Asset and Health Dynamics Among the Oldest Old: An Overview of the AHEAD Study

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Understanding the dynamics of health and related behaviors of the oldest old is an important research goal with far-reaching implications for policy and clinical decision making. Over the last decade several national panel studies have yielded data useful for describing health transitions in various representations of the elderly population. Among these are the National Long Term Care Surveys, or NLTCS (Manton, Stallard, & Corder, 1995), and the first Longitudinal Study of Aging, or LSOA (Kovar, Fritti, & Chyba, 1992). Researchers, however, have lacked comparable national data with which to simultaneously describe health dynamics and transitions in other life domains, including changes in economic well-being, marital and family status, and reliance on public and private support systems. The overall goal of the study of Asset and Health Dynamics Among the Oldest Old (AHEAD) is to bridge this gap for an interdisciplinary research community.

The 1993 AHEAD study is the first wave of a biennial prospective panel study, nationally representative of the noninstitutional population born in 1923 or earlier. It is a companion study to the Health and Retirement Study (HRS) described by Juster and Suzman (1995). Broad-based analytic concerns motivated and guided the development of each. AHEAD is organized around a conceptual model which recognizes three generic types of resources available to the elderly: economic, programmatic, and familial. Economic resources result from past employment, consumption, and saving decisions by the individual or the household and include not just private savings but also private pensions, housing equity, and consumer durables. Programmatic resources are individual claims on structured federal or state transfer programs such as Social Security, Medicare, Medicaid, and other categorical programs, including food stamps. Family resources are the combined stocks of time and financial reserves held by the extended family of the older individual. Relatives can make time available to provide care of varying intensities for frail elders; alternatively, they can purchase supportive services directly or make direct cash transfers for their discretionary use. At a point in time, the level and mix of these resources differ across older individuals. As individuals age, they consume their resources at varying rates. On average, a decline in health increases the consumption of resources. The rate at which resources are consumed will vary across time, even among individuals who have the same initial endowments of various kinds of resources.

Studies of old age are often characterized as studies of change because the advanced ages are dense in significant life transitions. The framework around which AHEAD is organized explicitly directs attention to the interweaving of...
changes in health, economic well-being, and transfers (both public and private). Among the research issues which the AHEAD panel study is designed to address are: (1) How do health transitions map onto changing patterns of life-cycle consumption and dependency on public and familial resources? (2) What are the pathways by which patterns of asset consumption and variability in income flows impoverish some elderly people, particularly widows? and (3) How do changes in the mix and distribution of intergenerational transfers over time relate to important health transitions in late life, including the hazards of disability, institutionalization, and Medicaid spend-down?

In the next section, we briefly expand on the research issues which gave rise to AHEAD. These substantive considerations anchor many of the design, content, and sampling decisions which are described in the three subsequent sections. We conclude with a brief overview of data from the 1993 baseline interview and a summary of plans for later waves of AHEAD, including its eventual merger with HRS and the aging-in of new cohorts in 1998.

RESEARCH ISSUES

Aging and Health Transitions

Even into the ninth or tenth decade of life, individuals may maintain physical fitness and daily independence, preserve important social roles (as spouses, grandparents, volunteers, and even paid workers), and retain overall life satisfaction. Nonetheless, individuals at advanced ages have an increasingly greater chance of incurring measurable physiologic changes in organ and tissue function, chronic symptoms (e.g., pain or sleeplessness) of known or unknown etiology which may impair normal functioning, discrete clinical conditions (syndromes and diseases), dysfunctions (physical, social, cognitive, mental), disabilities, and sensory impairments. Changes accumulate and progress over time, alter personal and social behaviors, and fundamentally modify the relationship of the individual to the physical and social environments. Despite the complex modes of clinical presentation, many elements of declining health have been measured as categorical health “transitions,” including changes in function. Counts of health transitions in well-defined populations yield estimates which ultimately can be used to describe the health of a population, such as life-table measures of active life expectancy (Crimmins, Hayward, & Saito, 1996).

There is a clear gradient associating low socioeconomic status (SES) with poorer health outcomes, including both the incidence of adverse health events and mortality (Feinstein, 1993). This inverse correlation may be related to prior occupational exposures, other physical or social stresses, hygienic risk factors (such as smoking), restricted access to health care services, poor nutrition, or substandard housing. While the correlation between SES and health may attenuate at the very oldest ages, little is known about the dynamics of the underlying linkages. Few studies have focused on how specific conditions or functional problems accelerate dissaving (i.e., the consumption of financial resources) or how combined changes in health and economic status affect the subsequent use of health care services. Because both spouses in an elderly couple have an increasing risk of experiencing health problems, but draw on commonly held resources, it is important to examine the trajectories of their health and wealth changes in combination. Finally, the implications and costs of illness are seldom confined only to the older person and his or her spouse. The health problems of an elderly parent often cascade throughout the extended family as adult children and grandchildren become involved in caregiving or providing financial support.

Dynamics of Health, Assets, and Impoverishment

In cross-section, the economic status of the elderly declines with age. In 1992, for example, the median income of those aged 65–69 was $12,551, but just $9,101 for those aged 85 and over (U.S. Bureau of the Census, 1993a). Poverty rates also increase with age, and this pattern is particularly striking for older women, whose 1992 poverty rate increased from 9.1% at ages 65 to 69 to 22.7% at ages 85 and over (Moon & Mulvey, 1996). There are several possible explanations for these age differences. First, the oldest old (those aged 85 and over) have spread a given stock of economic resources over unexpectedly long lifetimes; only limited resources may remain near the end of life. Second, the very old of today are the survivors of cohorts with low lifetime earnings. These cohorts have endured economic events which cumulatively have eroded their financial resources. Not only were they of working age during the Depression, but the inflation of the 1970s reduced the real value of their private pensions. Finally, the assets many individuals bring to old age are reduced by high out-of-pocket costs for health care.

The future economic status of the elderly depends on the quantitative importance of these alternative explanations. If age differences in economic status, for example, are due mostly to cohort differences, the economic status of the very old in the next century will likely improve as more well-to-do cohorts reach advanced old age. If cohort differences are small, however, and dissaving is the primary explanation, the economic status of the elderly may show very little improvement over time. Societal changes, such as shifts in public entitlement programs (most importantly, changes in the structure of Social Security and Medicare), changes in the tax code, or fluctuating returns on investments may undermine these straightforward predictions, however.

Aging and dissaving. — The most widely used framework for studying the relationship between age and economic status is the Life Cycle Hypothesis (LCH). This theory predicts that at an unspecified age elderly individuals and households will consume at a level higher than their income and thereby dissipate. The LCH is contrasted with a bequest motive for saving, which predicts that the desire to leave a bequest is sufficiently strong that assets may not decline, even at very advanced ages. These models imply important differences in individual behaviors and policy perspectives. Under the LCH, for example, the elderly have a fairly short time horizon (roughly speaking, their life expectancy at a given age), so that events that will occur in the distant future (e.g., projected deficits in the Social Security Trust Fund) will not af-
fect their behavior today. In contrast, the bequest motive implies that the time horizon for the elderly is limitless because it operates through their heirs.

Existing data sets are inadequate to empirically evaluate the predictions that the two theories yield. In the final year (1979) of the Retirement History Survey (RHS), the oldest respondents were but 74 years of age — considerably younger then the age at which dissaving may begin. Furthermore, dissaving is inferred from asset changes which, over time, can be dominated by macroeconomic shocks, such as the high and variable inflation rates of the 1970s. Because the Panel Study of Income Dynamics (PSID) spans several decades, inferences about asset changes are less vulnerable to macroeconomic events; however, the sample sizes of the very old in the PSID are too small to support reliable estimation of asset changes. Counts of elderly respondents in the Survey of Income and Program Participation (SIPP) are generally substantial, but assets are typically measured only once in a panel from the SIPP (the 1984 panel, in which assets were measured twice, one year apart, is an exception). Furthermore, tests of the LCH and bequest motive can be sharpened if they incorporate details of intended and actual bequests as well as age-related changes in assets.

The largest component of bequeathable wealth for most elderly is their housing equity (Venti & Wise, 1989), yet the role of housing in desired bequests cannot be understood without simultaneously considering how health affects housing choices. Furthermore, inter-vivos giving, either in cash or income-in-kind, may substitute for bequests or implicitly repay adult children for the care provided an elderly parent.

**Dissaving and spend-down.** — Rates of dissaving appear to increase with age; yet controlling for age, unmarried persons in very good health do not dissave on average, while those in poor health dissave at high rates (Hurd, 1990, 1991). An obvious explanation is that those in worse health have greater medical expenditures; alternatively, those in poor health may anticipate dying sooner and choose to consume their resources at a faster pace. Anticipating the eventual need for long-term care and the advantages of Medicaid coverage for nursing home care, some elderly persons may transfer assets to their heirs or convert them into a form which does not disqualify them from acquiring Medicaid coverage. Such behavior we term “spend-down” to distinguish the conscious choice to qualify for Medicaid from the simple drawing down of assets at the advanced ages.

The full extent of spend-down is unknown but may be widespread. In a random sample of Medicaid applicants in Massachusetts, for example, 54% had converted assets to “noncountable” forms of wealth, and 13% had transferred assets to others within 30 months of applying for Medicaid (General Accounting Office, 1993). Another indication that spend-down may be widespread is that a large fraction of the disabled elderly qualify for Medicaid while they are still residing in the community (Spillman & Kemper, 1995).

Finally, our understanding of spend-down is incomplete because only the outcome, and not the process itself, is observed in existing panel data. To understand Medicaid spend-down and distinguish it from other forms of dissaving, we need to observe economic status and related behaviors prior to illness and disability. We know little of the factors that influence ex ante choice, including at what stage in the disease or disability process spend-down begins, how much of spend-down simply is increased consumption and how much is transferred assets, or how various types of transfers across generations of the extended family affect the rate of spend-down.

**Health Dynamics, Family Resources, and Care Outcomes**

**Family transfers.** — Despite widespread research interest in family transfers (see Soldo & Hill, 1993, for a review of alternative perspectives), most prior studies have been fairly simplistic, examining transfers only in one direction (typically from younger kin to the elderly in gerontology), in but one currency (most commonly, time or in-kind transfers), with but only one exchange partner (usually the adult child who is the primary caregiver) from a much larger array of potential helpers, without regard for the family history of transfers, which may prescribe obligations and reciprocities.

To a large extent, data limitations require far simpler estimation strategies than current conceptual models imply. The first LSOA, for example, provides kin information only at baseline and does not link transfer behaviors to a specific relative; the 1988/89 National Survey of Family and Households (NSFH) and its 1992–94 follow-up provide such linkages but only for fairly global types of transfers with only limited information on the health and financial circumstances of all generations in a family. The NLTCS provides linkages from a family roster to care behaviors at a point in time, but not across waves. In the absence of detailed information on potential helpers and their dynamic transfer behaviors, most published studies of caregiving or financial assistance are simple demand-type models in which the older relative’s needs at a point in time are assumed to dictate the flow of resources across the generations without regard for the resources or circumstances of alternative kin providers.

Recent work in economics, demography, and sociology is converging on an analytic framework which integrates the needs, resources, and constraints of donors and recipients (Cox & Rank, 1992; Hogan, Eggebeen, & Clogg, 1993; Rosenweig & Wolpin, 1994). The extended family represents a pool of potential providers and potential recipients of assistance, and the structure of the family as well as the needs and resources of its individual members are important in determining who helps elderly parents (Dwyer & Coward, 1991). Adult children are not interchangeable resources for their elderly parents because of differences in their own life situations, abilities, and preferences (Wolf & Soldo, 1994; Ettner, 1995). Both the absolute and relative resources and needs of parents and children, as well as the availability and prices of goods and services in the marketplace, jointly determine the direction, type, and intensity of help given.

**Care services.** — Transfers not only redistribute resources within the extended family, they also have implications for
other behaviors, including the use of formal health care services (most notably market services in the community and nursing home care) and public sector benefits (particularly Medicaid). Previous cross-sectional research indicates that the kinless elderly and those who do not rely on kin, for other reasons, are overrepresented in nursing homes (Kemper, 1992). While such analyses suggest that family caregiving deters institutionalization, the existing literature is inconclusive. Data are needed that track changes in the mix and intensity of time transfers simultaneously with changes in patterns of disability and comorbidities and the pace of dissaving. Particularly important are observations on how these factors interact in the period immediately before death, an interval typically neglected in other panel studies.

In general, prior research indicates that the frail elderly with higher incomes spend more out-of-pocket on formal services, either in the community or in the nursing home. Based on their review of the literature, Wiener and Hanley (1992) report that there is generally a positive and significant association between income and paid care, leading them to argue that formal care is a normal good for the frail elderly. Sustained over time, out-of-pocket expenditures for labor-intensive personal care would presumably lead to substantial dissaving unless financial transfers by adult children offset the care costs to the parent. Access to and use of formal care may be sensitive not only to the privately held resources of the frail elderly but also to those of their children. From a life-cycle perspective one would expect a strong correlation between the wealth of generations (Behrman & Taubman, 1990) and their propensity to pool resources to accommodate declines in health. Finally, it is important to note that the supply of potential providers of care is itself dynamic. Exogenous change (e.g., the death or migration of the primary caregiver) can initiate change in the size, structure, or type of care system, including nursing home admission.

Summary
There are a number of outstanding research issues which involve the joint dynamics of health, economic resources, family, and health care. It was clear at the outset that for AHEAD to sustain such analyses, a true prospective design would be necessary. Perhaps more importantly, AHEAD would need to track: (1) changes across the multiple domains of human aging, for both spouses in a couple as well as for unmarried individuals; (2) individuals from independent community-living arrangements to retirement or as-assisted care communities to intensive home care or nursing homes admissions; (3) the flow of resources to and from elderly parents and their children, including inter-vivos giving and, ultimately, bequests; and (4) episodes of eligibility for public benefits, notably Medicaid, and how these episodes relate to health dynamics, the cost of care, and inter-generational transfers. In the next section, we describe the details of the AHEAD design.

KEY DESIGN DECISIONS

Overview
AHEAD is a biennial prospective panel study which in its 1993 baseline identified 10,297 eligible persons and interviewed 8,222 individuals aged 70 and over and their spouses. This first wave of AHEAD is nationally representative of the community resident population born in 1923 or earlier. If more than one age-eligible individual was living in a sampled household, one was randomly selected. If the sampled person was married or living with a partner, an interview was sought with the spouse/partner, regardless of age. Thus, some respondents are the younger spouses of those aged 70 or over in 1993. Interviews were completed with 8,222 persons — 7,447 born in 1923 or earlier and 775 younger spouses. An average interview lasted approximately 60 minutes and covered 10 major content areas: demographic and background information, health, cognition, family structure and transfers, use and cost of health services, job status, income, net worth, subjective expectations, and insurance (health and life). Although most of the AHEAD design decisions reviewed below were substantively driven, budget issues and concerns for respondent burden also played a role. Their influence is noted where appropriate.

Planning
In its design and content, AHEAD benefited from the ambitious 18-month planning process of its companion study, the HRS. Most of those involved in the design of AHEAD had participated in this process (Juster & Suzman, 1995), which involved the formation of six Expert Working Groups corresponding roughly to the major content and design concerns of AHEAD as well. These groups examined questionnaires and designs used in other studies, including those which focused on aging rather than retirement, per se. Recommendations of the Working Groups were reviewed and discussed by a Steering Committee, which advised the University of Michigan, and the Monitoring Committee, which advised the National Institute on Aging (members of these Committees are listed in the Appendix). Discussions usually yielded a consensus view on design and content. The intellectual tradition which emerged from this process emphasized far-ranging consultation with researchers in diverse fields, an openness to review and innovation, and the singular importance of data quality. These traditions were largely carried over to AHEAD.

Sample restrictions. — Defining the baseline population for any panel study involves balancing the substantive goals of the project against cross-sectional versus long-term representation, budget constraints, and the length of time before analytically meaningful data become available. With neither time nor budget constraints, the analytic payoff for AHEAD would be greatest if the initial observation had been restricted to individuals prior to any age-related decline in their health or financial resources. Screening a household population to identify such a subgroup is both expensive and difficult. Qualifying respondents on the basis of age or birth cohort is a natural and cost-efficient alternative, but there is variation in the timing of health and related state transitions even in late life. Some individuals experience an initial health decline in their late 40s, an age when rates of chronic disease incidence begin to increase, while others are relatively disease-free well into their 80s.
and beyond. Recent evidence suggests that the timing of transitions of greatest interest to AHEAD has shifted upward over time (Manton & Stallard, 1990; Manton et al., 1995) although there are still significant racial and ethnic differences in the pace of individual aging (Manton & Stallard, 1997).

In defining age eligibility for AHEAD, the goal was to maximize the number of significant life transitions which could be observed over the shortest period of time while minimizing contamination of the baseline with a large number of individuals who had already completed many of the analytically interesting transitions. The former consideration argued for setting the eligibility bar fairly high (e.g., at age 75 or 80), while the latter concern implied a much younger standard. An age range truncated at 65 or 70, for example, would require 10 to 15 years of observation before a sufficient number of transitions would accumulate. Defining eligibility at an older age, say at age 80 and over, would invite the bias of selective survivorship (e.g., Perls, Morris, Ooi, & Lipsitz, 1993). Most likely such bias would be concentrated in minority subgroups. Comparable, though less drastic problems, would have resulted had persons of different ages been sampled differentially. In consultation with the advisory committees, a compromise between the extremes was struck, and baseline eligibility was defined in terms of the birth cohorts of the year 1923 or earlier, i.e., those aged 70 and over in 1993.

Only community-based individuals in the designated age range were eligible for the AHEAD baseline. While institutionalized residents experience a number of important transitions in their physical, functional, and cognitive health, such changes and the process of dissaving are difficult to interpret in the absence of detailed information on prior economic and family circumstances. Particularly difficult is distinguishing dissaving because of health care expenditures from seeming ex ante spend-down because of asset transfers to children or others in order to qualify for Medicaid nursing home benefits. In most cases these processes play out over a period of time and may be largely completed by the time of admission to a nursing home. Because of the time frame and level of detail necessary to reconstruct health and wealth dynamics retrospectively, as well as a concern for minimizing recall bias (Wallace, Kohout, & Colsher, 1992), all AHEAD respondents are observed in the community at the baseline. Transitions in health and related states, including entry into and out of various types of long-term care facilities, will be observed in panel as such events unfold. This decision clearly emphasizes the long-term goals of the study over its short-term yield.

**MODE**

Although the same instrument was administered to all self-respondents in AHEAD, those aged 70 to 79 were generally interviewed by telephone, while those aged 80 and over were generally interviewed in person. Because costs per telephone interview are only about 40% of those for a face-to-face interview, a larger phone sample can usually be obtained for a given budget. If budget issues alone dictated interview mode, all AHEAD interviews would have been done by phone, but age-related increases in the prevalence of hearing and cognitive impairments, arthritis, and frailty argued against using a telephone interview for the very oldest respondents. Nonetheless, the mixing of telephone and personal interview modes raises concerns about comparability, differences in response propensities, and the potential for inducing artificial change as respondents shift from one mode to another. The former concern was addressed in the design of the AHEAD baseline; the latter issue is the focus of a true experiment in the second wave (see below).

Investigations comparing modes using various designs (split-ballot, short-term reinterview) have shown few systematic differences (Frey, 1989; Herzog & Rodgers, 1988). Moreover, whatever differences were evident in early mode comparisons seem to have declined over time (de Leeuw & van der Zouwen, 1988). Questionnaires for personal interviewing, however, cannot be simply and directly translated into a telephone survey; special adaptations are necessary (Biemer, 1988). During the design phase of AHEAD, analyses of the 1989 Survey of Consumer Finances (SCF) provided empirical, albeit nonexperimental, evidence on the quality of financial reporting by older respondents over the phone. While elderly respondents in general have higher missing data rates than younger ones, no mode differences were evident in the SCF.

In AHEAD, there was some variation in interview mode within age group. About 72% of those aged 70–79 in 1993 completed their baseline interview by telephone. Telephone interviews also were conducted with 72% of younger spouses. Personal interviews in these two groups were substituted when the household lacked a telephone, the respondent was unable to be interviewed over the phone, or when the respondent preferred a personal interview. Among those aged 80 and over, 70% of the interviews were conducted by the expected personal interview mode (Heeringa, 1995).

Controlling for age, presence of a spouse, and extent of health problems, personal interviews averaged approximately 4 minutes longer than telephone interviews. Response rate differences between the two modes were minimal and nonsignificant. All those in the age range where telephone was the preferred mode were initially contacted in person as part of the HRS household screen. Mail contact was maintained with all persons identified as AHEAD-eligible from the time of the HRS personal screening interview to the request for an AHEAD interview. Interviewers also alerted AHEAD respondents by means of a personal letter that they would be calling to conduct the interview. While the lack of differences in response probabilities is encouraging in this time of lean survey budgets, it is important to note that the request for a phone interview was hardly a “cold call” as would normally be the case in a random-digit dial (RDD) sample. Evaluations of the mixed interview modes are ongoing.

**CONTENT**

To provide for reliable estimates of transitions over time, the AHEAD baseline interview measured major physical, functional, and cognitive health domains; family structure and family transfers both to and from the respondent; current income and its sources, assets, housing, and employment; and use of health care services, out-of-pocket expen-
dities, and health insurance. In each area, AHEAD drew heavily on measurement strategies developed for the HRS, although items were modified to take account of the older age range in AHEAD.

The baseline interview exploited the technologies of computer-assisted interviewing (CAI). Skip patterns were programmed and question fills (i.e., insertions tailored to the respondent) were created and accumulated over the course of the interview. In effect, a customized interview was created for each respondent. CAI also made it possible to minimize the burden on spouses. The first spouse was asked to provide all the roster information on household members and nonresidential children and step-children. This roster quite literally was carried over to the interview with the second spouse where it appears as a “pop-up” screen, allowing the second spouse to identify by name his/her exchange partners. The spouse who was most knowledgeable about the financial situation of the household provided information on income and its sources, assets, medical expenditures, and insurance for both the husband and the wife. This spouse was designated the “financial respondent.” To create interviews of approximately equal length, the interviewer suggested that the nonfinancial respondent be interviewed first. In cases where one spouse was ill, this sequence was not always followed.

In the following summaries of the main content areas, the average times shown are for unmarried self-respondents, although there is considerable variation in the length of each section depending on the respondent’s attributes. We also identify for the reader other articles in this issue that demonstrate the analytic potential of each area.

Health (average time: 27 minutes)

Items with credible validity for self-report were chosen to represent the major health and functional status domains. These domains include: major chronic illnesses, with measures of illness severity as reflected in the type and intensity of care; important chronic symptoms, such as pain and sleeplessness; physical function, as measured by difficulty and assistance with basic self-care activities, such as activities of daily living (ADLs), use of assistive devices, and the instrumental ADLs (IADLs), and higher levels of physical function, as reflected in recreational physical activity and more strenuous chore activities; overall self-reported summaries of global and emotional health status; hygienic behaviors, such as smoking and alcohol use; general use of health services, including medical (physician and hospital), dental, institutional, long-term care, and a variety of professional services (see Schoenbaum & Waidmann, Chapter 5 in this issue); common emotional and mental conditions such as anxiety and depression; self-reported assessment of sensory function: vision and hearing; overall use of medications and significant surgical procedures (e.g., coronary artery bypass grafting or joint replacement); and cognitive function, indicated by a dementia screening instrument and testing of selected cognitive domains such as memory and reasoning.

These measures were selected to have several important properties: comprehensiveness of coverage, reliability based on prior studies, construct validity based on analyses of HRS (Wallace & Herzog, 1995) and other surveys, item comparability to other major national health surveys, reasonable sensitivity to change, analytic utility demonstrated in prior studies, and successful administration during pretesting activities. Time constraints, however, limited the range of health measures in the AHEAD baseline. A priority was placed on obtaining information about diseases with the highest prevalence and those associated with relatively high costs in terms of clinical care, caregiver burden, or dissaving. While AHEAD retained HRS measures of prevalent and disabling conditions and pain symptoms, new questions were added on falls, hip fractures, joint replacement surgeries, glaucoma, and urinary incontinence. Each of these questions was added because of its likely significance for care needs and resource utilization in the older AHEAD age group. AHEAD measures of physical functioning, on the other hand, differ substantially from those in the HRS 1 baseline. These changes allow for adequate differentiation of a more functionally impaired research population. In the AHEAD study we focus on ADLs and some of the more basic physical functions related to mobility, upper extremities, and fine motor skills (Stump, Clark, Johnson, & Wolinsky, Chapter 4 in this issue).

Measures of cognitive functioning also are intended to differentiate a more impaired study population than the younger, preretirement HRS cohort. AHEAD retains the general HRS focus on tests of learning and abstract reasoning — the latter in an experimental module — but adds measures of orientation and attention as typical in geriatric mental status questionnaires. The Telephone Interview for Cognitive Status (TICS) measure was chosen because it had been validated specifically for phone use (Brandt, Spencer, & Folstein, 1988; Herzog & Wallace, Chapter 3 in this issue). The Center for Epidemiological Studies Depression (CES-D) scale was modified to improve ease of telephone administration. Of eight items in the AHEAD version of the CES-D, five measure mood and three measure the psychosomatic dimension. To provide balance across these dimensions, the response scale was simplified to two categories. Recent methodological research (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993) demonstrates that these changes sacrifice little of the structure and precision of the original scale.

Family Structure and Transfers (average: 10 minutes)

An important innovation in the HRS was its complete family roster of living children and respondents’ siblings who were linked to specific transfers from the HRS respondent (Soldo & Hill, 1995). AHEAD continues and extends this strategy. Basic demographic, social, and economic data were collected about all living children. If a child was married, the demographic and work status variables were recorded for the spouse. This was done primarily to provide detailed information on daughters-in-law, who are frequent caregivers to the frail elderly but whose attributes and care involvement are unobserved in other survey efforts to profile the extended family (see, for example, the limited family rosters in the first LSOA and the NLTCS). The residential history of children living with respondents was obtained in order to determine who moved in with whom, for
whose benefit, and the duration of the coresidential arrangement. Proximity to nonresidential children was estimated by the parent-respondent as well. With computer-assisted interviewing, it is fairly easy to link each mention of a transfer (e.g., caregiving or financial assistance) with the unique ID number assigned to the child or in-law involved in the transfer. Whereas in Wave 1 of HRS only intergenerational transfers given are linked to individual children, in AHEAD both transfers given and transfers received are identified and linked to specific children or children-in-law (see Henrietta, Hill, Li, Soldo, & Wolf, Chapter 10 in this issue). Assistance given to grandchildren (e.g., help with the cost of school tuition) is indexed to the grandchild’s parent. To provide the data necessary to examine spend-down issues, questions are asked about specific asset transfers over the last year and over the last 5 years (see McGarry & Schoeni, Chapter 7 in this issue). Gifts and financial assistance also were separately identified for the two time frames. For analyses of family caregiving, all mentions of personal care and instrumental care are linked through the family roster to the specific provider, and each provider’s effort is distinguished in terms of the frequency and intensity of help given (see Norgard & Rodgers, Chapter 8; and Wolf, Freedman, & Soldo, Chapter 9, in this issue). If a provider is paid, information is obtained on who paid and if a child paid some or all of the costs; this information also is linked to specific individuals listed in the family roster. We anticipate that this feature of AHEAD will support a full range of analyses on the competition between work and parent care and how adult children complement and substitute for each other in assisting their older parents.

Economic Content (average: 28 minutes)

The approach used in AHEAD to measure economic variables builds on that developed for HRS (Moon & Juster, 1995). Specific items were modified, reflecting differences in the population studied and the analytic objectives of the two studies. In AHEAD, for example, we focus on regular sources of monthly income because almost all elderly have regular Social Security benefits and many have income from pensions. Conventional questions about wealth were included and supplemented by items on IRAs and other retirement accounts, trusts, and sizable transfers (see Smith, Chapter 6 in this issue).

A number of innovations from the HRS baseline were repeated in the AHEAD study. In HRS the techniques of bracketing and unfolding successfully reduced missing data in the asset measures (Smith, 1995). These same techniques were used to measure both assets and income in AHEAD. Probability scales to elicit “expectations” of future events also were successful in HRS (Hurd & McGarry, 1995). AHEAD adapted these techniques and expanded on their use, adding items on the perceived probabilities of moving in with a child or into a nursing home, leaving an inheritance, or exhausting savings because of medical care costs.

The housing section in AHEAD required considerable innovation. The value of housing is a large component of the net worth of the elderly, but the housing environment also can be understood as an adaptation to physical limitations. AHEAD includes questions on physical modification made to the housing unit in order to compensate for restricted physical abilities, as well as the value of first and second homes. Respondents also reported if they lived in a complex or community which provided services, the cost of these services, and whether the expected future flow of services had an asset value because of lump-sum entry fees.

The first aim of the employment section was to provide adequate data to study retirement among those 70 or over. The determinants of the labor force participation of this age group are not well understood, even though a small but significant number of elderly people work. In 1990, for example, the participation rate of those aged 70–74 was 15.4% for men and 8.2% for women (Gendell & Siegel, 1992). The work patterns of younger spouses also are of interest because their earnings affect the economic status of their entire households, including spouses in their 70s. In AHEAD a limited set of job history questions also were asked of nonworking respondents. Because a large fraction of the AHEAD population is widowed, some information on the job history of deceased spouses was requested. Eligibility for Medicare and Medicaid was ascertained, and those covered were requested to provide their card numbers. These identification numbers are the basis for linking the survey data to utilization and diagnostic information contained in administrative records.

After extensive discussion with outside experts and alternative form pretests, we chose not to ask detailed questions about private medical insurance. A substantial fraction of pretest respondents did not know the details of their coverage, including copayments or their annual deductibles. Information on the cost of policies was obtained as a proxy for the extent of coverage. Separate questions were asked about long-term care insurance, including whether such policies covered community care. Finally, questions about life insurance elicited estimates of the cash value as well as the insurance value of any policies. Respondents were asked to identify the beneficiaries of their life insurance policies to provide information on intended bequests.

Proxy interview content. — Because of the increasing risk of physical and cognitive health problems, studies of the elderly typically make special provisions for proxy interviews (Rodgers & Herzog, 1992). Interviews conducted with proxy respondents used essentially the same AHEAD questionnaire as those conducted with respondents themselves, but with phrasing altered by CAI to refer to a third person. Measures of subjective phenomena, such as the measure of depressive symptoms, pain, and the expectation items, were deleted. The cognitive test battery was modified. The TICS was not administered and a number of questions about behavioral problems (e.g., wandering) were asked in its place. The latter measures also are intended to indicate the difficulty of managing a cognitively impaired person.

Spanish version. — The Spanish language version of the questionnaire was developed when the English language questionnaire was nearly completed. The translation process is intended to avoid problems that sometimes arise be-
cause of ethnic differences in the Spanish that is spoken and understood in the United States. The process is described by Breslow (1994).

Experimental Modules

As in HRS, a number of short experimental modules (approximately 2–3 minutes in length) are included at the end of the AHEAD interview. These modules serve two purposes: (1) They provide preliminary data in areas of interest to AHEAD for which no well-formulated hypotheses or valid measures exist, and (2) they allow calibration of measures contained in the main questionnaire with similar measures from other studies. Each of seven modules was asked of a random subset of all AHEAD respondents; the average sample size was 877, although 2,086 did not complete any module; experimental modules were not attempted in interviews with proxies (840). The modules included in AHEAD 1 and their sample sizes (shown in parentheses) are:

- **Module 1: Time use (n = 804).** — This module contains a set of questions on unpaid but economically productive activities — home maintenance, volunteer work, and informal help to others. Together with core questions on paid employment, these questions (adapted from Herzog, Kahn, Morgan, Jackson, & Antonucci, 1989) permit a balanced assessment of the productive contributions of older adults.

- **Modules 2 and 3: Alternative ADLs.** — The issue of comparability or equivalence of alternative functional health measures is an important one because of the widespread use of ADL measures in policy research. Module 2 (n = 845) contains the ADL questions which have been proposed for the new LSOA; Module 3 (n = 915) replicates the ADL function items on the NLTCs screen. Rodgers and Miller (Chapter 2 in this issue) use these data to evaluate the correspondence between the different ADL question formats. In the second wave, the same respondents from Wave 1 were asked to complete Module 2 again. This feature will enable analysts to correlate alternative ADL scores at a point in time and over time.

A subset (n = 251) of respondents assigned Module 3 were asked an innovative sequence designed to measure the concept of resilience, defined as the individual's ability to recover quickly and completely from any misfortune or challenge.

- **Module 4: Similarities (n = 810).** — The core AHEAD measures of cognitive functioning reflect basic orientation and processing skills and the ability to learn new information. These measures do not assess the dimension of abstract reasoning which is thought to decline less precipitously with age. Abstract reasoning also may serve as an important compensatory cognitive skill. The WAIS Similarities is a widely used measure of abstract reasoning and replicates the scale in the core HRS 1 interview (Wallace & Herzog, 1995).

- **Module 5: Quality of life (n = 858).** — In combination with other health measures, quality of life variables can be used to describe the psychosocial consequences of declining health. The conflict between quality of life concerns and medical care may be particularly common among the oldest old, whose comorbidities often necessitate invasive, painful, time-consuming, or expensive medical regimes. A focus on the essential quality of life issue — whether life is still worth living — underlies the questions in this module. The questions were adapted from unpublished work by Lawton (personal communication, 1993) and from the purpose-in-life subscale of Ryff’s (1989) Subjective Well-Being Scale. In addition to the quality of life items, a few questions on mastery and personal control from Pearlin and Schooler (1978) are included in the module.

- **Module 6: In-depth ADLs (n = 894).** — Research on cognitive, psychomotor, and psychological functioning indicates that there is considerable potential for adapting to and compensating for declining functioning among the elderly. Specific compensating mechanisms include a change in the ways an activity is performed, increasing the time allotted for completing the activity, lowering standards for the completion of an activity, and modifying the immediate environment to facilitate performance (Keller, Kovar, Jobe, & Branch, 1993). In order to explore whether such adaptive mechanisms account for a lack of reported difficulty with bathing despite obvious physical or cognitive impairments, Module 6 probes various detailed adaptive strategies for bathing. Because financial issues are a central concern in AHEAD, comparable questions on adaptation and performance of financial management activities appear at the end of Module 6. The same respondents repeated this module in Wave 2.

- **Module 7: Financial pressure (n = 920).** — There is considerable interest in the ways in which financial pressures structure the lives of the elderly. Module 7 asks respondents to indicate if they find it difficult to pay their bills or if they cut back on non-medical expenses, such as eating out or traveling. This module also asks about the perceived fairness of policy alternatives for making long-term care in nursing homes more accessible to older people.

Linkages With Administrative Data

An important feature of AHEAD is its linkage with administrative data systems which provide coverage of content areas (e.g., job history, earnings while employed, and medical billings) which respondents cannot reliably report.

Data from the Social Security Master Benefit file provide independent verification of the monthly reported Social Security benefit — the most important income source for the elderly. These administrative data also show type of benefit (retired worker, widow or widower), whether the benefit began initially as a disabled worker’s benefit, and information on spells of coverage by the Supplementary Security Income program. The Social Security Administration (SSA) also provides data from which analysts will be able to estimate lifetime earnings. Information about the earnings history of a respondent includes covered earnings for each year from 1951 to the present, the sum of covered earnings from 1937 to 1950, and the annual quarters of coverage from 1937 to the present. Because of privacy considerations, access to files containing these detailed data on So-
cial Security benefits and lifetime earnings linked to survey responses will be restricted.

With respondent permission, AHEAD survey data also are linked to the 100% MEDPAR Outpatient, Hospital, Home Health Agency, Hospice, and the Physician/Supplier Part B (including the enhanced 5% data) files. These data allow for continuous monitoring of charges to Medicare, use and dates of Medicare-certified facilities, diagnostic information, and important medical and surgical procedures. When possible, Medicaid-eligible respondent data also will be linked to their program records using the Medicaid Statistical Information System (MSIS). Sponsored by HCFA, this activity collects individual-level Medicaid reports from 25 states. While MSIS data are now available for only about half of all Medicaid recipients, these data are useful for identifying nursing home patients, locations, and attendant costs; validating diagnostic reports and out-of-pocket expenses; and determining in a sample the costs of specific medications, procedures, and services. It is anticipated that other states will join the MSIS over the next few years.

Respondent permission to link to his/her own Medicare and Medicaid records is requested as part of the interview; those who agreed were asked to supply their Medicare or Medicaid number. This number is accepted by HCFA as sufficient evidence of informed consent. For Social Security records, however, a signed consent form is required by SSA.

Summary. — The entire content of the AHEAD interview provides coverage not only of core domains, but also of supplemental areas (through experimental modules), and job and benefit histories and Medicare billings (through linkages with administrative records). The entire questionnaire for the first wave of AHEAD, including modification for proxy interviews and the experimental modules, may be downloaded from the AHEAD Home Page.

PRETESTING AND FIELD PROCEDURES

The first pretest of AHEAD was conducted in January 1993. Approximately 35 interviews were completed using paper-and-pencil questionnaires. A special pretest was conducted in March 1993 to test four different versions of questions that were being considered to measure the ADLs; 34 interviews were completed. The first pretest using computer-assisted interviewing (CAI) was conducted in May 1993, when 30 pretests were completed. A final pretest of the CAI instrument was conducted in August 1993, with 41 completed interviews.

The interviewers were trained for production interviewing during October 1993. A total of 137 Survey Research Center interviewers were trained for the study. These interviewers came to one of three training sessions, each lasting for a period of 5 days (or 7 days, for newly hired interviewers). During those sessions they were instructed on the use of laptop computers for the electronic recording of sample management information and for conducting CAI for telephone and personal interviews, as well as on the specific objectives and content of AHEAD. Actual interviewing began in October, following the training sessions and after each interviewer completed a test interview to the satisfaction of their supervisor.

As described below, the AHEAD sample was drawn from two independent sampling frames. The majority of the sample was obtained from the HRS screening. Sample selections from HRS were divided into two releases, each representative of the full target population, in order to maintain better control over total field costs. The second such release was turned over to the interviewers in January 1994. The list sample obtained from Medicare was released in February 1994. All interviewing was completed by July 1994.

SAMPLING PLAN

Areal samples of the U.S. household population typically involve some sort of multistage cluster design. Housing units are listed in small geographic areas within larger sampled areas or primary sampling unit (PSU). These household listings also can provide the screening information necessary to identify distinct subgroups within a population. Screening costs, however, usually prohibit using areal methods to sample rare subgroups in the population, such as those of interest to AHEAD. The study was fortunate to be able to “piggy-back” on the 1992 HRS screening of 69,377 housing units from a multistage area probability sample (Heeringa & Connor, 1995). About 11,965 AHEAD-eligible individuals were identified in a total of 9,474 households. For each, interviewers recorded the year of birth, current address (and that of any other residence), and the names, phone numbers, and addresses of two nonresidential persons who would know how to reach the individual. Because of reduced funding levels, the 93 PSUs selected for the HRS screening were decreased to 81 for drawing the AHEAD sample. The remaining 7,919 households constituted the AHEAD household sample. Almost all respondents born between 1914 and 1923 were recruited from this household screen, but only about half of respondents born in 1913 or earlier were obtained from this screen. In this older age group, a dual sampling frame was used.

Dual Sampling Frames

While areal probability samples such as that used in the HRS are common, there has been some concern that frail elderly, especially those who live with adult children, are underrepresented in household listings and resulting area probability samples. True list samples are thought to minimize this problem. List samples of persons aged 65+ can be drawn from administrative records referred to as the Enrollment Data Base (EDB), a subset of the Medicare Beneficiary Records file created by the SSA for the Health Care Financing Administration (HCFA). This file is available to government agencies for use as a sampling frame for sponsored studies of the elderly population. This list is the sampling frame used by the National Long Term Care Survey (Manton et al., 1995); the Medicare Current Beneficiary Survey (Apodaca, Judkins, Lo, & Skellan, 1992); and the Women’s Health and Aging Study (Guralnik, Fried, Simonick, Kasper, & Lafferty, 1995), an epidemiologic study of disabled women aged 65 and over in Baltimore, Maryland. Samples obtained from the HCFA-EDB files, however, may underrepresent older persons who worked in jobs not covered at that time by Social Security, had fewer than 10
quarters of employment in covered occupations, or who emigrated to the United States late in life.

To systematically evaluate the magnitude and direction of coverage bias in the two types of sampling frames, about half of AHEAD respondents born in 1913 or earlier were selected from the HCFA-EDB list. The dual frame was restricted to those aged 80 and over because phone contact information was not available from the HCFA-EDB list. As described above, the preferred mode in the oldest group was a face-to-face interview; those 70–79 were largely interviewed by telephone.

In AHEAD, the dual frame was accomplished by deleting those in the birth cohorts through 1913 in about half of the sampling segments from HRS and replacing an approximately equal number of selections (1,700) from the HCFA-EDB file. HCFA provided information about all Medicare enrollees in all 274 counties in which the HRS sample was drawn (a total of 4,373,198 records). The Sampling Section of the Survey Research Center (University of Michigan) implemented a three-stage probability sample of Medicare enrollees born in 1913 or earlier (Rodgers, 1996). Because there is no reliable way to identify persons living in nursing homes or other types of facilities from the list, 20.3% of individuals from the HCFA-EDB frame were deemed to be ineligible in the field compared to a loss of 13.0% of potential respondents who were sampled from the HRS frame (Rodgers, 1996).

In the final sample, the HRS screen contributed 1,724 respondents and the HCFA-EDB list, 1,496 respondents born in 1913 or earlier. Table 1 shows the unweighted counts by age from the two frames. Among eligibles, the response rate was 83.1% for those from the HRS frame and 74.9% for those from the HCFA-EDB list. This difference is significant and most likely reflects the shorter time interviewers had to work the HCFA-EDB sample (Rodgers, 1996). In spite of the difference in response rate, a comparison of the age distribution of the two independent samples of those born in 1913 or earlier corresponds closely to that obtained from the 1993 Current Population Survey for those aged 80 and over (Rodgers, 1996).

More importantly, there is no evidence that the areal frame from HRS underrepresents those with severe health problems. Differences between the two frames were significant in only 3 (general heart disease, fractured hip, and cataracts) of the 17 health conditions compared (Rodgers, 1996). Nonetheless, differences in the direction expected if household screens are more likely than Medicare list samples to miss those in the poorest health. Differences were not significant with respect to other comparisons, including contrasts of overall health, depression, cognitive ability, functional health, out-of-pocket health care expenditures, or the proportion foreign-born. Of the 80 comparisons made by Rodgers (1996), only 9 were significant at the 5% level, some of which are undoubtedly due to chance alone. If there truly are substantial differences between the two populations, we would expect many more of the comparisons to be statistically significant. It also appears that estimates from the HCFA-EDB list sample are not biased by the slight underrepresentation of relatively recent immigrants or others not eligible to receive Social Security benefits.

### Table 1. Response Rates per 100 Selections Aged 80 and Over, by Sampling Frame and Age; AHEAD 1 (1993)

<table>
<thead>
<tr>
<th>Response Rate per 100</th>
<th>Unweighted Total</th>
<th>HRS Screen</th>
<th>HCFA-EDB List</th>
</tr>
</thead>
<tbody>
<tr>
<td>80–84</td>
<td>82.4</td>
<td>1070</td>
<td>74.6</td>
</tr>
<tr>
<td>85–89</td>
<td>82.1</td>
<td>470</td>
<td>77.1</td>
</tr>
<tr>
<td>90+</td>
<td>90.2</td>
<td>184</td>
<td>71.8</td>
</tr>
<tr>
<td>Total (80+)</td>
<td>83.1</td>
<td>1724</td>
<td>74.9</td>
</tr>
</tbody>
</table>

Treatment of Households Eligible for Both AHEAD and HRS

A number of households contained persons eligible for both HRS (i.e., one or more members were born between 1931 and 1941) and AHEAD samples (i.e., one or more members born in 1923 or before). In most of these cases, the AHEAD-eligible individual was a parent or parent-in-law of the HRS respondent, and an interview was attempted with the AHEAD-eligible resident. But, approximately 200 households included an AHEAD-eligible person who had already been interviewed as the spouse — almost always the husband — of the HRS respondent. After consideration of alternatives and consultation with the Steering and Monitoring committees, 60% of couples eligible for both studies were randomly assigned to HRS, and the remainder were assigned to AHEAD. While this means that some cases were lost to each study, random allocation of this unique subgroup can be compensated for by using the individual and household sampling weights described below.

### Oversamples.

Minority elderly follow different pathways through old age. Such differences may be cultural or reflect socioeconomic variation. Distinguishing among competing hypotheses to account for observed racial and ethnic differences requires adequately sized prospective panels of minority elderly. In addition to its core multistage, area probability sample, AHEAD also inherited from HRS oversamples of Blacks, Hispanics, and residents of the State of Florida (the Florida oversample was mandated by language in the Congressional appropriations for HRS and carried over to AHEAD). As part of the original HRS sample, a second-stage supplement was formed from Census tracts in which more than 10% of the households had a Black head. All households containing eligible respondents, regardless of race, entered the final sample from these Black oversample areas. The Hispanic oversamples were concentrated in areas with relatively large densities of Mexican American Hispanics. In these areas, respondents were qualified for the study based on year of birth and Hispanic ancestry.

The number of AHEAD respondents who are Hispanic, Black, or resident of the State of Florida (excluding younger spouses of respondents aged 70 and over) are shown in the first column of Table 2. These observed counts can be compared with those in the second column,
Table 2. Observed and Expected Number of Black, Hispanic, and Florida Respondents; AHEAD 1 (1993)

<table>
<thead>
<tr>
<th>Oversample Groups</th>
<th>Number of Respondents</th>
<th>Effective Overrepresentation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observed</td>
<td>Expected</td>
</tr>
<tr>
<td>Blacks</td>
<td>1027</td>
<td>569.8</td>
</tr>
<tr>
<td>Hispanics</td>
<td>418</td>
<td>292.3</td>
</tr>
<tr>
<td>Residents of Florida</td>
<td>973</td>
<td>578.1</td>
</tr>
<tr>
<td>Total</td>
<td>7447</td>
<td>7447</td>
</tr>
</tbody>
</table>

which show the expected number in each group for a fixed sample size of 7,447. These expected counts mirror the distribution of the U.S. population aged 70 and over by race, ethnicity, and state of residence at the time of data collection (p. 33, no. 35 in U.S. Bureau of the Census, 1993b; p. 20, no. 20 in U.S. Bureau of the Census, 1994a; p. 32, no. 33 in U.S. Bureau of the Census, 1994b; p. 22, no. 22 in U.S. Bureau of the Census, 1995). The observed counts are consistently higher than those which would have occurred if AHEAD had randomly sampled the noninstitutionalized population aged 70 and over. These higher-than-expected counts are attributable not only to the oversampling which was built into the design of the HRS and AHEAD screening, but also to differences in the response rates for the three groups and the sample as a whole. In combination, these factors produced interviews with 1.8 times as many Blacks as would have been obtained from the same sized simple random sample; 1.4 times as many Hispanics; and 1.7 times as many residents of Florida.

Weights
Weights were developed to adjust for differential probabilities of selection (including oversampling) and observation. These are described more fully in Heeringa (1995). One weight variable (either WTRPOP or WTRNORM in the public releases of the data) should be used for analyses at the level of the individual respondents and another (either WTHHPOP or WTHHNORM) should be used for analyses at the household level (i.e., married couples along with unmarried individuals). Each of these weights is the product of three components. The first of these takes account of the sample selection probabilities for each individual or household by adjusting for the oversampling of select subgroups; the subselection of households eligible for both HRS and AHEAD; and, at the respondent level, for selection of one individual in those sampled households with multiple but unmarried residents born in 1923 or earlier. The second component of the weight variables adjusts for nonresponse; it was created by dividing the sample into cells defined by geography (Census Division, and whether or not in a Metropolitan Statistical Area), age group, and racial composition of the neighborhood. The nonresponse weight component within a given cell is the inverse of its response rate. The third and final component of the weight variables is a post-stratification adjustment factor, designed to bring the weighted distribution of a few key variables into line with population totals as determined from external data. For the household-level weights, the post-stratification factor adjusted the sample to the 1990 Census totals for married and single households with persons aged 70 and older. The post-stratification component for the individual-level weights adjusted the respondent distribution to match 1990 Census data across 16 cells defined by Census region, gender, and age group (70–79 vs 80 and older).

In addition to the differences in probability of observation, the sample design for AHEAD resembles almost every other national survey in that it is multistage and involves both stratification and clustering. This feature has important consequences for the estimation of sampling variances, confidence intervals, and tests of statistical significance. Standard statistical packages estimate the sampling variances of descriptive statistics (such as means, proportions, and coefficients for regression models) assuming simple random sampling. These packages yield potentially misleading estimates for data, such as those from AHEAD, which were obtained with a multistage design. Variables, included in the public releases of AHEAD, can be used to adjust for features of complex sample designs in the estimation of sampling variances. These variables are named AH_SESTR (which defines sample error computation strata) and AH_SECU (which defines sampling error computation units; there are two such units within each of 53 strata).

Data Quality
The quality of survey data can be evaluated in numerous ways. In this section, we discuss just three general indicators of data quality: response rates, comparison of the AHEAD sample with independent estimates from the U.S. Bureau of the Census, and the substitution of proxy interviews for self-reports.

Response rates. — The HRS “core” area probability sample, the oversamples of Blacks, Hispanics, and residents of Florida, and the HCFA-EDB list frame contributed a total of 10,297 sample selections in 7,509 households. Sample selections are persons eligible to participate in AHEAD by virtue of their year of birth (1923 or earlier) or marital status (i.e., born after 1923 if the spouse was born in 1923 or earlier). Counts of sample selections define the unweighted denominators in response rate calculations.

Table 3 shows the weighted and unweighted age distribution of these sample selections. Those of unknown age are nonrespondents for whom date of birth was not ascertained before the interview terminated. Sample selections of known age less than age 70 are the younger spouses (primarily wives) of married persons born in 1923 or earlier. There are only minor differences between the weighted and unweighted age distributions, primarily after age 80. At these advanced ages the effects of the post-stratification adjustments described above are most pronounced.

The age-specific unweighted response rates for these selections by source of the sampling frame are shown in Table 4. Responses are generally high (80.0% overall) but decline somewhat with age. There is minor variation in the overall response rates between the core sample (80.8%) and the oversamples (80.1%, 80.7%, and 76.6% for Black, Hispanic, and Florida oversamples, respectively). In all age
groups except those 80–84, response rates are lowest in the Florida oversample.

Table 5 shows the unweighted counts of respondents by age and gender. It also shows the weighted distribution of those born in 1923 and before. The unweighted distributions can be used by analysts as control counts. The excluded cases were sampled conditionally on their marital status and are not a representative sample of any other age group (e.g., 65–69). As expected, the number of weighted interviews with female respondents exceeds those with males by about 64%. While the majority of interviews were completed with respondents under age 80, there are 1,004 interviews with sample selections aged 85 and over that will support analyses of the oldest-old of considerable complexity. Nearly 10% of all male respondents and 15% of all female respondents were aged 85 and over.

**Comparability of estimates.** — In isolation, it is difficult to gauge the overall representativeness of the AHEAD sample. Table 6 compares the population-weighted estimates from AHEAD with comparable age and gender-specific estimates from the Public Use Microdata Sample (PUMS) of the 1990 Census. Other things being equal, we would expect to see ratios of 1993 AHEAD estimates to 1990 PUMS estimates to center on about 1.0. This is generally the case, except for females aged 80 and over. In this group, the AHEAD population estimate is 86.4% of the corresponding 1990 Census-based estimate. This discrepancy is due in part to the inclusion of institutionalized persons in the Census estimate. Rates of institutionalization increase with age (from 1.4% at ages 65–74 to 24% at ages 85 and over) and are highest for very old women. In 1990, 70% of nursing home residents aged 75 and over were women (U.S. Bureau of the Census, 1996). Nonetheless, the possibility remains that women aged 80 and over are underrepresented in AHEAD. Research on the coverage properties of the AHEAD dual-frame sample design continues (Rodgers, 1996).

**Proxy interviews.** — In surveys of the elderly, proxy interviews are a widespread and effective way to reduce item overall nonresponse (Rodgers & Herzog, 1992). As shown in Table 7, overall proxy interviews were substituted for...
The rate of proxy response in AHEAD is roughly comparable to that of the 1984 LSOA (8.5%), which also sampled only household respondents, but at ages 55 and over.

Overall, proxy respondents completed interviews for proportionally more older men than women (13.2% vs 8.7%), although after age 85, proxy interviews are more common for women. If a proxy interview was completed for a male respondent, the spouse was the most likely proxy. At ages 75 and over, men unable or unwilling to complete their own interviews are at least four times more likely to have been proxied by their wives than women who had proxy respondents. Because of gender differences in mortality and the cultural norm of women marrying slightly older men, married men are far more likely to rely on wives as their health declines; older women are generally widowed by the age at which they would be likely to decline a self-interview.

Other things being equal, a spouse is presumed to know more about a respondent than other possible substitutes. This is particularly true in AHEAD, where interviews are attempted with both spouses. Asking a healthy spouse to provide a brief profile of respondents' health at baseline. Differences in age structures confound gender-specific comparisons of disease and disability prevalence in cross-section. To offset this, both simple and adjusted prevalence estimates are shown for males in columns 1 and 2, respectively. The adjusted estimates are standardized to the observed age distribution of female respondents and can be interpreted as the prevalence that would obtain if males had the same 5-year age structure as women. For those diseases or conditions more common among older women then men, comparing the adjusted male estimate with that for women generally narrows the gender gap in prevalence. This is the case, for example, for the subjective measures of overall health, reports of hygienic health behaviors, and sensory

Table 6. Estimates of the Population by Age and Gender; 1993 AHEAD 1st and 1990 Census Public Use Microdata Sample (PUMS)*

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>1990 Census PUMS</th>
<th>1993 AHEAD</th>
<th>1993 AHEAD to 1990 PUMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-79</td>
<td>5,803,660</td>
<td>5,899,410</td>
<td>1.0165</td>
</tr>
<tr>
<td>80+</td>
<td>2,162,280</td>
<td>2,174,375</td>
<td>1.0056</td>
</tr>
</tbody>
</table>

*Household population only.

Table 7. Overall Rate of Proxy Interviews and Spouse Proxy Interviews, by Age and Gender; AHEAD 1 (1993) (weighted sample size in parentheses)

<table>
<thead>
<tr>
<th>Age</th>
<th>Rate of Proxy Interview</th>
<th>Rate of Spouse Proxy</th>
<th>Rate of Proxy Interview</th>
<th>Rate of Spouse Proxy</th>
<th>Rate of Proxy Interview</th>
<th>Rate of Spouse Proxy</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-74</td>
<td>12.1</td>
<td>81.1</td>
<td>4.9</td>
<td>52.2</td>
<td>7.9</td>
<td>70.7</td>
</tr>
<tr>
<td>75-79</td>
<td>12.9</td>
<td>82.5</td>
<td>5.5</td>
<td>18.9</td>
<td>8.4</td>
<td>57.8</td>
</tr>
<tr>
<td>80-84</td>
<td>14.4</td>
<td>66.6</td>
<td>10.1</td>
<td>13.1</td>
<td>11.6</td>
<td>35.6</td>
</tr>
<tr>
<td>85-89</td>
<td>14.4</td>
<td>28.9</td>
<td>16.3</td>
<td>6.8</td>
<td>15.7</td>
<td>13.2</td>
</tr>
<tr>
<td>90+</td>
<td>26.2</td>
<td>30.6</td>
<td>34.2</td>
<td>0.7</td>
<td>32.5</td>
<td>5.8</td>
</tr>
<tr>
<td>Total</td>
<td>13.2</td>
<td>72.4</td>
<td>8.7</td>
<td>18.6</td>
<td>10.4</td>
<td>44.4</td>
</tr>
</tbody>
</table>

*Proportion of proxy interviews from a spouse * 100.
impairment. The male-female gap widens somewhat when the adjusted rates are used to compare conditions typically selective of men, including stroke and diseases of the lung.

The health profile that emerges from the AHEAD baseline is consistent with cross-sectional data from comparable but larger national surveys, including the National Health Interview Survey (National Center for Health Statistics, 1995). Chronic disease is common, and most respondents report having at least one of the seven major conditions included in the AHEAD health battery. Heart disease is the leading cause of death in the AHEAD age range and is the second most often reported condition (after hypertension) for both male and female respondents. In late life, problems with chronic pain and sensory impairment are widespread as well.

Family status. — The family resources of the elderly, and the frail elderly in particular, are not fully circumscribed by others living in the same household. Nonetheless, coresidency, especially with a spouse, indicates the potential for care and assistance that is not duplicated by elderly living alone or with others. As shown in Table 9, nearly three quarters of male AHEAD respondents, but only about one third of women, are married and living with their spouse. Nearly half of female respondents are widowed and most of these live alone. Across the entire AHEAD age range, only about 4.3% of men and 12.4% of women live with their children, although other analyses (not shown) indicate that the proportion living with children increases with age, as multigenerational arrangements substitute for nursing home admissions. AHEAD-based distributions of marital status and living arrangements correspond closely to published estimates from the 1993 Current Population Survey (CPS; U.S. Bureau of the Census, 1996).

Financial status. — Data on average income for AHEAD households are shown in Table 10. The average annual income for an AHEAD household headed by an individual aged 70 and over was $23,790 in 1992-93. The average income from Social Security ($9,743) is about two fifths of this average total. Average annual income from assets was $5,148, or about one fifth of the total average income. Far less important are earnings and other sources, including payments from SSI and financial help from children.

Far more instructive for understanding income sources for the elderly is the distribution of households by relative...
importance of income from various sources. These distributions are shown in Table 11. Very few households (only 3%) do not receive any of their annual income from Social Security benefits. At least half of AHEAD households, however, receive no income from private pensions or annuities, assets, earnings, or other sources.

Social Security benefits are by far the primary source of income for AHEAD households: 52% of these households receive 60% or more of their annual income from these benefits. Private pensions and annuities are far less important: only about half receive any income from this source, and just 5% of AHEAD households receive 60% or more of their income from this source. Although assets make up about 22% of average annual income, the distribution of asset holdings is very skewed. Most households draw no income from assets (48%), and about 29% derive from 1 to 19% of their incomes from this source. No AHEAD respondents rely exclusively on private pensions, assets, or earnings.

Comparisons of these estimates with published CPS data are inexact because these data are available only for the broad age groups "65 to 74" and "75 and over" (Grad, 1994). For most comparisons, the AHEAD estimates fall as one would expect between the two age-specific estimates. The sole exception is income from assets. While the fraction of households that derive less than 20% of their income from assets is about the same in AHEAD as in the CPS, the relative allocation of households that report no income from assets and those with 1 to 19% of their incomes from assets differs between the two surveys: AHEAD has more households with none and fewer with 1 to 19%. These differences most probably arise from differences in the sequence of questions between the CPS and AHEAD. In AHEAD, respondents were asked to first list their sources of income; in the CPS, respondents were asked if they received any income from specific sources. It appears that AHEAD respondents omit small sources of income such as interest from modest checking or savings accounts, but the CPS format prompts respondents to mention even small amounts of interest income. The income format used in AHEAD 2 (i.e., the 1995 wave) is comparable to that used in the CPS as well as that used throughout HRS.

Another indication of the financial status of AHEAD households is the receipt of means-tested benefits. The proportion of households receiving food stamps, Supplementary Income (SSI), Medicaid, and low-income housing benefits is shown by age in Table 12. Medicaid is by far the most common income-tested benefit; about 10% of all AHEAD households contain a Medicaid-eligible person. Those over age 80 are more likely than those aged 70–79 to receive income-tested benefits, but never in excess of 13%.

In combination, new data on financial resources (measured in terms of income) indicate that true poverty and high incomes are concentrated in relatively few AHEAD respondents. Smith's (1997) analysis of wealth shows a similar skew.

**Linkages.** — An important part of the design of AHEAD is the linking of AHEAD data to Medicare, Medicaid, and Social Security records. All of these links require the permission of the respondent and the respondent’s benefit access number.

Table 13 shows the rate of Medicare and Medicaid coverage by age and the rate of permission (i.e., rate of obtaining Medicare and Medicaid numbers) given program coverage. The Medicare coverage rates are certainly reasonable among those 70 or over. The vast majority of AHEAD respondents (97.2%) are eligible for Part A of Medicare; approximately 91.1% also are eligible for Part B. Permission to link survey responses to Medicare records was obtained for about 80% of respondents.
Table 13. Weighted Percent of Medicare and Medicaid Coverage and Percent Giving Permission to Link to Administrative Records, by Age and Gender: AHEAD 1 (1993) (weighted percent)

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>Medicare Covered</th>
<th>% Giving Permission to Link*</th>
<th>Medicaid Covered</th>
<th>% Giving Permission to Link*</th>
<th>Total Unweighted Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>70–74</td>
<td>96.6</td>
<td>83.1</td>
<td>7.4</td>
<td>77.0</td>
<td>2818</td>
</tr>
<tr>
<td>75–79</td>
<td>97.5</td>
<td>83.4</td>
<td>8.7</td>
<td>73.6</td>
<td>2081</td>
</tr>
<tr>
<td>80–84</td>
<td>97.8</td>
<td>84.5</td>
<td>11.2</td>
<td>71.9</td>
<td>1544</td>
</tr>
<tr>
<td>85–89</td>
<td>97.6</td>
<td>80.3</td>
<td>13.1</td>
<td>68.5</td>
<td>712</td>
</tr>
<tr>
<td>90+</td>
<td>97.4</td>
<td>77.0</td>
<td>15.0</td>
<td>58.4</td>
<td>292</td>
</tr>
<tr>
<td>Total</td>
<td>97.2</td>
<td>83.0</td>
<td>9.3</td>
<td>72.7</td>
<td>7447</td>
</tr>
</tbody>
</table>

*Of those eligible for Medicare.
*Of those eligible for Medicaid.

The rate of Medicaid coverage recorded in AHEAD increases with age, corresponding to the decline in economic status with age. Adjusted for the difference in the ages of the populations, the actual AHEAD measure falls between the SIPP and CPS measures. The Medicaid permission rate is considerably lower than the Medicare permission rate, possibly reflecting cognitive impairments or proxy interviews that are associated with lower economic status.

Written permission to link a respondent’s survey data to their Social Security files was obtained in about 65% of the cases. This compares with a permission rate of 71% obtained in HRS1. All interviews in the first wave of HRS were done face-to-face, thereby alleviating the problem of mailing permission forms out to respondents interviewed by phone and having the signed forms returned by mail. A substantial number of AHEAD respondents or their children called the project’s 800 number, which was given to respondents if they had questions or concerns about the study. It is clear that many older persons, or their younger kin, are concerned about possible misuse of Social Security numbers. Another attempt will be made in Wave 2 to secure SSA linkage permission from those unwilling to provide written consent in 1993.

FUTURE PLANS FOR AHEAD

In addition to the baseline, funds were awarded to support Wave 2 of AHEAD in 1995 and a combined HRS/AHEAD in 1998. The 1998 HRS/AHEAD field work will encompass Wave 4 of HRS and Wave 3 of AHEAD. An attempt will be made to reinterview all surviving respondents at each wave. Respondents born after 1923 (i.e., younger spouses of married AHEAD-eligible respondents) will be followed until the wave after which they have remarried. New spouses will be added. The design includes proxy interviews for panel members unable to self-respond and a final proxy interview at the wave following the panel member’s death. As panel members enter long-term care institutions, we will attempt a self-report interview but will conduct a proxy interview if frailty, cognitive impairment, or the institution’s protective practices preclude a self-response. Data will be collected on the care received by the panel member in an institution; also, data-gathering on the characteristics and types of care utilization will continue for respondents who provided permission to link to their Medicare and Medicaid records. Data from these administrative files also will be used to validate self-reports of chronic conditions.

Using the National Death Index or state of death information from the next of kin, a copy of a deceased respondent’s death certificate will be obtained (National Center for Health Statistics, 1990). All causes of death and clinical information on the death record, including underlying cause, will be coded by a single nosologist using ICD-10 procedures. Data will be coded directly onto an electronic file for analytic use.

Mode effects. — Most respondents under age 80 at the time of the baseline interview will eventually be switched from a telephone interview to a personal interview. The AHEAD design produces a confounding of mode and age, and some age effects may arise because of differences in measurement error properties between the face-to-face and telephone modes. The issue is whether this mode switch will introduce age-related changes in health or economic status as respondents aged 78–79 make the transition from telephone to face-to-face interviews.

To explore experimentally whether and how a switch from telephone to face-to-face mode affects responses, the switch from telephone to face-to-face modes was randomly delayed for some respondents in Wave 2 and accelerated for others. Only the birth cohorts of 1914–17 were affected by this mode experiment. In the absence of this experiment, the design called for switching the cohorts of 1914 and 1915 from telephone as the preferred mode at Wave 1 to face-to-face as the preferred mode at Wave 2 (when they will be 80 or 81). Similarly, those in the cohorts of 1916 and 1917 would have been switched at Wave 3. The experiment randomly assigned half of each of these cohorts at Wave 2 to the face-to-face mode, and the other half to telephone. Comparison across modes but within cohorts should reveal mode effects. Users of the data will be able to identify the assignment of respondents in the affected cohorts.

Wave 2. — The field work for Wave 2 concluded in July 1996. Preliminary estimates are that interviews were obtained with 7,694 of the 8,222 Wave 1 respondents or their proxies, for a re-interview rate of 93.6%. The retention rate...
was constant across age groups and for men and women alike, but was slightly lower for Hispanics (91.1%) than for non-Hispanics (93.7%), and lower for African Americans (91.4%) and those of other races (91.2%) than for Whites (94.0%). The probability of a Wave 2 interview was somewhat lower if the baseline interview was with a proxy (91.4%) rather than with the respondent (93.8%). There were very few differences in retention rates between those sampled through the HRS screen (93.6%) and the HCFA-EDB list (93.3%).

By Wave 2, 858 (10.4%) of the Wave 1 respondents had died, and final proxy interviews were obtained for 742 (86.5%) of them. Mortality between waves increased sharply with age (from 6.7% for those born between 1919 and 1923 to 31.5% of those born before 1904); was higher for men (12.7%) than for women (9.1%); and higher if the Wave 1 interview was with a proxy rather than with the sampled individual (26.1% vs 8.7%). Respondents who at baseline rated their health as “poor” had substantially higher mortality than those who rated their health as “good” to “excellent” (27.3% vs 6.4%) in 1993.

At Wave 2, interviews were sought not only with Wave 1 respondents but also with another 188 individuals, including 106 married persons who refused at Wave 1, another 53 married individuals who were not asked to participate at Wave 1 because they were in nursing homes or other institutions, but whose spouses (or partners) had been respondents; and 32 new spouses or partners of Wave 1 respondents. Of these 188 additional persons, 38, or 20%, had died by Wave 2; proxy interviews were obtained for 33 (87%) of these individuals. Interviews were obtained with 109 of the survivors (73% of those alive at Wave 2).

Aging-in of new cohorts. — Even in a relatively short period of time, the social, economic, and policy environments of the elderly can change dramatically. By continually refreshing AHEAD (and HRS) with new cohorts, it is possible to track individual-level changes that emerge either as a function of cohort differences or macro-economic events that have behavioral consequences.

In 1998, AHEAD will age-in respondents from the birth cohorts of 1924 to 1930, thereby closing the gap between the HRS cohorts of 1931–1941 and the AHEAD cohorts of 1923 or earlier. HRS will add sampled members from the pre-baby boom cohorts of 1942 to 1947 in 1998. At present, plans call for adding approximately 1,800 new respondents to AHEAD and about 3,700 to HRS. The refreshment sample for the cohorts of 1924 to 1930 will be drawn from currently age-ineligible AHEAD and HRS spouses and the HCFA-EDB list frame described above. The addition of new cohorts to both HRS and AHEAD will not only increase the statistical power of the two studies as original respondents die or decline to participate in later waves, but also creates what is, in effect, an ongoing steady-state sample for the U.S. household population over age 50. The addition of new cohorts should provide researchers with the data necessary to examine individual-level effects of macro-economic shifts, including changes in Social Security or Medicare policies and cohort differences, per se.

Merging AHEAD and HRS content. — A key feature of merging the AHEAD and HRS samples is smoothing existing differences in content. A major step in this direction was undertaken in conjunction with the second wave of AHEAD (1995) and the third wave of HRS (1996). Because members of the original HRS panel will now age into AHEAD as respondents turn 70, seamless measurement will enhance the long-run analytic value of both studies. As noted above, many of the content areas in AHEAD adapted measures from HRS. Where changes were made, they were justified in terms of the higher average disability of the older age groups. In order to avoid sudden shifts in content, AHEAD and HRS have adopted a common instrument for computer-assisted interviewing. Changes in the AHEAD instrument were largely to amplify content in a given area. In places where new content replaced items asked in AHEAD 1, the older measures are included in AHEAD 2 as experimental modules. This feature will allow analysts to calibrate the effects of question changes between the first two waves.

Major revisions were made in the health content. For each condition reported by the respondent, AHEAD 2 asked a series of follow-up questions to index severity. If diabetes was mentioned, for example, respondents were asked to report (a) if they use oral medication or insulin or follow a special diet to manage their disease; (b) if their diabetes had caused problems with their kidneys or protein in their urine; and (c) if they had been directed to lose weight. If the condition was reported in the baseline interview, the information was preloaded and disease-specific questions were modified. Respondents who previously reported a condition were asked to assess if their disease was now better managed or was now considered under control. For repeat mentions of cancer, a follow-up question asked if the new occurrence was a metastasis of the disease reported previously. AHEAD 2 also included checklists to ascertain symptoms and preventive health behaviors. Several new subscales also were added to the battery of cognitive performance tests, and AHEAD 2 augmented the CES-D index of depressive symptoms with a scale of clinical depression.

The functional health sequence also was modified in the second wave of the AHEAD survey. Respondents were asked the detailed ADL and IADL questions only if they reported one or more general activity restrictions. Most of those in the HRS age range skip around the detailed ADL/IADL questions because they report no problems managing a block, picking up a dime, climbing stairs, etc. Many AHEAD respondents qualified for the detailed ADL items based on the activity screens. In AHEAD 2, the functional health items were asked in a way more comparable to their use in other studies. Namely, all respondents first were asked if they have difficulty doing an activity, and then if they receive help or use equipment to do the activity. All helpers, rather than only the most intensive helpers, were identified and their hours per week were reported with a true metric scale.

AHEAD 2 adopted the income and asset approach used in HRS. Although the merged AHEAD-HRS content avoided using age screens wherever possible, detailed employment questions were forgone after age 75. Both studies...
now use a common health insurance section with the exception that Medicare questions are not asked of respondents younger than age 65. New items have been added on residential history, ownership of a second home, proximity to children from that home, transfers, and widowhood. The average length of an interview with an unmarried respondent increased by about 5 minutes.

Release of data. — A true public release file for AHEAD 1 is expected to be available by Summer 1997. A preliminary file from AHEAD 2 will be available about the same time. Access to files linking the survey data to administrative records will be restricted in order to protect respondent privacy and confidentiality. Users wishing to obtain access to such files will be asked to submit detailed security plans. Information on this and other topics is available from the AHEAD Home Page.

Conclusions

AHEAD is a major new data set available to the gerontology research community (Post, 1996). AHEAD has several unique features which enhance its usefulness for a wide range of life-cycle studies. Unlike other currently available panel data sets, AHEAD provides observations on both the husband and wife within a couple; surviving spouses will continue in the study regardless of their initial age. Because AHEAD provides linked observations on adult children and stepchildren as well, the economic, social, and psychological effects of late-life health transitions can be described in terms of ripple across the generations of the family over time. The richness of these data will be further augmented by the merger of data from next-of-kin interviews which describe family caregiving in the often intense period of need preceding death. Information on the disposition of a respondent’s estate will similarly provide materials to test bequest motive hypotheses for economists and reciprocity hypotheses for sociologists. Analyses of the financial and care implications of late-life illness also will draw on merged data from the Medicare billings files and death certificates.

AHEAD continues the tradition of innovation established in HRS. The baseline of both surveys includes measures of cognitive performance; these are expanded on in subsequent waves. Because all of these cognitive measures, described by Herzog and Wallace (1997), have demonstrated psychometric properties, cognitive psychologists have unprecedented opportunities to describe the natural history of cognitive change in a large, diverse, community-based population. Other researchers will likely explore the relationship of change in cognitive states to other aspects of health, service use, and economic well-being.

Of particular importance for understanding the changing demographic composition and geographic distribution of the elderly are substantial oversamples of Blacks, Hispanics, and residents of Florida. Analysts will have opportunities to test contextual hypotheses as well as to describe the trajectory of late-life changes in health, family supports, and economic status for minority subgroups alternatively defined by race, nativity, language fluency, religious affiliation, or ethnic identity.

Finally, AHEAD, like HRS, makes use of experimental modules to evaluate material considered to be innovative and analytically interesting. Data from both surveys are made available to the research community within months of their collection, albeit in less than perfect form. AHEAD is pioneering the use of the World Wide Web as a distributional system for data, documentation, communication among users, and an ongoing bibliography. The staff of AHEAD invite comments from users through their Home Page (http://www.umich.edu/~hrswww/index.html) or Internet address (aheadask@isr.umich.edu).

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References


Appendix

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