotional well-being score among all three age groups. It ranks highest in the share of adults—regardless of age—who are not depressed. Its relative score on this indicator is more than enough to overcome a less than lofty ranking (no higher than fourth) for the suicide rate indicator.
- Among adults under age 75, France scores the lowest for this domain. It ranks in the bottom two in the percentage not depressed and ninth in suicide rates for both of the younger age groups.
- Despite ranking seventh in the percentage of adults not depressed, Switzerland fares worst on emotional well-being among persons age 75 and older. This is due to its having the worst suicide rate among the 12 countries.

**TABLE 4.1a. Emotional Well-Being Sub-Index, Older Adults Ages 50-64**

| Country       | SUB-INDEX SCORE | Percent Not Depressed (Non-Clinical) | Transformed Suicide Rate per 100,000 (Ages 55-64) |
|---------------|-----------------|--------------------------------------|---|
| Austria       | 42              | 69.9                                 | -22.9   |
| Belgium       | 14              | 62.7                                 | -27.0   |
| Denmark       | 48              | 68.0                                 | -18.8   |
| France        | 0               | 51.8                                 | -22.3   |
| Germany       | 38              | 62.4                                 | -17.5   |
| Greece        | 97              | 71.3                                 | -3.6  |
| Italy         | 53              | 58.8                                 | -8.7  |
| Netherlands   | 61              | 67.5                                 | -13.6   |
| Spain         | 63              | 63.6                                 | -9.4  |
| Sweden        | 43              | 65.6                                 | -18.8   |
| Switzerland   | 13              | 60.4                                 | -25.3   |
| United States | 100             | 84.0                                 | -13.8   |

Note: We obtain the transformed suicide rate by multiplying the actual suicide rate by [-1].

**TABLE 4.1b. Rankings on Emotional Well-Being Indicators, Older Adults Ages 50-64**

| Country       | AVERAGE RANKING ACROSS INDICATORS | RANKING Percent Not Depressed (Non-Clinical) | RANKING Transformed Suicide Rate per 100,000 (Ages 55-64) |
|---------------|-----------------------------------|--|---|
| Austria       | 7                                 | 3  | 10  |
| Belgium       | 10                                | 8  | 12  |
| Denmark       | 6                                 | 4  | 8   |
| France        | 11                                | 12   | 9   |
| Germany       | 8                                 | 9  | 6   |
| Greece        | 2                                 | 2  | 1   |
| Italy         | 7                                 | 11   | 2   |
| Netherlands   | 5                                 | 5  | 4   |
| Spain         | 5                                 | 7  | 3   |
| Sweden        | 7                                 | 6  | 7   |
| Switzerland   | 11                                | 10   | 11  |
| United States | 3                                 | 1  | 5   |

**TABLE 4.2a. Emotional Well-Being Sub-Index, Older Adults Ages 65-74**

| Country       | SUB-INDEX SCORE | Percent Not Depressed (Non-Clinical) | Transformed Suicide Rate per 100,000 |
|---------------|-----------------|--------------------------------------|--------------------------------------|
| Austria       | 17              | 70.2                                 | -30.3                                |
| Belgium       | 24              | 65.9                                 | -23.4                                |
| Denmark       | 41              | 70.2                                 | -20.8                                |
| France        | 0               | 55.7                                 | -23.3                                |
| Germany       | 28              | 62.6                                 | -18.6                                |
| Greece        | 72              | 66.3                                 | -4.9                                 |
| Italy         | 32              | 55.6                                 | -10.7                                |
| Netherlands   | 63              | 66.1                                 | -8.2                                 |
| Spain         | 30              | 57.6                                 | -13.1                                |
| Sweden        | 41              | 67.5                                 | -18.1                                |
| Switzerland   | 10              | 63.4                                 | -26.6                                |
| United States | 100             | 86.4                                 | -12.5                                |

Note: We obtain the transformed suicide rate by multiplying the actual suicide rate by [-1].

**TABLE 4.2b. Rankings on Emotional Well-Being Indicators, Older Adults Ages 65-74**

| Country       | AVERAGE RANKING ACROSS INDICATORS | RANKING Percent Not Depressed (Non-Clinical) | RANKING Transformed Suicide Rate per 100,000 |
|---------------|-----------------------------------|--|--|
| Austria       | 7                                 | 2  | 12   |
| Belgium       | 9                                 | 7  | 10   |
| Denmark       | 6                                 | 3  | 8  |
| France        | 10                                | 11   | 9  |
| Germany       | 8                                 | 9  | 7  |
| Greece        | 3                                 | 5  | 1  |
| Italy         | 8                                 | 12   | 3  |
| Netherlands   | 4                                 | 6  | 2  |
| Spain         | 8                                 | 10   | 5  |
| Sweden        | 5                                 | 4  | 6  |
| Switzerland   | 10                                | 8  | 11   |
| United States | 3                                 | 1  | 4  |

Note: We obtain the transformed suicide rate by multiplying the actual suicide rate by [-1].

**TABLE 4.3a. Emotional Well-Being Sub-Index, Older Adults Age 75 and Older**

| Country       | SUB-INDEX SCORE | Percent Not Depressed (Non-Clinical) | Transformed Suicide Rate per 100,000 |
|---------------|-----------------|--------------------------------------|--------------------------------------|
| Austria       | 30              | 66.2                                 | -42.2                                |
| Belgium       | 16              | 56.8                                 | -39.7                                |
| Denmark       | 36              | 63.2                                 | -34.3                                |
| France        | 17              | 53.9                                 | -35.0                                |
| Germany       | 15              | 49.1                                 | -29.7                                |
| Greece        | 58              | 53.7                                 | -6.3                                 |
| Italy         | 38              | 50.7                                 | -16.1                                |
| Netherlands   | 63              | 62.2                                 | -14.0                                |
| Spain         | 29              | 49.4                                 | -20.4                                |
| Sweden        | 60              | 64.5                                 | -19.1                                |
| Switzerland   | 0               | 54.8                                 | -47.8                                |
| United States | 100             | 83.1                                 | -16.8                                |

Note: We obtain the transformed suicide rate by multiplying the actual suicide rate by [-1].

**TABLE 4.3b. Rankings on Emotional Well-Being Indicators, Older Adults Age 75 and Older**

| Country       | AVERAGE RANKING ACROSS INDICATORS | RANKING Percent Not Depressed (Non-Clinical) | RANKING Transformed Suicide Rate per 100,000 |
|---------------|-----------------------------------|--|--|
| Austria       | 7                                 | 2  | 11   |
| Belgium       | 8                                 | 6  | 10   |
| Denmark       | 6                                 | 4  | 8  |
| France        | 9                                 | 8  | 9  |
| Germany       | 10                                | 12   | 7  |
| Greece        | 5                                 | 9  | 1  |
| Italy         | 7                                 | 10   | 3  |
| Netherlands   | 4                                 | 5  | 2  |
| Spain         | 9                                 | 11   | 6  |
| Sweden        | 4                                 | 3  | 5  |
| Switzerland   | 10                                | 7  | 12   |
| United States | 3                                 | 1  | 4  |

Note: We obtain the transformed suicide rate by multiplying the actual suicide rate by [-1].

## D.2. Composite Index and Composite Rankings

Composite indices range from those with few dimensions and indicators to other more complex weighted scores. Well-being is a complex concept, and a larger and broader composite index quickly runs into problems of data availability and comparability. Even with four domains and 13 indicators for each of the three age groups studied here, we have had to limit our analysis to 12 countries for which comparable data were available. As noted earlier, rankings based on composite indices are influenced by extreme values that a country may have on one or more indicators. An alternative to composite indices are composite rankings based on the average ranking of indicators. Extreme values have less influence on any individual country's composite ranking than they have on a country's composite index score.

### *D.2.a. Composite Index Scores*

In Tables 5.1, 5.2, and 5.3, column two gives the composite index score, an overall index of well-being across all four domains. The overall index is the average of the scores in the four domains (the last four columns of the tables).

- Despite a poor score on physical and cognitive well-being, the U. S. score in other domains, particularly social connectedness and emotional well-being, raises the overall well-being for the older population in all three age groups.
- The relative standing of material well-being falls off sharply for the U.S. older population after age 64—that is, in the retirement years.
- In Switzerland, the relative standing of material well-being improves for the older age groups, while the relative standing of physical and cognitive well-being remains strong across all age groups.
- In the Netherlands, the relative standing for the physical and cognitive well-being, social connectedness, and emotional well-being domains remains stable across age groups.
- A low material well-being score in southern European countries (Italy, Greece, and Spain) is offset by better physical and emotional well-being scores between ages 50-64. For older population groups, however, the material well-being score remains low relative to other countries while physical and emotional well-being scores deteriorate relative to other countries.
- Among countries with equal or nearly equal composite scores in overall elderly well-being, the factors driving their relative standing may or may not be the same. Belgium and Austria, for example, have index scores of 41 and 40 that rank 9<sup>th</sup> and 10<sup>th</sup> among the countries studied in the 50-64 age group. Twenty or more points separate these two countries' sub-index scores in three of the four domains. Belgium scores higher than Austria in the material well-being domain and the social connectedness/relationships domain. However, Austria scores much higher than Belgium in the emotional well-being domain and somewhat higher in the physical/cognitive well-being domain. In the 65-74 age group, Austria and Belgium both have a composite index score of 36, with both countries having modest scores on material well-being and on physical/cognitive well-being but relatively low scores on social connectedness and emotional well-being.

**TABLE 5.1. Overall Index, Older Adults Ages 50-64**

| Country       | OVERALL INDEX       |      | SUB-INDEX SCORES       |  |   |                         |
|---------------|---------------------|------|------------------------|--|---|-------------------------|
|               | SCORE<br>(0 to 100) | RANK | Material<br>Well-Being | Physical<br>and<br>Cognitive<br>Well-Being | Social<br>Connectedness<br>and<br>Relationships | Emotional<br>Well-Being |
| Austria       | 40                  | 10   | 34                     | 60   | 24  | 42                      |
| Belgium       | 41                  | 9    | 54                     | 46   | 50  | 14                      |
| Denmark       | 64                  | 3    | 73                     | 56   | 78  | 48                      |
| France        | 46                  | 7    | 44                     | 72   | 67  | 0                       |
| Germany       | 44                  | 8    | 50                     | 73   | 15  | 38                      |
| Greece        | 50                  | 6    | 1                      | 63   | 40  | 97                      |
| Italy         | 32                  | 11   | 17                     | 59   | 0   | 53                      |
| Netherlands   | 59                  | 5    | 53                     | 64   | 60  | 61                      |
| Spain         | 29                  | 12   | 0                      | 28   | 24  | 63                      |
| Sweden        | 69                  | 2    | 61                     | 82   | 91  | 43                      |
| Switzerland   | 62                  | 4    | 66                     | 100  | 70  | 13                      |
| United States | 75                  | 1    | 100                    | 0  | 100   | 100                     |

**TABLE 5.2. Overall Index, Older Adults Ages 65-74**

| Country       | OVERALL INDEX       |         | SUB-INDEX SCORES       |  |   |                         |
|---------------|---------------------|---------|------------------------|--|---|-------------------------|
|               | SCORE<br>(0 to 100) | RANK    | Material<br>Well-Being | Physical<br>and<br>Cognitive<br>Well-Being | Social<br>Connectedness<br>and<br>Relationships | Emotional<br>Well-Being |
| Austria       | 36                  | (tie) 7 | 60                     | 51   | 17  | 17                      |
| Belgium       | 36                  | (tie) 7 | 54                     | 40   | 27  | 24                      |
| Denmark       | 46                  | 5       | 48                     | 39   | 57  | 41                      |
| France        | 39                  | 6       | 70                     | 53   | 31  | 0                       |
| Germany       | 33                  | 10      | 50                     | 39   | 14  | 28                      |
| Greece        | 35                  | 9       | 0                      | 15   | 53  | 72                      |
| Italy         | 19                  | 11      | 17                     | 28   | 0   | 32                      |
| Netherlands   | 53                  | 4       | 68                     | 48   | 33  | 63                      |
| Spain         | 11                  | 12      | 1                      | 0  | 12  | 30                      |
| Sweden        | 54                  | 3       | 61                     | 68   | 45  | 41                      |
| Switzerland   | 63                  | 2       | 100                    | 100  | 42  | 10                      |
| United States | 72                  | 1       | 73                     | 14   | 100   | 100                     |

**TABLE 5.3. Overall Index, Older Adults Age 75 and Older**

| Country       | OVERALL INDEX       |         | SUB-INDEX SCORES       |  |   |                         |
|---------------|---------------------|---------|------------------------|--|---|-------------------------|
|               | SCORE<br>(0 to 100) | RANK    | Material<br>Well-Being | Physical<br>and<br>Cognitive<br>Well-Being | Social<br>Connectedness<br>and<br>Relationships | Emotional<br>Well-Being |
| Austria       | 46                  | 5       | 80                     | 68   | 6   | 30                      |
| Belgium       | 40                  | (tie) 7 | 76                     | 39   | 28  | 16                      |
| Denmark       | 43                  | 6       | 54                     | 49   | 32  | 36                      |
| France        | 40                  | (tie) 7 | 85                     | 50   | 9   | 17                      |
| Germany       | 39                  | 9       | 59                     | 54   | 29  | 15                      |
| Greece        | 37                  | 10      | 1                      | 25   | 65  | 58                      |
| Italy         | 27                  | 11      | 30                     | 40   | 0   | 38                      |
| Netherlands   | 62                  | 2       | 94                     | 56   | 36  | 63                      |
| Spain         | 11                  | 12      | 0                      | 0  | 16  | 29                      |
| Sweden        | 52                  | 4       | 66                     | 48   | 33  | 60                      |
| Switzerland   | 58                  | 3       | 100                    | 100  | 34  | 0                       |
| United States | 81                  | 1       | 68                     | 58   | 100   | 100                     |

*D.2.b. Composite Rankings*

The composite rankings presented below are based on an average ranking of indicators, first within each domain and then averaging across the results for the domains. In Table 6.1 below, for example, a country's ranking on material well-being is the average of the indicator rankings as shown in Table 1.1b (see section D.1.a). In turn, the composite ranking given for a country in the second column of Table 6.1 is the average of the rankings for material well-being, physical and cognitive functioning, social connectedness, and emotional well-being (shown in the remaining four columns).

A summary of the average ranking of the countries across the four domains shows more clearly that no one country always performs best in all four domains, nor does any country stand out as the worst performer.<sup>7</sup> The average ranking across the domains ranges from fourth to tenth. The countries tend to fall into tiers of performance, and all countries have room for improvement.

For all age groups, the Netherlands, Sweden, Switzerland, and the United States fare best with an overall average ranking of fifth or better. Spain and Italy each have an overall average ranking of ninth or worse for all age groups. Other countries have better overall rankings for some age groups than for others. Average rankings for Denmark are similar to those of the Netherlands, Sweden, Switzerland, and the United States.

<sup>7</sup> We obtain similar results from the average ranking of all indicators for each country.

**TABLE 6.1. Average Ranking across Domains, Older Adults Ages 50-64**

| Country       | AVERAGE RANKING | DOMAIN AVERAGE INDICATOR RANKING |                                   |  |                      |
|---------------|-----------------|----------------------------------|-----------------------------------|--|----------------------|
|               |                 | Material Well-Being              | Physical and Cognitive Well-Being | Social Connectedness and Relationships | Emotional Well-Being |
| Austria       | 8               | 8                                | 7                                 | 10                                     | 7                    |
| Belgium       | 8               | 5                                | 9                                 | 8                                      | 10                   |
| Denmark       | 5               | 2                                | 6                                 | 4                                      | 6                    |
| France        | 7               | 7                                | 5                                 | 5                                      | 11                   |
| Germany       | 7               | 6                                | 6                                 | 9                                      | 8                    |
| Greece        | 7               | 12                               | 7                                 | 8                                      | 2                    |
| Italy         | 9               | 10                               | 7                                 | 12                                     | 7                    |
| Netherlands   | 5               | 6                                | 6                                 | 6                                      | 5                    |
| Spain         | 9               | 11                               | 10                                | 10                                     | 5                    |
| Sweden        | 4               | 5                                | 3                                 | 2                                      | 7                    |
| Switzerland   | 5               | 4                                | 2                                 | 5                                      | 11                   |
| United States | 4               | 2                                | 9                                 | 2                                      | 3                    |

**TABLE 6.2. Average Ranking across Domains, Older Adults Ages 65-74**

| Country       | AVERAGE RANKING | DOMAIN AVERAGE INDICATOR RANKING |                                   |  |                      |
|---------------|-----------------|----------------------------------|-----------------------------------|--|----------------------|
|               |                 | Material Well-Being              | Physical and Cognitive Well-Being | Social Connectedness and Relationships | Emotional Well-Being |
| Austria       | 7               | 5                                | 6                                 | 9                                      | 7                    |
| Belgium       | 7               | 7                                | 7                                 | 8                                      | 9                    |
| Denmark       | 5               | 7                                | 6                                 | 3                                      | 6                    |
| France        | 7               | 5                                | 6                                 | 8                                      | 10                   |
| Germany       | 8               | 8                                | 7                                 | 10                                     | 8                    |
| Greece        | 7               | 12                               | 10                                | 4                                      | 3                    |
| Italy         | 9               | 10                               | 8                                 | 12                                     | 8                    |
| Netherlands   | 5               | 4                                | 7                                 | 7                                      | 4                    |
| Spain         | 10              | 11                               | 10                                | 10                                     | 8                    |
| Sweden        | 4               | 4                                | 3                                 | 5                                      | 5                    |
| Switzerland   | 5               | 2                                | 1                                 | 6                                      | 10                   |
| United States | 4               | 4                                | 8                                 | 1                                      | 3                    |

**TABLE 6.3. Average Ranking across Domains, Older Adults Age 75 and Older**

| Country       | AVERAGE RANKING | DOMAIN AVERAGE INDICATOR RANKING |                                   |  |                      |
|---------------|-----------------|----------------------------------|-----------------------------------|--|----------------------|
|               |                 | Material Well-Being              | Physical and Cognitive Well-Being | Social Connectedness and Relationships | Emotional Well-Being |
| Austria       | 6               | 4                                | 4                                 | 10                                     | 7                    |
| Belgium       | 7               | 5                                | 8                                 | 7                                      | 8                    |
| Denmark       | 6               | 7                                | 6                                 | 6                                      | 6                    |
| France        | 8               | 4                                | 7                                 | 10                                     | 9                    |
| Germany       | 8               | 8                                | 6                                 | 8                                      | 10                   |
| Greece        | 7               | 12                               | 10                                | 2                                      | 5                    |
| Italy         | 9               | 10                               | 8                                 | 11                                     | 7                    |
| Netherlands   | 4               | 2                                | 5                                 | 4                                      | 4                    |
| Spain         | 10              | 11                               | 11                                | 10                                     | 9                    |
| Sweden        | 5               | 6                                | 6                                 | 5                                      | 4                    |
| Switzerland   | 5               | 1                                | 2                                 | 6                                      | 10                   |
| United States | 4               | 6                                | 6                                 | 1                                      | 3                    |

## **E. Next Steps and Conclusions**

The rapid population aging that faces much of the world represents a historically unprecedented demographic shift with profound social, political, and economic implications. Perhaps the single most important factor in determining how well countries are able to cope with the challenges arising from population aging is how well their older populations fare with respect to important aspects of well-being—including health, socioeconomic status, and productive ability. In an effort to help decision makers around the world monitor key dimensions of elderly well-being, we developed an index of well-being for older populations. Our goal has been to make the index as comprehensive as possible. However, data limitations such as comparability of survey samples and questions have restricted the number of comparable indicators across countries. The potential influence of cultural and socioeconomic conditions has also meant that we confined the initial analysis to Western industrialized countries in order to assess the reliability of the index among a more homogeneous group of countries. Despite these limitations, the index allows us to summarize the effect of some key dimensions—physical and mental health, income and poverty, and social ties—on the well-being of older adults. In doing so, the index produces an overview on how older population groups are doing overall. This in turn supports decision-makers in their analysis of the complex and multi-dimensional issues surrounding population aging.

### **E.1. Next Steps**

In this report, we have discussed the concepts underlying each domain; provided technical information regarding our sample, indicators, and methodology; and presented the results of the four sub-indices, a composite index, and a composite ranking. While we focused on documenting more technical aspects of the index construction in this report, one of our next steps is the substantive interpretation of the results.

As mentioned earlier in the data and methodology section (Section B), we are conducting a sensitivity analysis to determine the extent to which exclusion of the non-institutionalized population as well as of proxy respondents in some surveys affects the findings. We will incorporate these results into the final project report. If the estimated level of bias resulting from the exclusion of the institutionalized population and those requiring proxy responses from the sample warrants concerns, we will adjust the index results based on procedures already developed in consultation with our expert advisory committee.

In addition to our index results, we will make available data on some indicators for England, Israel, South Korea, and Mexico. We will facilitate other analysts' use and interpretation of the index by providing data on key contextual measures such as behavioral risk factors related to health outcome (e.g., smoking) and population-level indicators.

With additional funding, there are four natural extensions of the analysis discussed in this report. We list these below. From least complex to most complex, which also represents the least to most costly, possible follow-on to the current project include:

1. Extending the index to sub-groups within each country as sample sizes allow, e.g. men and women or in the case of the U.S., minority populations and whites.
2. Incorporating additional countries in the index, specifically those that joined the SHARE data collection after 2005.
3. Modifying the index to assess progress within and across countries over time and create a time series.
4. Developing, for the countries analyzed in this report, a contextual database of "de jure" policies affecting elderly well-being.

Extending the index to subgroups within the population would increase its usefulness to analysts studying individual countries. Applying the index to countries as they join the SHARE data collection and creating a time series would make the index more dynamic and would chart progress as well as providing snapshots at different points in time. Policy applications of the index would be greatly enhanced and made available to a wider group of researchers and analysts if information about existing national policies targeting the older population were more readily available. Researchers face a tremendous burden even when they try to describe the policy environment affecting older populations within one country.

## **E.2. Conclusion**

The composite index of well-being developed to this point allows us to assess the overall well-being of older population groups of one country relative to others and to ascertain which factors contribute to the country's relative standing. As we mentioned in Section B.1, readers should not treat small differences in results for indicators as substantively significant. However, larger differences—particularly in any sub-index and composite index—provide valuable information about the relative standing of these countries with respect to the well-being of older populations.

Our results demonstrate that countries with similar overall levels of well-being among older adults may have different advantages and face different challenges to improving the well-being of their older population. For example, for the 50-64 age group, France and Germany have very similar overall composite scores (46 and 44). While these two countries have similar overall levels of material well-being and physical and cognitive well-being, they vary with respect to social connectedness and emotional well-being. France's level of social connectedness is an advantage that Germany does not have. On the other hand, France faces a greater challenge with respect to emotional well-being in this group.

The composite rankings help make clear that no one country is best in every domain or on every indicator. The countries that lead across the domains and indicators are the Netherlands, Sweden, Switzerland, and the United States. Those lagging behind are Italy and Spain. Still, even these latter two countries have lessons to offer others. For example, Spain scores well on emotional well-being for persons ages 50-64. These results suggest that it may be more helpful for policy and program planning to look at what factors are contributing to a country's relative standing than to be overly concerned with the overall index scores and rankings.

Although the index as presented here considers the older populations of these countries to be homogenous across age groups, variations may exist within subpopulations. The United States in particular has an older population that is racially and ethnically diverse—and likely to become even more so in coming years. This diversity is particularly pronounced in terms of economic activities over the life course. These activities have a cumulative impact on material well-being and health at older ages. Racial and ethnic differences in many indicators used in construction of our well-being index make a strong case for comparison of well-being across racial groups in the United States. The sample size of the Health and Retirement Study (HRS) would support such an analysis.

In short, we have only begun to assess the analytic possibilities of the well-being index. It appears to sort countries with relatively similar cultures and socioeconomic development into interpretable levels of performance based on the well-being of older age groups. The next challenge is to assess the index performance with a more culturally and socioeconomically diverse set of countries. In order to advance this index, further data harmonization across countries is needed, including careful attention to the way survey samples are drawn and to generalization of the sample to the entire older population of a country. Sensitivity analyses currently underway will help us identify the extent to which such efforts may be needed and may lead to specific data recommendations to the national survey teams. In addition to expanding results based on the current set of indicators included in the index, we also hope to identify improvements in data that will allow additional comparison of countries across a variety of contextual factors or potential expansion of the index to include other domains.

## APPENDIX A - DATA AND SAMPLE

Only a limited number of data sources allow consistent cross-national measurement of well-being. The harmonization efforts by the Behavioral and Social Research Program at the National Institute on Aging and international collaboration across research institutions have resulted in survey datasets on older populations with substantially comparable content for a number of countries. This provides us with a unique opportunity to construct comparable indicators across our project countries.

We have supplemented the survey datasets with published data from other sources, to the extent possible, in order to capture key dimensions of well-being. The data sources for the indicators, therefore, fall into two categories: survey datasets, including the Health and Retirement Study (HRS) for the United States and those that are either based on the HRS or contain significant comparable content for other countries; and aggregate data from published reports and databases from intergovernmental organizations such as the World Health Organization, the World Bank, the Organization for Economic Co-operation and Development (OECD), and the United Nations Population Division. While use of the same survey instruments helps to achieve comparability of data across settings, it is not a guarantee, especially given the wide range of political, social, economic and cultural backgrounds that countries have. To minimize any bias resulting from the lack of comparability in our indicators, we have assessed internal and external validity for the indicators and have made adjustments to indicator definitions as necessary. We provide a description of each data source at the end of this section.

The samples from survey data sources comparable to the HRS consist of adults age 50 and older. The HRS sample in the 2004 and 2006 waves used for the current analysis consist of adults age 50.5 and older and 52.5 and older, respectively. Each survey provides weights that take into account non-response and the age-gender distribution of the population. Some surveys also calibrate results to be representative across geographic units within the country. With respect to institutionalization, the surveys adopt different strategies (see Table A2). Overall, the use of weights and proxy responses make the results for each country representative of the community-based populations for their age group in most countries. As a result, our measures of health status, likely underestimate the prevalence of illness and disability, and the extent of underestimation may differ from country to country. The sample sizes for all the countries are presented in the table below.

**Table A1. List of Countries and Data Sources**

| Country       | Sample Size<br>(Age 50 and over) | Data Source | Year |
|---------------|----------------------------------|-------------|------|
| Austria       | 1,849                            | SHARE       | 2004 |
| Belgium       | 3,649                            | SHARE       | 2004 |
| Denmark       | 1,615                            | SHARE       | 2004 |
| France        | 3,038                            | SHARE       | 2004 |
| Germany       | 2,943                            | SHARE       | 2004 |
| Greece        | 2,669                            | SHARE       | 2004 |
| Italy         | 2,508                            | SHARE       | 2004 |
| Netherlands   | 2,877                            | SHARE       | 2004 |
| Spain         | 2,354                            | SHARE       | 2004 |
| Sweden        | 2,997                            | SHARE       | 2004 |
| Switzerland   | 962                              | SHARE       | 2004 |
| United States | 18,469                           | HRS         | 2006 |

Sources: SHARE Release 2-0-1 Survey Datasets; U.S. Health and Retirement Study (survey dataset).

**Table A2. Survey Sampling, Institutionalization and Proxy Rates by Country**

| Country       | Survey<br>(year)  | Data for<br>Analysis<br>Includes<br>Persons in<br>LTC<br>Institutions | Population to<br>which<br>Individual<br>Respondent<br>Weights<br>Calibrated | Proxy<br>Rate<br>(%) | OECD Institution-<br>alization Rate, Age<br>65+ (per 1000) |
|---------------|-------------------|---|---|----------------------|--|
| Austria       | SHARE<br>(2004)   | No  | Total   | 1.11                 | 36   |
| Belgium       | SHARE<br>(2004/5) | No  | Total   | 2.38                 | 63   |
| Denmark       | SHARE<br>(2004)   | Yes   | Total   | 1.87                 | 54   |
| France        | SHARE<br>(2004/5) | No  | Total   | 6.51                 | 69   |
| Germany       | SHARE<br>(2004)   | Yes   | Total   | 1.99                 | 36   |
| Greece        | SHARE<br>(2004/5) | Yes   | Total   | 3.21                 | n/a  |
| Italy         | SHARE<br>(2004)   | No  | Total   | 3.91                 | n/a  |
| Netherlands   | SHARE<br>(2004)   | Yes   | Total   | 4.9                  | 72   |
| Spain         | SHARE<br>(2004)   | Yes   | Total   | 4.3                  | 19   |
| Sweden        | SHARE<br>(2004)   | Yes   | Total   | 1.74                 | 75   |
| Switzerland   | SHARE<br>(2004)   | No  | Non-<br>institutional   | 0.08                 | 64   |
| United States | HRS<br>(2006)     | Yes   | Non-<br>institutional   | 6.8                  | 39   |

Sources: Estimates based on OECD Health Data, June 2009; UN World Population Prospects, 2008; SHARE Release 2-0-1 Survey Datasets; U.S. Health and Retirement Study (survey dataset).

### **Health and Retirement Study (HRS)**

<http://hrsonline.isr.umich.edu/>

Project Country: United States

HRS is a national panel survey of individuals over age 50 and their spouses in the United States. It is funded primarily by the National Institute on Aging and administered by the Institute for Social Research at the University of Michigan. HRS is intended to provide data for those making policy decisions that affect retirement, health insurance, savings, and economic well-being. The survey contains information on demographics; income; assets; health; cognition; family structure and connections; health care utilization and costs; housing; job status and history; expectations; and insurance. The baseline survey conducted in 1992 contains data on the 1931-41 birth cohorts. Later surveys enrolled additional birth cohorts (those born before 1924, 1924-30, 1942-47, and 1948-53). In addition to those respondents, the survey also interviewed the spouses or the partners of a respondent. Follow-up surveys are conducted every other year, with proxy interviews for those who died between interview years. Currently, the total sample includes more than 22,000 persons in 13,100 households with oversampling of Hispanics and Blacks (and Florida residents for cohorts enrolled before 2004). Nine waves of data have been collected to date (1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006 and 2008). Whenever possible, we use data from a subset of HRS called the RAND HRS Data files (Version H), a collection of selected variables derived from the HRS that has been cleaned and processed for easier accessibility by the Labor & Population Program at the RAND Center for the Study of Aging.

### **Survey of Health, Aging, and Retirement in Europe (SHARE)**

[www.share-project.org](http://www.share-project.org)

Project Countries: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, and Switzerland

SHARE is a cross-national, interdisciplinary panel database of micro data on health, socio-economic status and social and family networks of individuals age 50 or older. The SHARE data currently cover 14 European countries and Israel, with additional countries being added over time. The study sample for each country ranges from about 1,000 to 4,000. Baseline surveys in the 11 European countries used for this analysis were conducted in 2004. Three other European countries joined the SHARE project in 2006, participating in the second wave of data collection in 2006-07. One or two waves have been collected for each country, and the most recent waves publicly available for analysis were collected between 2004 and 2007. Our analyses used wave 1, Release 2.0.1 and the Release 2.3.0 updates to the wave 1 physical functioning measures.

## *Published Reports/Databases*

### **OECD Health Data**

[www.oecd.org/health/healthdata](http://www.oecd.org/health/healthdata)

Project Countries for Which Data are Available: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, Switzerland, and United States

The OECD Health Data is an electronic database released annually in June, and offers the most comprehensive source of comparable statistics on health and health systems across OECD countries. The database consists of more than 1,200 series covering mainly health-related topics, such as health status; health care resources and utilization; and expenditure on health. It also contains some demographic and economic information.

### **OECD Social Expenditure Database (SOCX)**

[www.oecd.org/document/9/0,3343,en\\_2649\\_34637\\_38141385\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/9/0,3343,en_2649_34637_38141385_1_1_1_1,00.html)

Project Countries for Which Data are Available: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, Switzerland, and United States

SOCX contains statistics on a wide range of public and private social expenditures at program levels that are comparable across countries. Social policy areas covered include old age, survivors, incapacity-related benefits, health, family, unemployment, and housing. The data are provided for 30 OECD countries for the period 1980-2005.

### **Penn World Table**

[http://pwt.econ.upenn.edu/php\\_site/pwt\\_index.php](http://pwt.econ.upenn.edu/php_site/pwt_index.php)

Project Countries for Which Data are Available: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, Switzerland, and United States

The Penn World Table provides purchasing power parity and national income accounts in international prices for 188 countries for the years 1950-2004. PWT is built up through a set of sophisticated extrapolations from the successive benchmark studies, both through time and across space. The Penn World Table is a forerunner of a new kind of international data base that may be described as a Space-Time System of National Accounts. PWT 6 is comparable to previous versions of the table. The current version of Penn World Tables, PWT 6, is produced by The Center for International Comparisons at the University of Pennsylvania. Future versions will be jointly produced through the Center for International Data at Davis, and in association with the NBER.

### **Society at a Glance: OECD Social Indicators, 2006**

[www.oecd.org/document/24/0,3343,en\\_2649\\_34637\\_2671576\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/24/0,3343,en_2649_34637_2671576_1_1_1_1,00.html)

Project Countries for Which Data are Available: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, Switzerland, and United States

This biennial inventory of social indicators for OECD countries provides about 40 indicators on a wide range of topics related to social issues. The 2006 edition includes general context indicators such as income per capita and age dependency rates; self-sufficiency indicators such as employment and unemployment rates; equity indicators such as earnings inequality and old-age pension replacement rates; health indicators such as health care expenditure and long-term care recipients; and social cohesion indicators such as suicides and life satisfaction.

**WHO Mortality Database**

[www.ciesin.columbia.edu/IC/who/MortalityDatabase.html](http://www.ciesin.columbia.edu/IC/who/MortalityDatabase.html)

Project Countries for Which Data are Available: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, Switzerland, and United States

The WHO Mortality Database contains mortality data officially reported by WHO Member States. The database contains the number of registered deaths and infant deaths by cause, sex, and age. The cause of death is coded according to International Classification of Diseases (ICD) and the cause-specific data from as early as 1979. The database also presents the WHO estimates of completeness and coverage of mortality data for the latest year for which data are available for each country.

**World Health Survey (WHS)**

[www.who.int/healthinfo/survey/en/index.html](http://www.who.int/healthinfo/survey/en/index.html)

Project Countries for Which Data are Available: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, and Sweden

WHS is conducted by the World Health Organization in 70 countries in an effort to strengthen the evidence base required by policy makers to improve programs and policies that have an impact on the health of populations and health systems. It provides comprehensive baseline information on the health of populations and on the outcomes associated with the investment in health systems and their functioning.

**World Population Ageing 2007**

[www.un.org/esa/population/publications/WPA2007/wpp2007.htm](http://www.un.org/esa/population/publications/WPA2007/wpp2007.htm)

Project Countries for Which Data are Available: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, Switzerland, and United States

*World Population Ageing 2007* is a report prepared by the Population Division, Department of Economic and Social Affairs at the United Nations. It provides a description of global trends in population aging and includes a series of aging process indicators for 187 countries, areas, and regions. Examples of indicators presented include dependency ratios, average annual growth rates of the older population, life expectancy at specific ages, and survival rates.

**World Population Prospects (WPP)**

<http://esa.un.org/unpp/>

Project Countries for Which Data are Available: Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, Switzerland, and United States

WPP provides basic demographic information that serves as inputs for calculating many key indicators in the United Nations system. It is published by the Population Division, Department of Economic and Social Affairs at the United Nations and revised every two years. WPP incorporates the findings of the most recent national population censuses and the numerous specialized population surveys carried out around the world. For the population projections, four variants (i.e., high, medium, low, and constant-fertility) are available based on different assumptions regarding fertility levels. The WPP contains data for 228 countries or areas around the world.

## APPENDIX B - VARIABLE DEFINITIONS

For comparability purposes, all variables used in this study are either defined or re-scaled so that higher values indicate being better off on that particular indicator. Data sources for the indicators are the Health and Retirement Study (HRS) for the United States and the Survey of Health, Ageing and Retirement in Europe (SHARE) for the European countries, unless otherwise noted. The authors estimated indicator values using these datasets.

**Table B1. List of Variables in Each Domain**

| Domain                                    | Variables   |
|---|---|
| 1. Material Well-Being                    | 1.1. Personal Income<br>1.2. Household Income Per Capita<br>1.3. Not in Absolute Poverty  |
| 2. Physical and Cognitive Functioning     | 2.1. No Disability<br>2.2. Living Independently (IADL, medications)<br>2.3. Immediate and Delayed Recall (no/mild cognitive impairment)<br>2.4. Physically Functional (walking short distance)<br>2.5. Old Age Life Expectancy (at 50-54, 65-69, and 75-79)<br>2.6. Not Obese |
| 3. Social Connectedness and Relationships | 3.1. Socially Connected (participate in economic/social activity)<br>3.2. Contact with Children   |
| 4. Emotional Well-Being                   | 4.1. Not Depressed<br>4.2. Suicide Rate (Reverse Coded)   |

### 1. Material Well-being Domain

#### 1.1. Personal Income: Average income of older adults, in current PPP dollars.

Personal income generally consists of individual income from various sources—including earnings; private and public retirement pensions; disability insurance; unemployment or workers compensation; and other government transfers. The exact components differ slightly across the surveys, partly because of the differential treatment of some components as either individual-level or household-level income. For example, HRS considers alimony as household-level income, but SHARE does not. We convert personal income to Purchasing Power Parity (PPP) dollars using the Penn World Table (Version 6.3), published by the Center for International Comparisons of Production, Income, and Prices at the University of Pennsylvania.

#### 1.2. Household Income Per Capita: Average per capita income of households in which older adults live, in current PPP dollars

Household income consists of the personal income of all household members as well as household-level income, such as income from assets held jointly and lump sums from insurance, pension, and inheritance. The exact components differ across the surveys. We compute the income per capita by dividing the total household income by the size of each household across respondents. We convert household income per capita to PPP dollars using the Penn World Table (Version 6.3), published by the Center for International Comparisons of Production, Income, and Prices at the University of Pennsylvania.

### **1.3. Not in Absolute Poverty: Percent of older adults living at or above the poverty line (local currency equivalent of U.S. poverty line for year being measured)**

We define absolute poverty as household income below the poverty threshold for a given household size in a given year, as defined by the U.S. Office of Management and Budget. We use weighted average thresholds for a particular household size and do not consider the age composition of household members. We adjust the poverty thresholds by using PPP conversion factors from the Penn World Table (Version 6.3), published by the Center for International Comparisons of Production, Income, and Prices at the University of Pennsylvania. Because the income data available in the surveys refer to those from the previous year, we apply the thresholds from the year prior to the survey year (i.e., 2004 for SHARE and 2005 for HRS).

## **2. Physical and Cognitive Well-being Domain**

### **2.1. No Disability: Percent of older adults who have no difficulty in performing Activities of Daily Living (ADLs) (i.e., dressing, bathing, eating, getting in/out of bed, using toilet)**

We measure disability using levels of difficulty performing a set of basic activities of daily living (ADL) because of a physical, mental, emotional, or memory problem. These are indicative of being able to meet personal care needs on one's own. We define older adults to have no disability if they report no difficulty performing the five ADLs: dressing, bathing, eating, getting in and out of bed, and using the toilet. The respondents were asked to exclude difficulties expected to last less than three months. These questions did not ask whether the respondents required any assistance (e.g., personal help or a device) in performing the activities. Consequently, individuals considered to have no limitation may include some persons who can perform the selected activities only with some assistance. We excluded individuals who reported that they did not usually perform the particular activity.

### **2.2. Living Independently: Percent of older adults who have no difficulty taking medications.**

Whether one has any difficulty taking medications is one among several instrumental activities of daily living (IADL) necessary for individuals to live independently within a community. We measure the ability to live independently by using the question about taking medications, since this was the only IADL measure asked consistently across the surveys in this study. The respondents were asked whether they had any difficulty taking medications because of a physical, mental, emotional, or memory problem, excluding difficulties expected to last less than three months. We excluded individuals who reported that they did not take any medications.

### **2.3. Immediate and Delayed Recall: Percent of older adults who have no or mild impairment (measured with immediate and delayed word recall questions similar to those in the Mini-Mental State Examination)**

We measure cognitive functioning with a respondent's immediate and delayed word recall skills. These are a subset of questions based on the mini-mental state examination (MMSE)—a set of questions measuring cognitive ability—that were asked consistently across all the surveys for this study. Word recall refers to the ability to correctly recall a set of words given to the respondent, both immediately and after a delayed period of time. We define older adults with no or mild cognitive impairment to be those who are able to either correctly recall at least five (out of 10 for both HRS and SHARE) of the words immediately after being read out or correctly recall at least five of those same words after several minutes (i.e., after other questions have been asked). The construction of the indicators for the HRS sample is based on the Imputation of Cognitive Functioning Measures 1992-2006 (v1.0) dataset.

## **2.4. Physical Functioning: Percent of older adults who have no limitation in walking for one block/short distance**

While the surveys asked various questions regarding physical functioning, we measure functional ability using a question on whether one had any difficulty walking for a single city/town block because it was asked consistently in most of the surveys used for the study. The surveys asked respondents to exclude difficulties expected to last less than three months. In SHARE, the distance was specified as 100 meters.

## **2.5. Old-Age Life Expectancy: The average remaining years of life at a given age, assuming that age-specific mortality levels remain constant.**

Data are from the national abridged life tables for five-year age groups that are available in the WHO Statistical Information System (WHOSIS), accessible online at [http://apps.who.int/whosis/database/life\\_tables/life\\_tables.cfm](http://apps.who.int/whosis/database/life_tables/life_tables.cfm). The tables are available for 1990, 2000, and 2006. We use the 2006 life tables for all countries. We present the life expectancy at ages 50-54 for the 50-64 age group in our analysis. Similarly, we present the life expectancy at ages 65-69 for the 65-74 age group, and that at ages 75-79 for the group age 75 and older. The definition of the life expectancy is the average number of additional years persons in a given five-year age group can expect to live if current mortality levels observed for the ages above this group were to continue for the rest of their lives.

## **2.6. Not Obese: Percent of older adults with the Body Mass Index (BMI) less than 30**

We assess the prevalence of obesity by using the Body Mass Index (BMI), defined as the weight in kilograms divided by the square of the height in meters ( $\text{kg}/\text{m}^2$ ). We classify those with BMI below 30 to be not obese. We use the higher BMI threshold for not being obese rather than the usual definition for adults (BMI under 25) because a slightly higher body mass tends to be protective for older adults, particularly those over 65.

## **3. Social Connectedness and Relationships Domain**

### **3.1. Socially Connected: Percent of older adults who are either employed or participate in at least one activity of a social organization in the last year (formal volunteer work, religious/political organizations, etc.)**

We define social connectedness as either being employed or being engaged in any formal volunteer work or activities hosted by clubs, organizations or societies in the past year. The list of clubs, organizations, and societies specifically mentioned in the questionnaire differed across surveys. HRS asked about involvement in volunteer work and attendance at religious services, or meetings or programs of groups, clubs, or organizations that a respondent belonged to. SHARE asked whether or not a respondent was involved in volunteer work, clubs, religious, or political organizations in the previous month.

### **3.2. Contact with Children: Percent of older adults who have any contact with at least one child in the last year**

We define older adults who have contact with children to be persons who either live or are in touch with at least one of their children through any mode of contact in the past year—whether in person, over the phone, by email, or through regular mail. We include older respondents with no living children in the denominator for the indicator. In the SHARE survey, respondents are asked about their contact with up to four of their children in the past year.

#### **4. Emotional Well-being Domain**

##### **4.1. Not Depressed: Percent of older adults who did not feel depressed in the previous month (not clinically defined)**

We measure depression with a non-clinical “yes/no” indicator of the individual’s feelings—whether they felt sad or depressed in the past month. HRS asked whether or not a respondent felt depressed much of the time over the week prior to the interview.

##### **4.2. Suicide Rate: Number of deaths from suicides and self-inflicted injuries per 100,000 persons ages 55-64**

We calculate this indicator by dividing the number of persons of a given age group who died from suicide or self-inflicted injuries in a given year by the population of the same age group, then multiplying the result by 100,000. We reverse the scaling by multiplying the rate by (-1) so that the higher scores indicates lower risks for suicide. Data are from the *WHO Mortality Tables*, “Table 1: Number of Registered Deaths.” This table reports the number of registered deaths by cause, sex, and age. Population and live birth data are also provided and were used to calculate death rates. For each country, we chose the year that most closely corresponded to the survey year of data used in this analysis (i.e., 2006 for HRS and 2004 for SHARE).

## APPENDIX C - METHODOLOGY

Hagerty and Land (2007) examined ways to construct summary indices that would maximize the level of agreement or “endorsement” in a specific audience (e.g. policymakers, researchers, and the general public). They derived several conditions for high levels of endorsement. First, all stakeholders should consider social indicators in an index to be important. Second, the indicators should exhibit high reliability—that is, they should consistently and dependably measure the concepts they are intended to capture. Third, the indicators should all be positively correlated. Fourth, the weights (importance) that individuals attribute to each indicator should have unimodal distributions<sup>8</sup> and be positively correlated. Fifth, when the importance that individuals place on each indicator is not known—giving each indicator equal weight is optimal because it minimizes the maximum possible disagreement about which indicator is most important. We considered these criteria in constructing the Index of Well-Being in Older Populations. As a result, we expect that the index will indicate the overall well-being of the older population in each country, defined in terms of the averages of social conditions encountered.

### Country Choice

The countries assessed in this report have been chosen primarily on the basis of data availability and comparability, and similarity with respect to cultural background and the level of socioeconomic development. That is, only the countries without gaps in the data, that have comparable data, and that are Western industrialized countries have been used to estimate the sub-indices and composite index.

### Indicators

The report reviews the 13 indicators that we have included in the index. Data for these indicators come from national surveys and international statistical sources for the latest available year of comparable data at the time we started the analysis. We have included only indicators that were available for all the countries.

We assess the reliability of the index on the basis of scale item intercorrelations and item-scale correlations. All indicators except the suicide rate were defined such that a higher score should correspond to better well-being. We reversed the scale for the suicide rate in order to use this indicator in the index.

#### *Scale Item Correlations*

High intercorrelations among scale items (indicators) within a domain suggest that these items measure the underlying concept. Tables C1 to C4 show the correlation coefficients and their level of significance for each pair of indicators within the domain for the 50-64 age group.

Our analyses show that intercorrelation patterns among scale items within each domain are similar across the age groups. Item correlations show significant and large pairwise correlations within in the material well-being domain.

There are also some significant and moderately high pairwise correlations among the indicators in the physical functioning domain. No limitation in physical functioning is strongly correlated with not being obese, and no difficulty taking medications is positively correlated with both of those indicators. However, 11 of 15 pair wise correlations in that domain are effectively zero. Better immediate and delayed recall is significantly correlated with only one measure in the physical and cognitive functioning domain in the 50-64 age group. It is negatively correlated with life expectancy for this age group. But because immediate and delayed recall is strongly positively correlated with material well-being, there is good evidence that this indicator does capture improved well-being.

In the social connectedness domain, we had previously considered including living with others as an indicator; but it is significantly and negatively correlated with being socially connected at ages 50 to 64 (but not at other

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<sup>8</sup> A unimodal distribution has one peak. A typical example is the normal distribution.

ages). Living with others was also not significantly correlated with any indicators in this domain for all age groups. On the basis of these findings and the significant negative correlation of not living alone with not being in absolute poverty for the 50-64 age group, we excluded this indicator. In effect, it was difficult to determine if living with others signaled better or worse well-being than living alone.

The two indicators in the emotional well-being domain are not significantly correlated.

**Table C1. Material Well-Being Item Intercorrelations, Ages 50-64**

|  | Average Personal Income (\$ PPP) | Average Household Income Per Capita (\$ PPP) | Percent Not In Absolute Poverty |
|--|----------------------------------|--|---------------------------------|
| Average Personal Income (\$ PPP)             | 1                                |  |                                 |
| Average Household Income Per Capita (\$ PPP) | 0.9593<br>0.00                   | 1  |                                 |
| Percent Not In Absolute Poverty              | 0.7077<br>0.01                   | 0.6818<br>0.0146                             | 1                               |

**Table C2. Physical and Cognitive Well-Being Item Intercorrelations, Ages 50-64**

|   | Percent With No Disability | Percent Living Independently (No Difficulty Taking Medications) | Immediate and Delayed Recall: Percent With No/Mild Impairment | Percent With No Limitations in Physical Functioning | Life Expectancy at Ages 50-54 (Years) | Percent Not Obese |
|---|----------------------------|---|---|---|---------------------------------------|-------------------|
| Percent With No Disability                          | 1                          |   |   |   |                                       |                   |
| Percent Living Independently                        | 0.0583<br>0.8573           | 1   |   |   |                                       |                   |
| Orientation And Recall                              | 0.1562<br>0.6278           | 0.1472<br>0.6481  | 1   |   |                                       |                   |
| Percent With No Limitations in Physical Functioning | 0.1860<br>0.5627           | 0.8953<br>0.0001  | -0.1533<br>0.6343   | 1   |                                       |                   |
| Life Expectancy at Ages 50-54 (Years)               | 0.5717<br>0.0521           | 0.2355<br>0.4613  | -0.5108<br>0.0897   | 0.3912<br>0.2086                                    | 1                                     |                   |
| Percent Not Obese                                   | 0.3246<br>0.3033           | 0.8254<br>0.0009  | 0.1529<br>0.6351  | 0.8632<br>0.0003                                    | 0.2598<br>0.4147                      | 1                 |

**Table C3. Social Connectedness Item Intercorrelations, Ages 50-64**

|                                      | Percent Socially Connected | Percent Having Contact With Children |
|--------------------------------------|----------------------------|--------------------------------------|
| Percent Socially Connected           | 1                          |                                      |
| Percent Having Contact With Children | 0.3835<br>0.2185           | 1                                    |

**Table C4. Emotional Well-Being Item Intercorrelations, Ages 50-64**

|  | Percent Not Depressed (Non-Clinical) | Transformed Suicide Rate per 100,000 (Ages 55-64) |
|--|--------------------------------------|---|
| Percent Not Depressed (Non-Clinical)             | 1                                    |   |
| Transformed Suicide Rate per 100,000(Ages 55-64) | 0.3011<br>0.3416                     | 1   |

*Item-Scale Correlations*

We examine two methods of assessing item-scale correlations—corrected and uncorrected (see table below). The corrected item-scale correlation compares each item (indicator) to a scale constructed with all the remaining items in the scale, excluding the item itself. In an uncorrected item-scale correlation, the scale is constructed with all items, including the item being assessed. Item-scale correlation provides a measure of the extent to which an item is representative of the whole scale. High item-scale correlations imply that the scale items together capture the underlying concept well. We also examine the correlation of item and scale rankings of the countries.

**Table C5. Item-Scale Correlations by Domain and Age Group**

| Item | Ages 50-64     |         |                |         | Ages 65-74     |         |                |         | Ages 75+       |         |                |         |
|------|----------------|---------|----------------|---------|----------------|---------|----------------|---------|----------------|---------|----------------|---------|
|      | Uncorrected    |         | Corrected      |         | Uncorrected    |         | Corrected      |         | Uncorrected    |         | Corrected      |         |
|      | 0-100<br>scale | Ranking | 0-100<br>scale | Ranking | 0-100<br>scale | Ranking | 0-100<br>scale | Ranking | 0-100<br>scale | Ranking | 0-100<br>scale | Ranking |
| 1.1  | 0.95           | 0.90    | 0.88           | 0.85    | 0.94           | 0.99    | 0.87           | 0.91    | 0.96           | 0.97    | 0.91           | 0.92    |
| 1.2  | 0.93           | 0.92    | 0.83           | 0.87    | 0.97           | 0.99    | 0.93           | 0.93    | 0.99           | 0.97    | 0.97           | 0.96    |
| 1.3  | 0.88           | 0.69    | 0.74           | 0.71    | 0.89           | 0.51    | 0.75           | 0.51    | 0.95           | 0.76    | 0.89           | 0.78    |
| 2.1  | 0.61           | 0.66    | 0.40           | 0.37    | 0.66           | 0.46    | 0.48           | 0.26    | 0.81           | 0.90    | 0.69           | 0.69    |
| 2.2  | 0.81           | 0.71    | 0.68           | 0.59    | 0.86           | 0.85    | 0.77           | 0.76    | 0.73           | 0.64    | 0.58           | 0.38    |
| 2.3  | 0.24           | 0.10    | -0.01          | 0.01    | 0.58           | 0.47    | 0.38           | 0.28    | 0.79           | 0.86    | 0.67           | 0.64    |
| 2.4  | 0.91           | 0.87    | 0.85           | 0.78    | 0.89           | 0.88    | 0.82           | 0.80    | 0.93           | 0.91    | 0.89           | 0.74    |
| 2.5  | 0.51           | 0.56    | 0.28           | 0.26    | 0.32           | 0.18    | 0.07           | -0.11   | 0.25           | 0.01    | 0.01           | -0.14   |
| 2.6  | 0.86           | 0.67    | 0.77           | 0.62    | 0.73           | 0.89    | 0.57           | 0.78    | 0.64           | 0.57    | 0.46           | 0.34    |
| 3.1  | 0.83           | 0.80    | 0.39           | 0.49    | 0.94           | 0.89    | 0.76           | 0.56    | 0.95           | 0.88    | 0.81           | 0.66    |
| 3.2  | 0.83           | 0.89    | 0.39           | 0.49    | 0.94           | 0.86    | 0.76           | 0.56    | 0.95           | 0.89    | 0.81           | 0.66    |
| 4.1  | 0.81           | 0.69    | 0.30           | 0.24    | 0.72           | 0.49    | 0.02           | -0.06   | 0.73           | 0.51    | 0.08           | -0.13   |
| 4.2  | 0.81           | 0.80    | 0.30           | 0.24    | 0.72           | 0.82    | 0.02           | -0.06   | 0.73           | 0.77    | 0.08           | -0.13   |

Generally there are substantial variations in the item scale correlations across age groups. Uncorrected correlations are much higher than the corrected correlations, as expected. For all age groups, both uncorrected and corrected correlations for the indicators in the material well-being domain are high. Life expectancy in the physical and cognitive well-being domain has particularly low item correlations. An earlier version of the index included living arrangements (not living alone) in the social connectedness and relationships domain, but this item had negative corrected item correlations—it is inversely correlated with other indicators in the domain. Not living alone may indeed be capturing the need to live with others for health or financial reasons rather than not being socially isolated. For these reasons, we excluded living arrangements from the index.

## Index Construction

### Sub-Indices

We standardize all indicator values and aggregate the results by domain. We create sub-indices for each domain by standardizing each indicator—using the value for the United States as the standard—and then summing the standardized scores for all the indicators in each domain. It is important to note that with the methods used in this analysis, the country chosen for the standard does not affect the results or their interpretation. Choosing a specific country as the standard rather than using the mean of all countries facilitates recalibration of the index when data for new countries are introduced. The sum of standardized scores is divided by the number of indicators in the domain, providing an average deviation from the U.S. score. Finally, the countries' scores are translated to a 0 to 100 scale using the “min-max” normalization formula:

$$s'(i) = [(s(i) - \text{Min } X) / (\text{Min } X - \text{Max } X)] * 100$$

where  $s(i)$  is the initial score,  $[\text{Min } X, \text{Max } X]$  is the initial range, and  $s'(i)$  is the new score in the  $[0, 100]$  range.

### The Composite Index

The composite index for each country is created by summing across the sub-indices and dividing by the number of domains. Hypothetically, if a country were to have the highest score on all four domains, it would have a composite index score of 100.

### *The Composite Ranking*

The composite ranking for each domain is the average ranking of the indicators in the domain (see equation below). A composite ranking of 1 (first) for any country would indicate that for this country, all the indicators in the domain ranked first. The overall composite ranking for each country is the average of the composite ranking results for the domains. An overall composite ranking of 1 (first) would mean that for this country, all indicators across all domains ranked first.

Domain composite ranking:

$CI_c^d = (\sum_{i=1}^N \text{Rank}_{ic}^d) / N$ , where  $\text{Rank}_{ic}^d$  is the rank of country  $c$  on indicator  $i$  in domain  $d$  and  $N$  is the number of indicators in the domain.

### **Weighting of Indicators and Domains**

For the sub-indices, we give equal weight to all indicators within each domain. In estimation of the composite index, domains likewise have equal weight. As a result, the weight given to each indicator in the composite index is inversely related to the number of indicators in the domain in which we included the particular indicator.

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