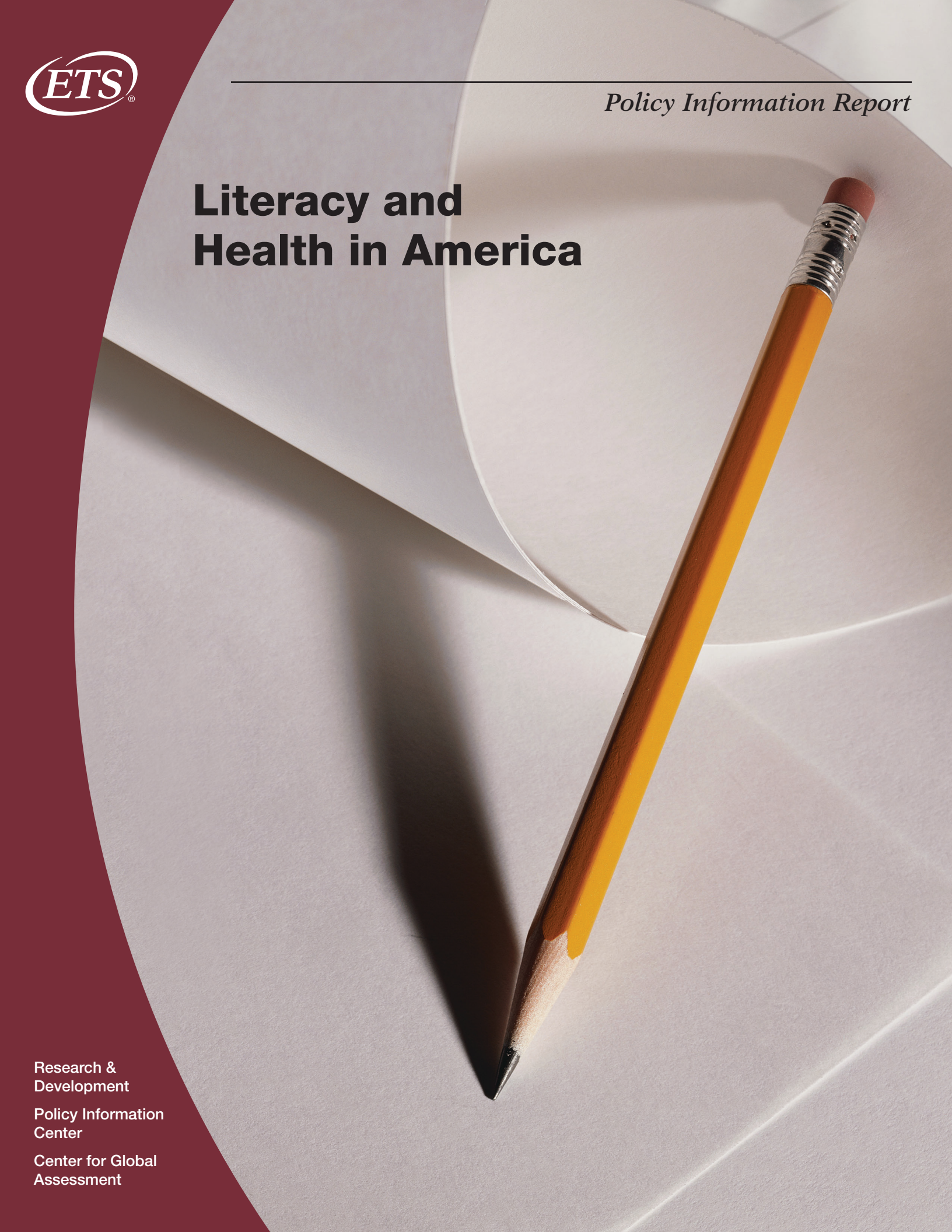
Policy Information Report

Literacy and Health in America



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April 2004

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Many billions of dollars are spent every year in the name of health. Despite all our advances, several societal features remain constant. First, access to good health is very unevenly distributed in this country. The poor, people of color, those who have limited English language skills, and those who live in rural areas are much less likely to receive basic preventive medical care when young, or receive appropriate therapeutic care when older. Second, those who work in the public health arena have long known the strong association between years of schooling and health outcomes that include mortality and morbidity. According to the research, those with fewer years of schooling are more likely to die from a chronic disease or injury and have higher rates of suicide, homicide, cigarette smoking, and heavy alcohol use than those with higher levels of education. Individuals regularly make (and do not make) decisions that affect their health, and the health of their families, with varying levels of information and corresponding effectiveness.

It is against this backdrop that Rima Rudd, Irwin Kirsch, and Kentaro Yamamoto undertook this study of the literacy of adults that is directly relevant to understanding and navigating issues related to health. Why produce a report that focuses on literacy and health? Because of studies such as the National Adult Literacy Survey (NALS), many are coming to understand that literacy is likely to be one of the major pathways linking health and education and may be a contributing factor to the wide disparities that have been observed in the quality of health care that many receive. The distributions of health-related literacy skills reported here show marked differences among adults based on their years of schooling, their age, their racial/ethnic status, and their country of birth. These health-related skills are also shown in this report to be associated with health status, access to sources of wealth, as well as engagement in reading activities and civic behavior.

Literacy and Health in America is the third in a series based on the vast amount of background and assessment information that has been collected from the NALS and other large-scale literacy surveys conducted by ETS. The first report, *The Twin Challenges of Mediocrity and Inequality: Literacy in the U.S. from an International Perspective*, compares the literacy performance of U.S. adults with the literacy performance of adults in other high-income countries. The report underscores the fact that our overall performance is mediocre at best and that as a nation we are among the world's leaders in the degree of inequality between our best and poorest performers. The second report, *A Human Capital Concern: The Literacy Proficiency of U.S. Immigrants*, helps us to understand these performance patterns in greater depth by focusing on the literacy proficiencies of the nation's immigrant population. It compares the distribution of immigrants' skills with that of native-born adults and their foreign-born counterparts in other countries.[1]

In this monograph, the authors focus on issues surrounding literacy and health. They use tasks from these same large-scale literacy assessments that were judged to involve health-related materials about such topics as drugs and alcohol, disease prevention and treatment, safety and accident prevention, first aid, emergencies, and staying healthy. The authors identified 191 tasks and then used them to create a Health Activities Literacy Scale (HALS) that was then linked back to the NALS database.

Literacy and Health in America makes a number of important contributions to the emerging field of health literacy:

- First, the report introduces the reader to the framework for organizing health activities that was used to identify and classify the tasks included in this study. This framework is useful in understanding the broad range of activities that are associated with public health and may help future health researchers broaden their scope of inquiry beyond the confines of the medical office or hospital setting.
- Second, this report emphasizes the importance of the interaction between the complexity of the material and what individuals are expected to do with that material. In demonstrating the importance of

[1] See: Andrew Sum, Irwin Kirsch, and Robert Taggart, *The Twin Challenges of Mediocrity and Inequality: Literacy in the U.S. from an International Perspective*, Policy Information Center, Center for Global Assessment, Educational Testing Service, 2002; Andrew Sum, Irwin Kirsch, and Kentaro Yamamoto, *A Human Capital Concern: The Literacy Proficiency of U.S. Immigrants,* Policy Information Center, Center for Global Assessment, Educational Testing Service, March 2004. Both reports are available from www.ets.org/research/pic.

understanding the tasks adults need to perform in activities related to health, this report underscores the limitations of focusing only on the structure and complexity of written or printed texts.

- Third, this monograph characterizes, for the first time, the health-related literacy skills of adults in the United States, including at-risk or vulnerable subpopulations, and shows the disparities that exist within our population.

As troubling as the data reported here may be, perhaps the greater issue concerns the future. As shown in surveys such as the National Assessment of Educational Progress (NAEP), the achievement gap among our school-aged population suggests strongly that gaps in health literacy will continue, absent direct intervention, with resultant impact on the health and economy of the United States. Collectively, this report and the monograph series of which it is a part contribute to our growing understanding of the consequences of the achievement gap we see in our school-aged population. The disparities we see in our youth translate into whether they will graduate from high school, if and where they will attend college, which subjects they are likely to study, their entry into and success in the labor market and, as this report indicates, their health status. As a nation, we must begin to use these and other data to understand better the challenges that face us as a nation and begin to take appropriate action.

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Acknowledgments

The authors appreciate the thoughtful reviews with detailed feedback and suggestions on the report made by Cynthia Baur of the U.S. Department of Health and Human Services, Alan Noonan of the Surgeon General's Office, Debra Roter of the John Hopkins School of Public Health, and both Richard Coley and Julie Eastland of ETS. Thanks are also owed to John Comings of the National Center for the Study of Adult Learning and Literacy and Monica Lathan of the American Public Health Association for their formative reviews and insights, Emily Zobel and Tayla Colton of the Harvard School of Public Health for their research assistance and coding of the literacy tasks into the health activities categories and to Matthias von Davier and Minwhei Wang of ETS for their careful analyses of the data. We thank the Pfizer Corporation for their contribution. Lynn Jenkins was the editor, Loretta Casalaina of ETS provided desktop publishing services, and Joe Kolodey of ETS designed the cover. Errors of fact or interpretation are those of the authors.

Researchers have long been interested in the relationship between literacy and health. Over the past several decades, many studies have been conducted to analyze the difficulty of health-related print materials, evaluate patients' ability to read these types of materials and to recognize common medical terms, and determine whether patients' literacy skills have an effect on health outcomes, such as self-care and disease management.

This report seeks to further illuminate the relationship between literacy and health using data from large-scale surveys of adult literacy — the National Adult Literacy Survey (NALS) and the International Adult Literacy Survey (IALS) — conducted by Educational Testing Service for the U.S. Department of Education. Included in these assessments were a variety of health-related materials on topics such as drugs and alcohol, disease prevention and treatment, safety and accident prevention, first aid, emergencies, and staying healthy. Survey respondents were asked to perform different literacy tasks based on these materials — for example, to read a medicine dosage chart and indicate the correct dose for a child of a particular weight and age, or to interpret information from a news article on bicycle safety. The survey also gathered extensive background information about respondents' demographic and socioeconomic characteristics, as well as their health status, literacy practices, and civic participation.

For the current study, researchers analyzed performance results for the 191 health-related tasks included in the large-scale literacy assessments. In doing so, they were able to create a new Health Activities Literacy Scale (HALS) linked to the NALS database. The HALS is a 0 to 500 scale that reflects a progression of health-related literacy skills from low (Level 1) to high (Level 5).

Using the new HALS scale, the authors estimate the distribution of literacy on health-related tasks among U.S. adults, describe the health literacy skills of at-risk or vulnerable population groups, and demonstrate how health-related literacy is connected to health status, wealth, and civic engagement.

Results for the Total Population

- Some 12% of the U.S. adult population is estimated to have skills in the lowest level (Level 1) on the HALS, while an additional 7% can be expected to have great difficulty performing even these simple tasks with a high degree of proficiency.
- Some 41% of those performing below Level 1 on the HALS report that they were born in a Spanish-speaking country, while roughly 51% report being born in the United States. (The remaining 8% are born in other countries.)
- There is no significant difference in average HALS scores for men and women.

Results for Selected Vulnerable or At-Risk Groups

Performance on the HALS scale varies by respondents' level of education, race/ethnicity, country of birth, and age.

- **Education:** Health literacy is strongly related to educational attainment. The average HALS score of adults who had not completed high school or earned a GED as of the time of the survey (220) is far lower than that for individuals who had graduated from high school or earned a GED (271) and for those who had continued their education beyond high school (306). Among adults who had not completed high school, about 22% performed below Level 1 on the HALS, while 26% were in Level 1 and 33% in Level 2. Thus, almost half (48%) did not score above Level 1, and slightly more than 80% did not exceed Level 2. Only 14% of those who had completed their high school education and just 4% of those who attended school beyond high school were found to be in or below Level 1.
- **Race/Ethnicity:** The average proficiency of White adults on the HALS is significantly higher than the average proficiency of Black, Hispanic, and other adults living in the United States. With the exception of White adults, more than 10% of each of the other racial/ethnic groups are estimated to be below Level 1. Among Hispanic adults, some 30% performed below Level 1. The observed differences among racial/ethnic groups reflect the influence of many variables such as education, resources, and/or immigrant status.

- **Country of Birth:** The average HALS scores of foreign-born adults are significantly below those of the adults who were born in the United States. Although Black adults tended to outscore Hispanic adults on the health literacy scale, Hispanic adults born in the United States tend to have higher proficiencies than native-born Black adults. Also, the large score gap between White and Hispanic adults (100 points) drops to 30 points when the comparison is made between native-born White and Hispanic adults.
- **Age:** The average HALS scores of younger adults are significantly higher than those of older adults. Almost half of the older adults in the United States performed in or below Level 1 on the HALS. Another 33% scored in Level 2.

Health Literacy Proficiency and Multiple Characteristics

The analyses also explored differences in health literacy proficiency with respect to adults' access to financial resources, health status, reading practices, and civic engagement.

- **Wealth Status:** On average, working adults who reported having additional assets such as income from savings or dividends have the highest HALS scores, and retired adults living below the poverty level have the lowest scores.
- **Health Status:** The majority of the NALS respondents (77%) reported that they did not have any health conditions that restricted their ability to work or attend school. Their average HALS scores are higher than those for adults in any of the other health status groups. The analyses revealed a relationship between health status and certain background characteristics, including level of education, nativity, race/ethnicity, and age.
- **Reading Engagement:** Average HALS proficiencies vary by level of reading engagement and by the use of documents at home and at work. Adults with the lowest average health literacy proficiency (237) are those who reported little prose reading and no document reading.
- **Civic Engagement:** Adults who tend not to vote or use a library and whose primary source of information is television have significantly lower HALS scores (267) than do those adults who vote, use the library, and get information from a broad range of sources (311).

In summary, the results of this investigation using the NALS data provide useful information about the health literacy skills of the U.S. adult population overall, and of at-risk and vulnerable populations. The findings show that social factors have a powerful impact both on literacy and on health outcomes. There were marked differences in health literacy skills, for example, based on adults' educational attainment, health status, income/poverty status, and reading practices. This research lays the groundwork for future examinations of literacy as a mediating factor in health disparities.

Literacy and its link to health are now on the national agenda. A number of public health studies published from the 1970s through the 1990s indicated that most health-related materials are written at reading levels that exceed the reading skills of the average high school graduate. Issues related to reading skills caught the attention of those in health fields as the findings of the 1992 NALS — which showed that many U.S. adults have limited literacy skills — began to be disseminated more broadly. The *Journal of the American Medical Association* published a white paper by the AMA Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs[2] that reflected medicine's growing recognition of literacy and its role in health care.[3] The U.S. Department of Health and Human Services included a call to improve health literacy among the health goals and objectives for the nation presented in the document *Healthy People 2010*.[4] In addition, the Institute of Medicine of the National Academies of Science convened a committee to examine issues and definitions associated with health literacy.[5] These events have increased both discussions and studies of needed improvements and changes in education and in health services. In addition, health researchers have been encouraged by the National Institutes of Health to explore more fully the known links between health and education by more closely examining education and exploring pathways that lead to health outcomes.

Traditionally, health researchers collected demographic information such as measures of income, education, occupation, age, and race on all surveys and for most studies. Two of these items, income and education, are most commonly used as measures of socioeconomic status. A 1998 report from the National Center for Health Statistics offers evidence from accumulated studies that health, morbidity, and mortality are all related to socioeconomic status as measured by income and/or educational attainment. For example, life expectancy is related to family income. So, too, are death rates from cancer and heart disease, incidences of diabetes and hypertension, and use of health services. Furthermore, death rates for chronic disease, communicable diseases, and injuries are inversely related to education: those with lower educational achievement are more likely to die of a chronic disease than are those with higher educational achievement. In addition, those with less than a high school education have higher rates of suicide, homicide, cigarette smoking, and heavy alcohol use than do those with higher education. In essence, the lower one's income or educational achievement, the poorer one's health.[6]

Few health researchers examined education or its component parts to elucidate the link between education and health outcomes. This was, in part, because education itself was not the major consideration, but was instead viewed as a marker of socioeconomic status. However, findings from large-scale surveys conducted in the 1990s, such as the NALS and the IALS, offered critical insight into literacy as a possible pathway between education and health. The publication of the findings from the NALS and the IALS surveys spurred health research into links between literacy and health and set the foundation for a field of inquiry known as "health literacy."

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2 See Ad Hoc Committee on Health Literacy for the Council of Scientific Affairs, American Medical Association, "Health Literacy: Report of the Council of Scientific Affairs," *JAMA* 281(6), 1999: 552-557.

3 See R.E. Rudd, B.A. Moeykens, & T. Colton, "Health and Literacy: A Review of the Medical and Public Health Literature," in J.P. Comings, C. Smith, & B. Garner (eds), *Annual Review of Adult Learning and Literacy*. San Francisco, CA: Jossey-Bass, 2000.

4 U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, *Healthy People 2010*. Washington, DC: U.S. Department of Health and Human Services, 2000. www.healthypeople.gov.

5 Institute of Medicine Committee on Health Literacy, *Health Literacy: A Prescription to End Confusion*. Washington DC: National Academies Press, anticipated publication Spring 2004.

6 E. Pamuk, D. Makuc, K. Heck, C. Reuben, & K. Lochner, *Socioeconomic Status and Health Chartbook. Health, United States, 1998*. Hyattsville, MD: National Center for Health Statistics, 1998.

A growing body of literature published during the mid to late 1990s through the present time provides evidence that adults with limited reading skills may face health-related disadvantages. A number of studies used the REALM *(Rapid Estimate of Adult Literacy Measure)*[7] or the TOFHLA *(Test of Functional Health Literacy in Adults)*[8] assessment instruments to measure skills in order to compare and contrast a variety of health-related outcomes for adults with limited reading skills and for those with strong skills. Study findings indicated that people with limited reading skills were, for example, less likely to make use of medical screening than were adults with stronger reading skills.[9] Patients with low scores on the TOFHLA were more likely to be hospitalized than were patients with high scores.[10] Furthermore, researchers found that patients with low scores on the TOFHLA were less likely to know how to manage their chronic disease [11, 12, 13] and were less likely to manage their chronic disease.[14, 15] Despite this growing interest in links between literacy skills and health outcomes, few studies have examined everyday health-related activities in the broader public health arena where limited literacy skills may have harmful consequences.

Each day, millions of adults must make decisions, take actions, and consider issues that influence not only their own well being, but that of their family members and of their community. These actions are not solely confined to traditional healthcare settings such as doctors' and dentists' offices, hospitals, and clinics. They take place in homes, at work, and in communities across the country. However, health researchers have not systematically examined tasks in these settings, which could include how well people use package labels found on household goods, appliances, cleaning products, or even over-the-counter medicines. Adults' ability to use a wide variety of health-related materials might influence health outcomes. Furthermore, disparities that might exist in the health literacy skills among various groups raise important issues with regard to equity in this country.

This report uses information generated from existing large-scale literacy surveys to investigate the link between literacy and health. Previous surveys such as the NALS and the IALS included health-related materials and tasks. For this analysis, the authors selected those tasks judged to reflect health-related activities and used them to construct a new health literacy scale. By linking these tasks to the NALS database, we are able to:

- Identify a framework for organizing health activities and classify tasks used in the literacy assessments according to this framework.
- Estimate the distribution of literacy on health-related tasks in America.
- Describe the distribution of health literacy skills among at-risk or vulnerable population groups.
- Demonstrate how health-related literacy skills are connected to health status, wealth, and civic engagement.

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7 T.C. Davis, S.W. Long, R.H. Jackson, et al., "Rapid Estimate of Adult Literacy in Medicine: A Shortened Screening Instrument," *Family Medicine,* 25, 1993: 391-5.

8 R.M. Parker, D.W. Baker, M.V. Williams, et al., "The Test of Functional Health Literacy in Adults: A New Instrument for Measuring Patients' Literacy Skills," *Journal of General Internal Medicine*, 10, 1995: 537-41.

9 T.C. Davis, C. Arnold, H.J. Berkel, et al., "Knowledge and Attitude on Screening Mammography Among Low-literate, Low-income Women," *Cancer*, 78(9), 1996: 1912-20.

10 D.W. Baker, R.M. Parker, & W.S. Clark, "Health Literacy and the Risk of Hospital Admission," *Journal of General Internal Medicine*, 13(12), 1998: 791-8.

11 M.V. Williams, D.W. Baker, E.G. Honig, et al., "Inadequate Literacy is a Barrier to Asthma Knowledge and Self-care," *Chest*, 114(4), 1998: 1008-25.

12 M.V. Williams, D.W. Baker, R.M. Parker, et al., "Relationship of Functional Health Literacy to Patients' Knowledge of Their Chronic Disease: A Study of Patients with Hypertension and Diabetes," *Archives of Internal Medicine*, 158(2), 1998: 166-72.

13 S.C. Kalichman, E. Benotsch, T. Suarez, et al., "Health Literacy and Health-related Knowledge Among Persons Living with HIV/AIDS," *American Journal of Preventive Medicine,* 18(4), 2000: 325-31.

14 S.C. Kalichman, B. Ramachandran, & S. Catz, "Adherence to Combination Antiretroviral Therapies in HIV Patients with Low Health Literacy," *Journal of General Internal Medicine*, 14(5), 1999: 267-73.

15 D. Schillinger, K. Grumbach, J. Piette, et al., "Association of Health Literacy with Diabetes Outcomes," *Journal of the American Medical Association*, 288(4), 2002: 475-82.

Health-related activities and the need to make use of health materials are related to life events and wax and wane over time along with one's roles and responsibilities.[16] Media announcements bring new medical findings or public health alerts into the home; new jobs may offer different health benefit packages; neighborhood changes may offer new opportunities for physical activities or limit existing ones; restaurant menus and store discounts require on-the-spot calculations. Purcell-Gates documented changes in literacy demands among groups of adults engaged in adult education programs. Study participants noted that literacy demands changed because of the birth of a child, living situations, health status, and family members' health needs. For example, parents reported needs to keep track of their children's appointments with health care workers, and to read school communications or school lunch menus. Adults in new living situations reported reading appliance directions, menus, schedules, or print on food containers. As their own health or the health of family members changed, they reported readings associated with medicines, books, calendars, and appointment books.[17]

The first step undertaken for the analyses reported here was to consider a variety of health activities — behaviors related to where and why people take health-related actions. As is noted above, health activities take place in the home, in the community, at work, in health care institutions, and in the policy arena. The purposes vary. For this analysis, we adopted a commonly used lexicon to differentiate among the various health-related activities: health promotion, health protection, disease prevention, health care, and systems navigation. Thus, the following reflect activities undertaken by adults in daily life and were used for coding the materials and tasks across the literacy surveys:

- **Health Promotion:** Generally, the emphasis in health promotion is placed on activities undertaken by individuals for their own health, and encompasses behaviors related to nutrition, physical activity, and other "healthy habits."
- **Health Protection:** Actions taken in everyday life to preserve and protect health are highlighted in traditional epidemiologic models. These activities include learning about changes in products, improvements in the design of structures, machines, products, systems or processes and in rules governing details or procedures. In addition, these activities are undertaken to protect the health of groups of people (such as workers or people living in a specific geographic location) and the public at large (all those who purchase food or drink water). The Institute of Medicine issued two reports on the scope of public health and each time highlighted the importance of public engagement in community action to ensure the health of the public.[18, 19] Included here are activities related to occupational health and safety and to safeguarding the environment which are linked to mandates from governmental agencies such as the Food and Drug Administration or are specified in federal legislation such as the Right to Know Act. Those materials coded under "protection" include discourse related to product safety, and to health-related social and environmental issues.

[16] We use several terms throughout this report that need some distinction. Health-related activities refer to the framework introduced in this report that provides a scheme for organizing and studying various health-related materials and tasks. A health-related task is used in this report to reflect the interaction between a text or material judged to involve health content and what someone is asked or expected to do with that material or text. There were 191 health-related tasks identified and used to create the Health Activities Literacy Scale (HALS) described in this report. The HALS was created to allow us to study and understand the distribution of health-related literacy in the United States. Sometimes we take the liberty of using the term health literacy in place of health activities literacy even though we do not claim to have captured all aspects of health literacy.

[17] V. Purcell-Gates, *Affecting Change in Literacy Practices of Adult Learners: Impact of Two Dimensions of Instruction*, NCSALL Report #17, Cambridge MA: National Center for the Study of Adult Learning and Literacy, 2003.

[18] Institute of Medicine Committee for the Study of the Future of Public Health, *The Future of Public Health*. Washington DC: National Academies Press, 1998.

[19] Institute of Medicine Committee on Assuring the Health of the Public in the 21st Century, *The Future of the Public's Health in the 21st Century*. Washington, DC: The National Academies Press, 2003.

- **Disease Prevention:** Disease prevention activities include actions undertaken to prevent the onset of an illness or a disease or to detect diseases at early stages. Included here are activities related to immunization, such as those for infants and school children, or flu and pneumonia inoculations for elders. Screening programs range from routine vision and hearing examinations to prostate or breast cancer tests. In addition, actions such as the use of sunscreen are included.
- **Health Care and Maintenance:** Health care activities focus on learning about an illness or disease, taking action to seek care, complying with the appropriate regimen, monitoring and measuring medicine and symptoms for chronic disease management, and engaging in dialogue and discussion with care providers such as dentists, doctors, pharmacists, mental health professionals, and nurses. Patient education brochures, labels for medical and dental products, and directions for care are some of the materials patients and family members must use to understand a disease or illness, follow recommended guidelines, prepare for tests and procedures, engage in self care, and manage a chronic disease.
- **Systems Navigation:** Finally, attention to barriers to programs, services, and care has shaped a fifth health literacy activity — one related to bureaucratic demands, referred to as "navigation." Navigation of the health care system encompasses those activities related to rights and responsibilities, application for insurance and other coverage plans, and informed consent for procedures and studies.

Table 1 offers a description of five health activities with examples. This schema enabled us to examine and code all of the materials and tasks used across various assessments of adult literacy skills that will be described here and link them to the NALS database. The results are referred to as the Health Activities Literacy Scale (HALS), and comprise what we call health literacy proficiency in this report.

Table 1:

Categories of Health Activities with Selected Examples

Health Activities	Focus	Examples of Materials	Examples of Tasks
Health Promotion	Enhance & maintain health	Articles in newspapers & magazines, booklets, brochures Charts, graphs, lists Food & product labels	Purchase food Plan exercise regimen
Health Protection	Safeguard health of individuals & communities	Articles in newspapers & magazines Postings for health & safety warnings Air & water quality reports Referendums	Decide among product options Use products Vote
Disease Prevention	Take preventive measures & engage in early detection	News alerts [TV, radio, newspapers] Postings for inoculations & screenings Letters re: test results Graphs, charts	Determine risk Engage in screening or diagnostic tests Follow up
Health Care & Maintenance	Seek care & form a partnership with health providers	Health history forms Medicine labels Discharge instructions Education booklets & brochures	Describe & measure symptoms Follow directions on medicine labels Calculate timing for medicine
Systems Navigation	Access needed services Understand rights	Maps Application forms Statements of rights & responsibilities, informed consent Health benefit packages	Locate facilities Apply for benefits Offer informed consent

The items that were used in creating the Health Activities Literacy Scale (HALS) were drawn from the hundreds of literacy tasks that had been developed for various large-scale surveys of adult literacy, all of which used the same definition of literacy and framework for constructing literacy tasks. This section provides a brief overview of these surveys and the definition used to measure literacy. Next we describe how each item was coded using the categories of health activities described above and then analyzed to create the new HALS. At the conclusion of this section is a description of the new health literacy scale and a discussion of how to interpret performance on this scale.

Surveys of Adult Literacy

Over the past decade or so, several large-scale literacy assessments were conducted that provide estimates of the literacy proficiencies of the adult population in the United States. In 1992, the National Adult Literacy Survey (NALS) was undertaken in the United States by Educational Testing Service (ETS) for the U.S. Department of Education.[20] The NALS survey was the largest and most comprehensive assessment ever undertaken of the literacy proficiencies of the nation's adult population (16 years and older). Many of the literacy concepts and measures underlying the NALS assessment were originally developed by ETS in two earlier assessments of the nation's young adult population (21-25 years old) and of unemployed and economically disadvantaged adults served by unemployment insurance and employment and training programs funded by the U.S. Department of Labor.[21]

The NALS assessment provided information on the literacy proficiencies of a sample of 26,091 adults 16 and older, including a sample of 1,147 adults in federal and state prisons, as well as supplemental samples from 12 states yielding state representative samples.[22] In addition to assessing participants' literacy skills, the NALS gathered extensive background information on their demographic and socioeconomic characteristics (e.g., age, gender, nativity status, educational experiences, labor force status, household income), their health status, and their literacy practices.

Following upon the NALS, a pioneering effort was undertaken to develop and conduct the first-ever comparative, international assessment of adult literacy. The International Adult Literacy Survey (IALS) involved the joint efforts of participating national governments, their statistical agencies and research bureaus, the Organisation for Economic Co-operation and Development (OECD), and the technical support of Statistics Canada, Educational Testing Service, and the National Center for Education Statistics in the U.S. Department of Education.[23] As with the NALS, a comprehensive background questionnaire in the IALS assessment captured information on respondents' demographic and socioeconomic characteristics, their labor market and schooling behavior, and their literacy practices. The international assessments took place in three stages, beginning in 1994 and continuing through 1998. Some 20 nations took part in the IALS project; most were in North America and Western Europe, but other countries included Australia, Chile, New Zealand, and several Eastern European nations (Hungary, Slovakia, and Poland).

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[20] For an introduction into the purposes, design features, and findings of NALS, conducted in 1992 by Educational Testing Service for the U.S. Department of Education, see: I.S. Kirsch, A. Jungeblut, L. Jenkins, & A. Kolstad, *Adult Literacy in America: A First Look at the Results of the National Adult Literacy Survey.* Washington, DC: U.S. Department of Education, National Center for Education Statistics, 1993.

[21] I.S. Kirsch & A. Jungeblut, *Literacy Profiles of America's Young Adults*. Princeton, NJ: Educational Testing Service, 1986. R.L. Venezky, C.F. Kaestle, & A.M. Sum, *The Subtle Danger.* Princeton, NJ: Educational Testing Service, 1997. I.S. Kirsch, A. Jungeblut, & A. Campbell, *Beyond the School Doors: The Literacy Needs of Job Seekers Served by the U.S. Department of Labor*. Princeton, NJ: Educational Testing Service, 1992.

[22] For further information on the sample size and design of the NALS survey, see I.S. Kirsch et al., *Adult Literacy in America*, 1993, pp. 5-7.

[23] For a review of the purposes, design features, sample design, timing, and findings of IALS, see: (i) Organisation for Economic Co-operation and Development & Statistics Canada, *Literacy, Economy, and Society: Results of the First International Adult Literacy Survey.* Paris and Ottawa, 1995. (ii) Organisation for Economic Co-operation and Development & Statistics Canada, *Literacy in the Information Age*. Paris and Ottawa, September 2000.

A unique aspect of these large-scale surveys is that they adopted the same definition and framework for measuring literacy, allowing us to examine literacy-related issues over time and among population subgroups. The definition of literacy was as follows:

> *Using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.*

In putting this definition into operation, the assessments measured respondents' proficiencies along three literacy scales: prose, document, and quantitative. A brief description of the tasks and skills underlying each of the three literacy scales is presented here:

Prose literacy — the knowledge and skills needed to understand and use information from texts that include editorials, news stories, poems, and fiction. Examples include: finding a piece of information in a newspaper article, interpreting instructions from a warranty, inferring a theme from a poem, or identifying the contrasting views expressed in an editorial.

Document literacy — the knowledge and skills required to locate and use information contained in materials that include job applications, payroll forms, transportation schedules, maps, tables, and graphs. Examples include: locating a particular intersection on a street map, using a schedule to choose the appropriate bus, or entering information on an application form.

Quantitative literacy — the knowledge and skills required to apply arithmetic operations, either alone or sequentially, using numbers embedded in printed materials. Examples include: balancing a checkbook, figuring out a tip, completing an order form, or determining the amount of interest from a loan advertisement.

Characteristics of Tasks Used in the Literacy Assessments

Each task used in the various literacy assessments represents a piece of evidence about a person's literacy. While the goal of the assessments is to develop the best possible picture of an individual's skills and abilities, the tests cannot include an infinite number of tasks nor can an infinite number of features of those tasks be manipulated. Therefore, part of the test development process involved discussions and decisions about which features should be central. Three task characteristics were identified and used in the construction of tasks. These characteristics include contexts/content, materials/texts, and processes/strategies.

Adult Contexts/Content — Since adults do not read written or printed materials in a vacuum, but read within a particular context or for a particular purpose, materials for the literacy assessment were selected that represent a variety of contexts and contents. This is to help ensure that no one group of adults is either advantaged or disadvantaged due to the context or content included in the assessment. Six adult context/content categories have been identified as follows:

- Home and family: may include materials dealing with interpersonal relationships, personal finance, housing, and insurance.
- Health and safety: may include materials dealing with drugs and alcohol, disease prevention and treatment, safety and accident prevention, first aid, emergencies, and staying healthy.
- Community and citizenship: may include materials dealing with staying informed and community resources.
- Consumer economics: may include materials dealing with credit and banking, savings, advertising, making purchases, and maintaining personal possessions.
- Work: may include materials that deal in general with various occupations but not job-specific texts, finding employment, finance, and being on the job.
- Leisure and recreation: may include materials involving travel, recreational activities, and restaurants.

Materials/Texts — While no one would doubt that a literacy assessment should include a range of material, what is critical to the design and interpretation of the scores that are produced is the range and specific features of the text material. A key distinction among texts that is at the heart of these literacy surveys is their classification into continuous and non-continuous texts. Conventionally, continuous texts are classified as prose and are formed of sentences organized into paragraphs. In these texts, organization occurs by

paragraph setting, indentation, and the breakdown of text into a hierarchy signaled by headings that help the reader to recognize the organization of the text. The primary classification of continuous texts is by rhetorical purpose or text type. These include: expository, descriptive, argumentative and injunctive.

Non-continuous texts are organized differently than continuous texts and so allow the reader to employ different strategies for entering and extracting information from them. On the surface, these texts appear to have many different organizational patterns or formats, ranging from tables and schedules to charts and graphs, and from maps to forms. However, the organizational pattern for these types of texts — which Mosenthal and Kirsch refer to as documents — is said to have one of four basic structures: a simple list, a combined list, an intersected list, and a nested list.[24] Together, these four types of documents make up what they have called matrix documents, or non-continuous texts with clearly defined rows and columns. They are also closely related to other non-continuous texts that these authors refer to as graphic, locative, and entry documents.

The distinction between continuous and non-continuous texts formed the basis for two of the three literacy scales used in these surveys of adult literacy. Continuous texts were the basis for tasks that were placed along the prose scale while non-continuous texts formed the basis for tasks along the document scale. The quantitative scale included texts that were both continuous and non-continuous. The distinguishing characteristic for this scale was that respondents needed to identify and perform one or more arithmetic operations based on information contained in the texts.

Processes/Strategies — This task characteristic refers to the way in which examinees process text to respond correctly to a question or directive. It includes the processes used to relate information in the question (the given information) to the necessary information in the text (the new information) as well as the processes needed to either identify or construct the correct response from the information available. These strategies included locating, cycling, integrating, and generating information as well as formulating and calculating for the quantitative tasks.

- *Locate* tasks require examinees to match one or more features of information stated in the question to either identical or synonymous information provided in the text.
- *Cycle* tasks also require examinees to match one or more features of information, but unlike locating tasks, they require respondents to engage in a series of feature matches to satisfy conditions stated in the question.
- *Integrate* tasks require examinees to pull together two or more pieces of information from the text according to some type of specified relation. For example, this relation might call for examinees to identify similarities (i.e., make a comparison), differences (i.e., contrast), degree (i.e., smaller or larger), or cause-and-effect relations. The needed information may be located within a single paragraph or it may appear in different paragraphs or sections of the text. In integrating information, examinees draw upon information categories provided in a question to locate the corresponding information in the text. They then relate the text information associated with these different categories based upon the relation term specified in the question.
- *Generate* tasks required respondents not only to process the information located in various parts of a text but also to go beyond that information to create a new category or main idea or summarization by drawing on their knowledge about a subject or by making a broad text-based inference.
- *Formulate* and *Calculate* tasks required respondents to apply one or more arithmetic operations (addition, subtraction, multiplication, or division) either as a single operation or in combination. Before performing these calculations, respondents must locate the numbers in a text and determine which operation(s) are needed to respond correctly.

[24] P.B. Mosenthal & I.S. Kirsch, "A New Measure for Assessing Document Complexity: The PMOSE/IKIRSCH Document Readability Formula," *Journal of Adolescent and Adult Literacy*, *41*(8), 1998: 638–657.

A number of variables were found to have an important influence on the complexity, and hence the difficulty, of the literacy tasks. The type of process involved in locating, cycling, integrating, and generating information is one important factor influencing task difficulty. The complexity of tasks associated with these processes/strategies can be influenced by several other variables. For example, these include: the number of categories or features of information the reader is required to process; the extent to which information given in the question or directive is obviously related to the information contained in the text; and the length and complexity of the text itself. In addition, the task complexity is influenced by the amount and location of information in the text that shares some of the features with the correct information that is being sought, and thus appears plausible, although it does not fully answer the question. On the quantitative scale the number and type of arithmetic operation are important variables in influencing the overall difficulty of a task. A detailed discussion of the definition and framework used in the NALS and the IALS and how these factors contribute to our understanding of what the literacy scores mean can be found in a recent ETS monograph, *The International Adult Literacy Survey: Understanding What Was Measured.*[25]

Scores on each of the three literacy scales ranged from 0 to 500 and were characterized in terms of five levels that capture the progression of complexity and difficulty, with Level 1 representing the lowest level of proficiency and Level 5 the highest. Table 2 provides the score range for each level of proficiency. A number of national and state organizations in the United States, including the National Governor's Association, have identified Level 3 proficiency as a minimum standard for success in today's labor markets.[26]

Table 2:

Range of Scale Scores Corresponding to Each Literacy Level

Level	Score Range
1	0 – 225
2	226 – 275
3	276 – 325
4	326 – 375
5	376 – 500

Respondents scoring in Levels 1 or 2 can best be characterized as possessing very limited to restricted literacy proficiencies. While few of the adults in Levels 1 or 2 would be considered "illiterate" in the historical meaning of that term (an inability to write one's own name or to read and understand a very simple passage), few have the skills many believe are needed to succeed in today's more technologically sophisticated economy, to gain access to high-wage jobs, or to actively participate in civic and political life. For example, adults who scored in the Level 1 to Level 2 range are performing below the average proficiencies of adults who graduated from high school; in fact, those in Level 1 are performing below the average score of adults who dropped out of high school and never earned a diploma or its equivalent.

[25] I.S. Kirsch, *The International Adult Literacy Survey: Understanding What Was Measured*. Princeton, NJ: Educational Testing Service, 2001. An electronic version of this report can be obtained at www.ets.org/research/dload/RR-01-25.pdf.

[26] J. Comings, A. Sum, J. Uvin, et al., *New Skills for A New Economy: Adult Education's Role in Sustaining Economic Growth and Expanding Opportunity.* Boston, MA: Massachusetts Institute for a New Commonwealth, 2001.

Coding the Literacy Items

Three researchers independently coded the materials and questions from previous literacy assessments into one of the five health-related activities identified above and all differences were resolved through discussions and refinement of the coding criteria. Some 191 literacy tasks were judged to measure health-related activities. The distribution of these tasks by type of health activity is shown in Table 3. The health-related literacy tasks do not evenly represent each of the five health contexts. Health promotion and health protection items, closely matched by number, comprise the bulk of the items (125 out of 191). Thirty-two tasks were judged to represent navigation activities while the remaining 34 tasks were split between activities associated with disease prevention and health care management. However, because these items represent everyday activities, they are likely to occur outside formal health care settings. Only 66 of the tasks (activities under prevention, care and management, and navigation) represent activities directly related to health care settings.

The 191 health-related literacy tasks that were identified provided a link across the various surveys, and were used to create a new HALS and to assign new item parameters to each of these tasks based on the responses of a nationally representative sample. Also, since the NALS is the largest and most comprehensive survey of literacy, involving more than 26,000 adults ages 16 and older, this new health literacy scale is linked back to the NALS database.[27] Thus, the results reported in subsequent sections of this report are based on the nationally representative sample of adults participating in the NALS.

Table 3:

Health Activities and Number of Coded Items

Health Activities	Number of Items (n=191)
Health Promotion	60
Health Protection	65
Disease Prevention	18
Health Care and Maintenance	16
Systems Navigation	32

Understanding the Health Activities Literacy Scale (HALS)

Just as adults participating in large-scale assessments are sampled from the population of adults living in households, the literacy tasks used in the various surveys are sampled from a population of possible tasks. Each literacy task, constructed and used in one of the assessments, represents a type of task sampled from the domain or construct of literacy and is representative of a kind of text and kind of process or strategy that is associated with adult contexts. The 191 tasks that make up the HALS are representative of the kinds of texts and processes that are associated with health activities. One caveat here is that since these earlier assessments were not designed to specifically measure health activities, this set of 191 tasks may not accurately reflect the relative weight or importance of the various health-related activities. Nevertheless, the span of items represents important aspects of health literacy across the five health contexts as illustrated in Table 3 above.

[27] See Appendix A for a brief description of the procedures used to place these health-related literacy tasks on a new scale and link it to the NALS.

One might imagine these health-related literacy tasks arranged along a continuum in terms of their difficulty for adults and the level of proficiency needed to respond correctly to each task. That is, just as adults received scaled scores according to their performance on this set of tasks, the literacy tasks received specific scale values according to their difficulty as determined by the performance of adults who participated in the survey. The procedure used to model this continuum of difficulty and ability is based on Item Response Theory (IRT). IRT is a mathematical model used for estimating the probability that a particular person will respond correctly to a given task from a specified pool of tasks.[28] The health-related literacy tasks are summarized along a single health activity literacy scale (HALS) that ranges from 0 to 500.

Of the 191 health-related literacy tasks identified, 80 (42%) consist of reading and using prose, 63 (33%) involve reading and using documents, and 48 or (25%) require some form of quantitative skill. The health-related literacy tasks vary widely in terms of the type of material that is being used and in terms of the type of question or directive that is being asked related to this material. As a result of this interaction, these tasks also vary considerably in terms of their average difficulty. This range is illustrated in the items displayed in Figure 1.

The items in Figure 1 are listed by a descriptor that represents a specific piece of material. One or more questions are associated with each material, and each represents a different level of difficulty or complexity. Thus, for example, the descriptor *Tempra Dosage* is highlighted in bold and appears three times under the column *Health Care and Maintenance.* This material and the related questions provide an example of how task difficulty may vary across a single text.

An Example of Task Variability Over a Single Text: One set of tasks coded under health care and maintenance involved reading a pediatric dosage chart for Tempra®. Three tasks associated with this text ranged from relatively simple (239 on the HALS), to moderately difficult (329), to quite hard (378) as shown in Figure 1 under health care and maintenance. The text material, used from the Tempra package, is illustrated in Figure 2.

The easiest task (239 on the HALS) directed the reader to simply underline the sentence that indicates how often medication should be administered. Participants had to locate and underline the sentence that read, "Dosage may be given every four hours as needed but not more than 5 times daily."

A second task using the Tempra text that fell at 329 on the HALS asked the reader to identify "How much Tempra syrup is recommended for a child who is 10 years old and weighs 50 pounds?" What makes this task so much more complex and difficult relates to the structure of the chart that the reader must use. The chart is composed of columns starting with age, then weight, then dosage by type including drops, syrup, chewables 80 mg, and chewables 160 mg. The typical reader would look down the column to find the age of the child and then over the row to the column for syrup. The problem here is that in very small print under the chart is a conditional statement that tells the reader: "if child is significantly under- or overweight, dosage may need to be adjusted accordingly."

Finally, the third and most difficult task associated with the *Tempra* materials (378) required the reader not only to locate information within the chart itself based on several stated conditions but then to calculate the maximum number of tablets that could be administered in a one-day period. Specifically, the task stated, "Imagine your child is 11 years old and weighs 85 pounds. According to the chart, how many 80 mg tablets of Tempra can you administer to your child in a 24-hour period?" Here, the reader must put together information on the chart with information provided elsewhere on the package.

[28] For more information on the scaling model that was used and the analyses performed, see T.S. Murray, I.S. Kirsch, & L. Jenkins, *Adult Literacy in OECD Countries: Technical Report on the First International Adult Literacy Survey.* Washington, DC: U.S. Department of Education, National Center for Education Statistics, 1998.

***Figure 1:** Selected Health Literacy Tasks for Each Set of Health Activities*

Scale Points	Health Promotion	Health Protection	Disease Prevention	Health Care & Maintenance	Systems Navigation
		476 – Blood alcohol			
		465 – Nuclear plant perils			
425 +					
		411 – Protecting children from head injuries			
					389 – Serving physically impaired
	382–Nutritional analysis				
	380–Bringing calcium			**378 – Tempra dosage**	
375					368 – Serving physically impaired
					365 – Are you eligible for SSI
				358 – High blood pressure	
		354 – Nuclear plant perils			
	345–Student athlete injuries	346 – Blood donation			
		334 – Shopping for safety			338 – Job benefits
		332 – Blood alcohol		332 – Doctors who listen	
			330 – Diabetes rates	**329 – Tempra dosage**	330 – Applying for insurance
325					
			318 – Aging bones	322 – Medco aspirin	
	313–Strike your child		310 – Periodontal disease		
	305–Bringing calcium	300 – Child safety in cars		305 – Doctors who listen	
	286–Vitamin E		296 – Aging bones		295 – PHP health plan
	280–Bringing calcium			285 – Doctors who listen	
	277–Nutrition analysis				
275	275–Vitamin guide	276 – Shopping for safety			
	273–Tempra coupon		273 – Periodontal disease		273 – Education benefits
					272 – Are you eligible for SSI
			270 – Periodontal disease	265 – Medco aspirin	
	260–Vitamin guide	261 – Bicycle helmet		263 – High blood pressure	262 – Soc. security application
		256 – Child safety in cars	252 – Gene defects		249 – PHP health plan
	244–Strike your child	243 – Blood donation		**239 – Tempra dosage**	232 – Applying for insurance
					230 – Are you eligible for SSI
225					
	207–What's in lunch boxes		206 – UNICEF measles		
				200 – Medco aspirin	
				185 – Medicine label	
175					
<175					
					102 – Social security card

This example clearly illustrates that the overall complexity of the text alone cannot explain the difficulty of the associated tasks. What varied in each of the three examples shown was what the reader was asked to do with the material. Any future attempts to study health literacy need to take into account not only the range of materials associated with health literacy but also the kinds of processing that are required to understand and use the information contained in various parts of these materials, whether they are presented orally or in written form.

Levels of Literacy in Multiple Health Contexts: Several questions arise once one looks at the distribution of tasks along the HALS: What distinguishes tasks at the lower end of the scale from those in the middle and upper ranges of the scale? Do tasks that fall around the same place on the scale share some set of characteristics that result in their having similar levels of difficulty?

Tasks at the lower end of the literacy scale do differ from those at the higher end.[29] In an attempt to

Figure 2:
Pediatric Dosage Chart

Recommend

ALCOHOL-FREE
ASPIRIN-FREE
Tempra®
ACETAMINOPHEN

A Caring Sponsor of
Ronald McDonald House®
Ronald McDonald House is a program of
Ronald McDonald Children's Charities®

Pediatric Dosage Chart Drops, Syrup, & Chewables

Age	Approximate Weight Range*	Dosage			
		Drops	Syrup	Chewables 80 mg	Chewables 160 mg
† Under 3 mo	Under 13 lb	½ dropper	¼ tsp	—	—
† 3 to 9 mo	13-20 lb	1 dropper	½ tsp	—	—
† 10 to 24 mo	21-26 lb	1½ droppers	¾ tsp	—	—
2 to 3 yr	27-35 lb	2 droppers	1 tsp	2 tablets	—
4 to 5 yr	36-43 lb	3 droppers	1½ tsp	3 tablets	1½ tablets
6 to 8 yr	44-62 lb	—	2 tsp	4 tablets	2 tablets
9 to 10 yr	63-79 lb	—	2½ tsp	5 tablets	2½ tablets
11 yr	80-89 lb	—	3 tsp	6 tablets	3 tablets
12 yr and older	90 lb & over	—	3-4 tsp	6-8 tablets	3-4 tablets

† Consult with physician before administering to children under the age of 2 years.
Dosage may be given every 4 hours as needed but not more than 5 times daily.
How Supplied:
Drops: Each 0.8 ml dropper contains 80 mg (1.23 grains) acetaminophen.
Syrup: Each 5 ml teaspoon contains 160 mg (2.46 grains) acetaminophen.
Chewables: Regular tablets contain 80 mg (1.23 grains) acetaminophen each. Double strength tablets contain 160 mg (2.46 grains) acetaminophen each.

* If child is significantly under- or overweight, dosage may need to be adjusted accordingly.
The weight categories in this chart are designed to approximate effective dose ranges of 10-15 milligrams per kilogram.
(Current Pediatric Diagnosis and Treatment. 8th ed. CH Kempe and HK Silver, ed. Lange Medical Publications: 1984, p. 1079)
LA-1451-2-88 © 1988, Bristol-Myers U.S. Pharmaceutical and Nutritional Group • Evansville, Indiana 47721 U.S.A.

[29] A more careful analysis of the range of tasks used in the IALS provides an indication of an ordered set of information-processing skills and strategies. See I.S. Kirsch, 2001.

represent this progression of complexity and difficulty, the HALS was divided into five levels using the same criteria employed in the NALS and the IALS. These levels have some shared properties. Tasks were placed along each scale so that someone at that point on the scale would have an 80% chance of answering that item correctly. Stated another way, the average person within each level would be expected to get 80% of the items within that level correct. In addition, the range of each level is such that a person at the bottom of each level would be expected to score about 60% on a hypothetical test made up of items from that level.

Since each literacy level represents a progression of knowledge and skills, individuals within a particular level not only demonstrate the knowledge and skills associated with that level but the proficiencies associated with the lower levels as well. In practical terms, this means that individuals performing at 250 on the HALS are expected to be able to perform the average Level 1 and Level 2 tasks with a high degree of proficiency. In contrast, someone with an estimated proficiency that is below 175 on the HALS would be expected to perform poorly even on the Level 1 tasks. That is, they would be expected to score less than 60% correct on a test made up of items from Level 1. Therefore, in this report we identify those who score less than 175 on the scale as below Level 1. The range of scores and associated levels for reporting performance on the HALS are shown in Table 4 below.

Table 4:

Range of Scale Scores Corresponding to Each Level on the HALS

Level	Score Range
<1	0 – 175
1	176 – 225
2	226 – 275
3	276 – 325
4	326 – 375
5	376 – 500

In this section, we describe the average health literacy of America's adults overall and by gender. Next, we focus on variables that allow us to look at groups who have been identified as vulnerable or at-risk. These population groups are those with less than a high school education, those with racial/ethnic minority status, and those who are over the age of 65. We also look at some of these groups in terms of other characteristics that may add to their strength or to their vulnerability, such as access to financial resources and first language, as indicated by country of birth. An examination of the HALS scores among various groupings of adults considered by those in the health sector as at-risk or members of vulnerable population groups offers measures of literacy and insight into health-related outcomes for these population groups. First, however, we provide some background information as to why it is important to understand the distribution of health-related literacy skills.

Background

The 2002 report by the Secretary of the U.S. Department of Health and Human Services to the President and Congress entitled *Health, United States, 2002* indicates that national health trends have been shaped by major changes in demographics — a growth of the elderly population, increasing racial and ethnic diversity, and differences in poverty rates among population subgroups. More elderly Americans are living longer with chronic health conditions, many of which pose activity limitations. Racial and ethnic disparities in health persist. In addition, disparities in the use of preventive services by age, by race and ethnicity, and by family income remain. For example, the poor and near poor are much more likely than others to be uninsured and less likely to have had a dental visit in the past year. Persons living in poverty and near-poverty are at highest risk for negative health outcomes and in need of greater access to health care.[30]

Furthermore, *Healthy People 2010*, the ten-year statement of health goals and objectives for the nation, noted high priority health issues and identified populations at-risk. The leading health indicators include measures of: immunization, injury and violence, environmental quality, access to health care, physical activity, overweight and obesity, tobacco and/or substance abuse, and responsible sexual behavior. Among the key population groups defined as at-risk for the leading health indicators are people with lower incomes and less education, people from ethnic and racial minority population groups, and older adults. *Healthy People 2010* notes that inequalities in income and education underlie many health disparities in the United States. Overall, those with higher income fare better than those with lower income. In 2000, more than one-quarter of Black and Hispanic children lived in poor families. Among people aged 25 to 64 years, the overall death rate for those with less than 12 years of education is more than twice that for people with 13 or more years of education.[31]

Health statistics of the U.S. population are generally reported in terms of various population characteristics and are compared and contrasted in terms of key variables. Many, but not all, questions typically asked in health surveys were also represented in the NALS. The NALS participants were asked questions about their gender, age, race/ethnicity, country of birth, highest level of education completed, region of the country, employment status, poverty status, and sources of income and support. The NALS participants were not asked to rank their health, a question generally included in health surveys. However, the NALS participants were asked questions regarding physical, mental, or other health conditions. One of these questions asked them whether they had any physical, mental, or other health condition that keeps them from participating fully in work, school, housework, or other activities. Other background information focused on their reading and literacy practices as well as their participation in civic activities such as voting.

[30] P.N. Pastor, D.M. Makuc, C. Reuben, & H. Xia, *Chartbook on Trends in the Health of Americans. Health, United States, 2002*. Hyattsville, MD: National Center for Health Statistics, 2002.

[31] U.S. Department of Health and Human Services, *Healthy People 2010*. www.healthypeople.gov.

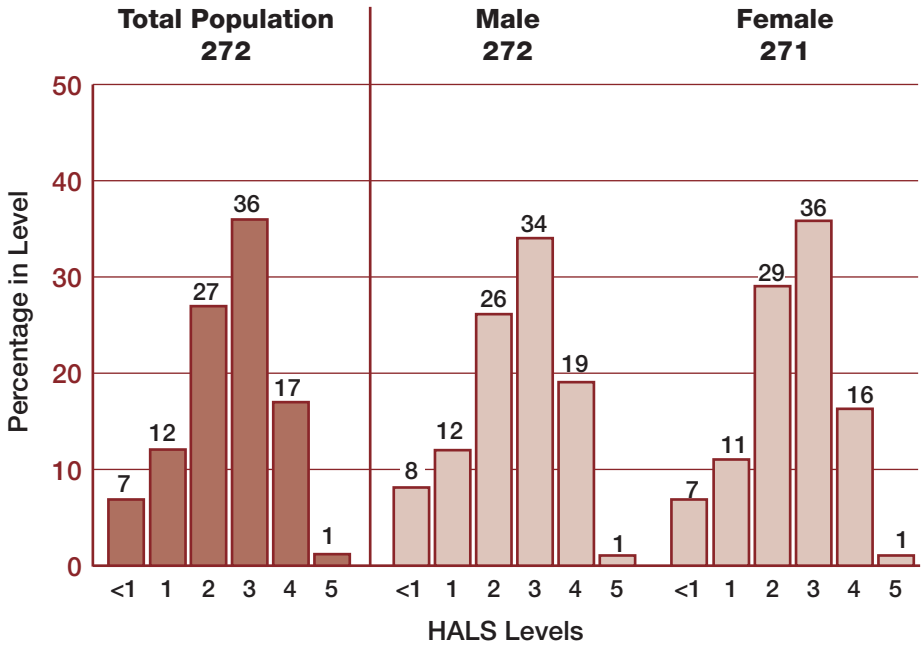
Results for the Total Population and by Gender

The average overall score of 272[32] on the HALS is similar to the average score on the three literacy scales[33] reported in the NALS with a mean score of 270. There is no significant difference between men and women on the HALS. As shown in Figure 3, their average scores on this scale are 272 and 271, respectively. Nineteen percent (19%) of the adult population performs in Level 1 or below on the HALS. Of these, some 12% of the total adult population performs health literacy tasks associated with Level 1 while an additional 7% are estimated to be below this level and thus unable to perform even these simple tasks with a high degree of proficiency. Interestingly, some 41% of those performing below Level 1 on the HALS reported being born in a Spanish-speaking country while some 51% reported being born in the United States. The remaining 8% reported being born in other countries. In 1992 there were some 191 million adults aged 16 years and older in the United States. Some 13 million are estimated to be performing below Level 1 while an additional 23 million are in Level 1 of the HALS.

While there is no significant difference in the average health activity literacy score for men and women, average proficiency on this scale does vary by other demographic variables that include education, country of birth, race/ethnicity, age, and access to resources.

Figure 3:

Average HALS Proficiency Scores and Percentage at Each Level, Overall and by Gender



[32] The standard deviation for the total population on this 500 point scale is 61.

[33] See Appendix B for a table showing the comparison of mean scores on HALS and each of the three literacy scales in NALS for selected subgroups. Overall, mean HALS scores fall within the range of average scores across the prose, document, and quantitative literacy scales reported in NALS. This reflects, in part, the fact that the items contained in HALS are drawn from these three scales.

Results for Selected Vulnerable or At-Risk Groups

Research findings indicate that health disparities continue to exist, despite general and steady health gains in the United States over several decades.[34] These disparities have been linked to those with less than a high school education, those with racial/ethnic minority status, and those who are over the age of 65. We look at each of these groups in terms of their performance on the HALS. We also look at some of these groups in terms of other characteristics that may add to their strength or to their vulnerability. For example, among minority populations we look at performance by level of education and in terms of health status and financial resources. We take a similar look at performance among the elderly in the United States

Adults with Less than a High School Degree/GED: A measure of educational attainment is generally included in all health survey instruments and is used, along with income and occupation, as a marker of socioeconomic status. Education and income are both independently linked to health. As is noted previously, numerous health studies indicate that death rates for chronic disease, communicable diseases, and injuries are inversely related to education.[35] Education is also an important benchmark for building literacy skill because most U.S. states identify people who are in need of adult education services as those who are 16 years of age and older, not in school, and who have not earned their high school diploma or GED. As stated in the 1975 book *Toward a Literate Society: The Report of the Committee on Reading of the National Academy of Education:*

> *We take the position that the "reading problem" in the United States should not be stated as one of teaching people to read at the level of minimum literacy, but rather as one of ensuring that every person arriving at adulthood will be able to read and understand the whole spectrum of printed materials that one is likely to encounter in daily life. … our national educational policy is that every child is expected to complete at least the twelfth grade; we ought then to expect every child to attain twelfth-grade literacy.*[36]

Figure 4 indicates that those adults who have not completed high school or earned a GED have an average score on the HALS of 220, or at the upper end of Level 1. Those who either graduated from high school or earned their GED achieved an average score of 271, and those who continued their education beyond high school obtained an average score of 306. Perhaps more alarming is the fact that, among those adults who did not complete high school, some 22% performed below Level 1 on the HALS while 26% were in Level 1 and 33% in Level 2. That is to say, almost half (48%) do not score above Level 1 and slightly more than 80% do not score above Level 2. By comparison, only 14% of those who completed their high school education and only 4% of those who attended school beyond high school were found to be in or below Level 1. In 1992, there were some 52 million adults who had not completed high school or earned their GED. Consequently, large percentages of adults in the United States with limited education would be expected to have a great deal of difficulty successfully performing a broad range of the health-related literacy activities found in our society.

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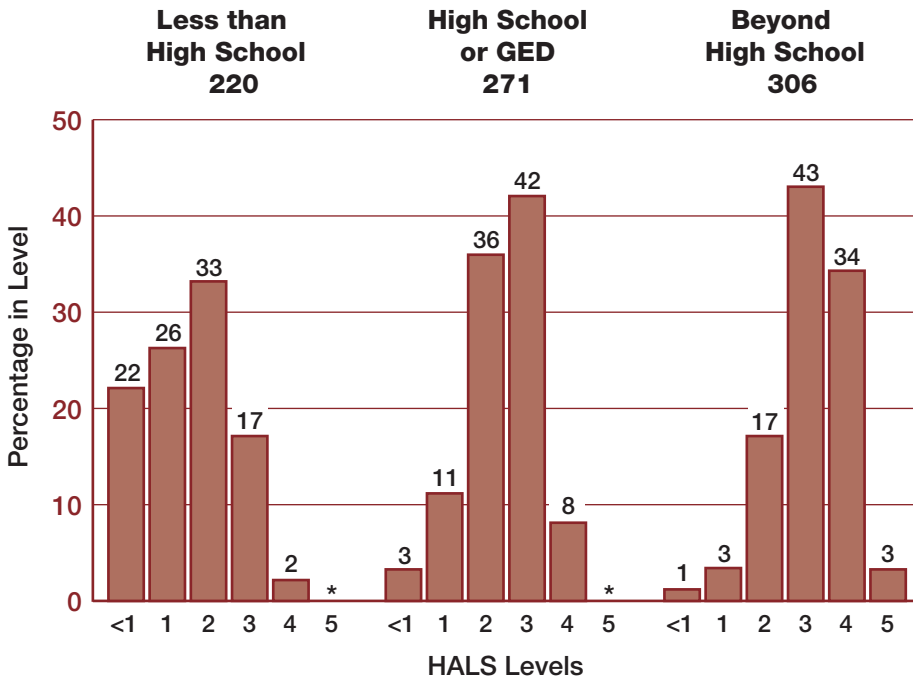
[34] E. Pamuk, D, Makuc, K. Heck, C. Reuben, & K. Lochner, *Socioeconomic Status and Health Chartbook. Health, United States, 1998.* Hyattsville, MD: National Center for Health Statistics, 1998.

[35] K.G. Keppel, J.N. Pearcy, & D.K. Wagner, "Trends in Racial and Ethnic-specific Rates for the Health Status Indicators: United States, 1990-98," *Healthy People Statistical Notes*, No.23, Hyattsville, MD: National Center for Health Statistics, 2002.

[36] J.B. Carroll and J.S. Chall (eds.), *Toward a Literate Society: The Report of the Committee on Reading of the National Academy of Education*. New York: McGraw Hill, 1975.

Figure 4:

Average HALS Proficiency and Percentage at each Level by Education



*Percentage less than .5

Adults from Minority Population Groups: Despite improvement in the health of Americans during the 20th century, large differences in health and health care use among racial and ethnic groups remain.[37] The Institute of Medicine (IOM) report on racial and ethnic disparities in health care notes that Black adults have the highest rates of morbidity and mortality of any U.S. racial and ethnic group, and that American Indians and Alaskan Natives experience higher mortality rates than White adults and also have low life expectancy, as do other racial and ethnic minority population groups. Racial and ethnic minority Americans are less likely to possess health insurance. In addition, the report notes that racial discrimination persists in "a wide range of important aspects of American life." The experiences of bias and discrimination are, according to the IOM report, likely to affect people's perceptions and responses in health care settings.[38]

The population of the United States is diverse and is becoming more diverse in terms of our racial and ethnic mix. For example, at the time of the NALS survey in 1992, the percentage of Americans of Asian or Pacific Island origin had increased by 100% during the decade of the 1980s and the percentage of individuals reporting Hispanic origin had increased by 50%. The racial and ethnic composition of our population continues to change today. In 2000 more than 12% of the U.S. population identified themselves as Hispanic and almost 4% as Asian or Pacific Islander.

[37] K.G. Keppel, J.N. Pearcy, & D.K. Wagener, 2002.

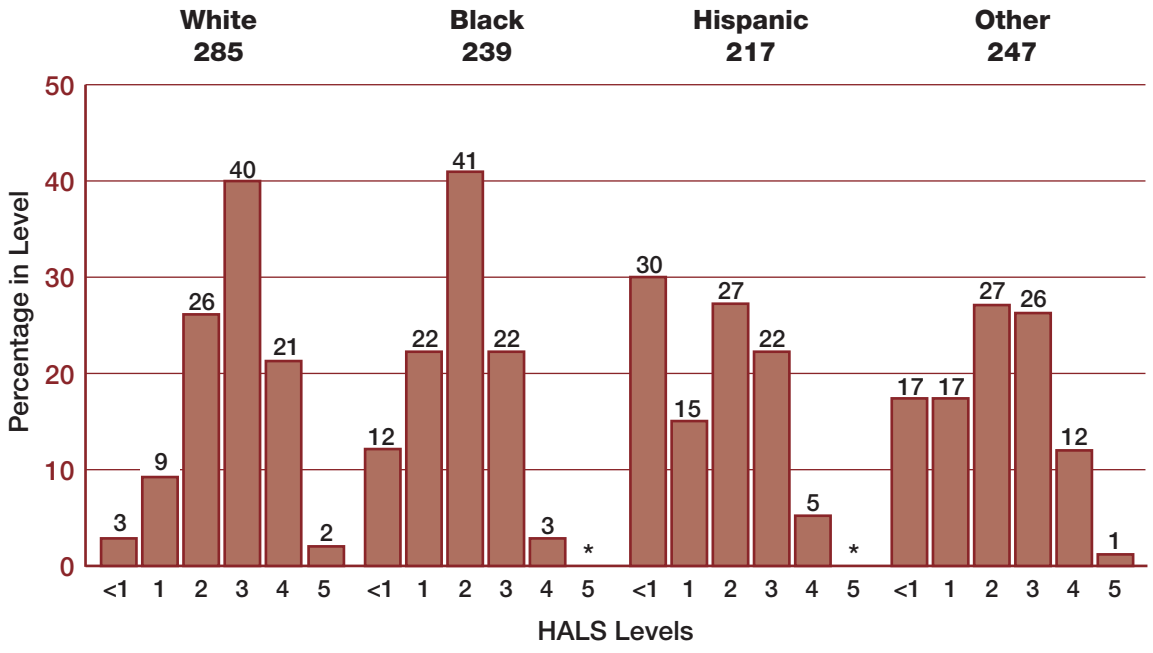
[38] B.D. Smedley, A.Y. Stith, & A.R. Nelson (eds.), *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care.* Washington, DC: The National Academies Press, 2003.

Of additional interest for our examination of minority population groups is the increase in the number of new immigrants into the United States over the past several decades.[39] An understanding of the health-related literacy proficiencies of this population is important as we interpret the health-related literacy skills of the total adult population and of minority population groups. These findings will also help us address the potential need for public policies addressing health-related issues among the foreign born. Furthermore, we will need to be attentive to the social and political forces shaping immigration and the opportunities individuals have had to develop literacy in their native languages.

Results by Race/Ethnicity: As is illustrated in Figure 5, the average proficiency of White adults on the HALS (285) is significantly higher than the average proficiency of Black (239), Hispanic (217), and other adults (247) living in the United States. It is also worth noting the disparity between the percentage of White adults who are performing below Level 1 compared with Black, Hispanic, and other populations.

Figure 5:

Average HALS Proficiency and Percentage at each Level by Race/Ethnicity



*Percentage less than .5

[39] A. Sum, I.S. Kirsch, & K. Yamamoto, A *Human Capital Concern: The Literacy Proficiency of U.S. Immigrants*. Policy Information Center, Center for Global Assessment, Educational Testing Service, March 2004.

With the exception of White adults, more than 10% of each of the other racial/ethnic groups reported here are estimated to be below Level 1. Among Hispanic adults, some 30% perform below Level 1. The observed differences among racial/ethnic groups reflect the influence of many variables such as education, resources, and/or immigrant status. As shown previously, education has a strong relationship with proficiency on the health activities scale. Differential access to education for disadvantaged population groups based on race/ethnicity may, for example, explain some of these observed differences.

Table 5 illustrates the HALS scores among Black and Hispanic adults based on education, health, and income. HALS scores increase, for both of these groups, with increases in educational attainment, in health status (as measured by not having a condition that limits participation in activities), and in income (as measured by poverty status, or access to financial resources).

Table 5:

Average HALS Proficiency Among Black and Hispanic Adults, by Selected Characteristics

	Black		Hispanic	
	Mean	SD	Mean	SD
TOTAL	**239**	**53**	**216**	**81**
By Education Level				
Less than High School	206	54	171	75
High School or GED	247	37	246	58
Beyond High School	273	38	276	55
By Health Status				
Limiting condition	198	57	193	60
No limiting condition	236	57	247	47
By Poverty Status				
Poor/Near Poor	222	53	193	78
Not Poor	257	47	252	67
By Whether They Earn Interest from Savings				
No	232	52	202	80
Yes	270	45	275	56
By Whether They Receive Dividends				
No	235	52	209	80
Yes	282	38	290	51

Results by Country of Birth/Language Group: According to the 1990 Census, approximately 14% of the U.S. population reported speaking "a language other than English at home."[40] In the 2000 Census this percentage increased to approximately 18%, with 23% of that group reporting that they spoke English "Not well" or "Not at all." About 70% of the non-native speakers of English are native speakers of Spanish; however, the language diversity is vast among the remaining 30% of non-native English speakers.[41] Noted in the IOM report referenced above, many adults from racial and ethnic minority groups find that language barriers and cultural misperceptions are very problematic in their efforts to access health care. In addition, non-native speakers of English face issues related to informed consent and shared decision making as well as to their ability to follow a medical regimen, keep appointments, or obtain important information about illness and medicines.[42]

As Table 6 illustrates, the average HALS proficiency scores among non native-born adults are significantly below those of the native adult population. Adults born in the United States have an average HALS proficiency of 278, or slightly above the average score of adults who terminated their education with a high school diploma or GED (271). Adults who were born in Spanish-speaking countries have an average HALS proficiency of 170. This score is more than 100 points, or 1.75 standard deviations, below the average HALS proficiency of adults born in the United States. Adults from European language countries have an average HALS proficiency of 253, or 25 points below native-born adults. Adults from Asian countries have an average proficiency of 235, or some 43 points below native-born adults. Foreign-born adults from European and Asian countries have an average HALS proficiency on the health-related literacy scale that is in the middle of Level 2 while adults who were born in Spanish-speaking countries have an average HALS proficiency below Level 1.

Table 6 also illustrates that nearly all White and Black adults report being born in the United States while only about half (52%) of Hispanic adults report being born in the United States. Black adults score higher on average on this health literacy scale compared to Hispanic adults. However, Hispanic adults born in this country tend to have higher proficiencies than Black adults who were born in the United States. The score difference between White and Hispanic adults is 100 points; however, the difference is reduced to 30 points when the comparison is made between native-born White and Hispanic adults.

Table 6:

Percent Born in the United States and Average HALS Proficiency by Race/Ethnicity and Country of Birth/Language Group

Race/ Ethnicity	Percent Born in U.S.	U.S. HALS Average	Percent Born Outside U.S.	Birth Country/Language Group			
				Spanish HALS Average	European HALS Average	Asian HALS Average	Other HALS Average
Black	95%	239	5%	*	*	*	226
Hispanic	52%	256	48%	167	*	*	*
White	96%	286	4%	*	254	*	273
Other	44%	265	56%	*	*	228	241
Total	90%	278	10%	170	253	235	243

* Sample size too small to provide a reliable estimate

40 U.S. Census Bureau, *U.S. Census Abstracts*, Washington, DC, 1990.

41 U.S. Census Bureau, *Census 2000, Summary File 3.* http://www.census.gov/population/socdem/language/table1txt.

42 B.D. Smedley, A.Y. Stith, & A.R. Nelson (eds.), 2003.

Given the strength of the relationship between education and proficiency on the HALS, it is not too surprising to see the results shown in Table 7 for average health literacy proficiency among adults by level of education and by country of birth. Within the three broad levels of educational attainment used in this report, adults born in the United States perform significantly higher than those who report being born in other countries. The differences between those born in the United States and those born in other countries are smallest among those who report pursuing their education beyond the high school level and are largest among those who do not have a high school diploma or GED.

Table 7:

Average HALS Proficiency by Level of Education and Country of Birth

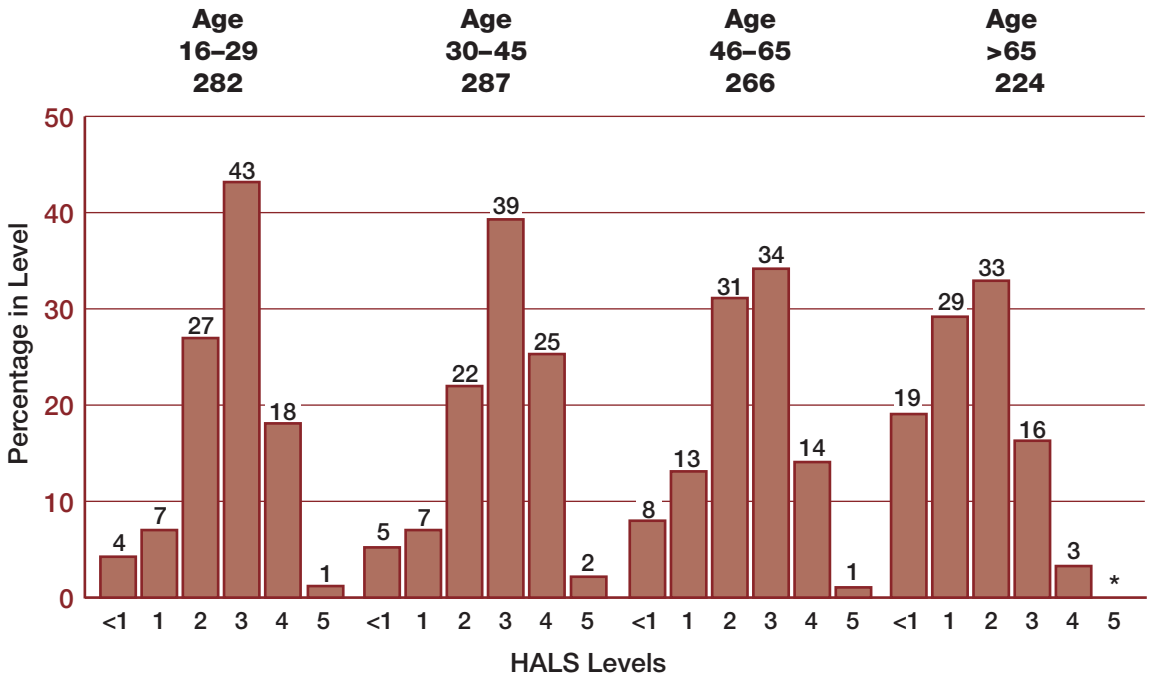
Education	Birth Country/Language Group				
	U.S.	Spanish	European	Asian	Other
Less than High School	232	138	197	179	194
High School or GED	274	206	241	209	241
Beyond High School	309	248	295	279	267

Older Adults: The proportion of the population that is elderly rose from 8% to 12% between 1950 and 2000. The U.S. Census Bureau projects that by 2050, one in five Americans will be 65 years of age or over. Understanding the health-related literacy skills of this older population is of concern to those in the health fields because the country's elders are dominant users of health care. In 1995, 79% of elders living outside institutions reported suffering from at least one chronic disease such arthritis, diabetes, or hypertension. Between 1994 and 1996 the mean number of ambulatory physician contacts among persons 65 years of age or older was 11.4 per year and the number of contacts increased with age. Older persons are the major consumers of inpatient health care.

As is illustrated in Figure 6, the average health-related literacy skills of younger populations are significantly higher than those of our older adults. Those over the age of 65 have an average health-related literacy score of 224 compared to 287 for those 30-45 years of age and 282 for those 16-29. This general pattern of rising then falling average literacy proficiency is consistent with results from both the NALS and the IALS. What is of concern here is that almost 50% of older adults in America are performing in or below Level 1 on health-related literacy tasks. Another 33% are performing in Level 2. These results suggest that older adults would have considerable difficulty dealing with the broad range of health-related tasks represented in this study.

Figure 6:

Average HALS Proficiency and Percentage at Each Level, by Age



*Percentage less than .5

Table 8 illustrates the HALS scores among older adults based on selected characteristics of education, health status, and access to resources. Health literacy proficiencies among older adults vary by these characteristics. HALS scores are higher for older adults with a high school education or above, with no health-related limitations on participation in activities, and with greater resources (as measured by poverty status or access to resources). These findings indicate that older adults with educational attainment beyond high school and those elders with access to resources have higher literacy skills than do those without such background or resources. This analysis indicates, however, that older adults have proficiency skills that are, on average, at or below Level 2. Older adults with literacy proficiency skills below Level 3 would have difficulty with many health-related tasks and would not, for example, be able to answer the more challenging questions related to the Tempra dosage chart offered earlier.

Table 8:

Average HALS Proficiency Among Older Adults by Selected Characteristics

Characteristics	Mean	SD
Adults >65	224	60
By Education Level		
Less than High School	192	54
High School or GED	240	44
Beyond High School	268	45
By Health Status		
Limiting condition	198	57
No limiting condition	236	57
By Poverty Status		
Poor/Near Poor	193	55
Not Poor	242	54
By Whether They Receive Dividends		
No	210	57
Yes	256	51

Additional variations in average HALS scores among elders can be seen when we examine the average scores of older adults by their race/ethnicity and level of education. What we see in Table 9 is that some 72% of Black older adults, 83% of Hispanic older adults and 44% of White older adults report not completing high school. Within this population, Black and Hispanic older adults have average scores on the health proficiency scale that are below Level 1, while White older adults who did not complete high school are in the middle of Level 1. Even though average proficiencies increase with more education, they do not exceed Level 2 among any racial/ethnic subpopulation.

Table 9:

Average HALS Proficiency Among Adults Over 65 by Education and Race/Ethnicity

Race/Ethnicity	Level of Education					
	Less than High School		High School or GED		Beyond High School	
	Percent	Mean	Percent	Mean	Percent	Mean
Black	72%	159	11%	220	17%	237
Hispanic	83%	135	10%	237	6%	*
White	44%	204	27%	242	28%	271
Other	60%	149	14%	171	20%	*

* Sample size too small to provide reliable estimate

The previous section of this report profiled the health literacy proficiencies of the adult population and of selected subpopulations. In presenting these data, we identified the health literacy of adults who might be considered at-risk or vulnerable. These include adults with limited education, those from racial and ethnic minorities, those born outside the United States, those with limited financial resources, and those over the age of 65. As is noted earlier, among people aged 25 to 64 years, the overall death rate for those with less than 12 years of education is more than twice that for people with 13 or more years of education, and those with higher incomes fare better than those with lower incomes. Literacy, long considered the foundation of education, may be one pathway explaining the link between education and health outcomes.

In this section, our focus shifts to looking at how these subpopulations' skills vary with respect to several areas of interest including access to financial resources, health status, reading engagement, and civic engagement. The background questionnaire included in the NALS contained a number of questions that were related to each of these four issues. A better understanding of how proficiency with health-related tasks is associated with these areas might offer additional insight into health-related outcomes. In the previous section, we focused primarily on single variables. We have chosen, in this section, to take a more complex view by creating indices using Latent Class Analysis (LCA) to help us identify groups of individuals within each of these areas of interest. LCA provides a means for organizing individuals into groups or classes based on their patterns of responses to sets of questions related to financial resources, health status, reading activities, and civic engagement. We then look at how these classes, or clusters, of adults relate to performance on the HALS overall and by selected subgroups.[43]

HALS and Wealth Status

In 1996 the percent of adults reporting fair or poor health was four times as high for persons living below the poverty level as for those with family income of at least twice the poverty level.[44] The background questionnaire from the NALS contained numerous questions related to resources as measured by wealth and income as well as to lack of resources as measured by receipt of welfare or food stamps. Questions included whether one was classified as living below poverty as determined by federal standards (1992) as well as sources of income. An LCA analysis of these items resulted in the identification of five classes of adults by wealth/income:

- **Class 1** (33% of sample): This group of adults is characterized by the absence (or low probability) of their response to any variable indicating poverty or public assistance and a high likelihood that they have assets that provide them with income from savings and/or dividends. In addition, this group tends to be employed adults over the age of 30.
- **Class 2** (37% of sample): Like Class 1, this group of adults is characterized by the absence of their response to any variable indicating poverty or public assistance. They differ from Class 1 in that they report not having sources of income from savings or dividends. These tend to be young adults who are either in school or the workplace but have not yet acquired assets that can provide them with a source of income.
- **Class 3** (13% of sample): Unlike adults in either Class 1 or 2, adults in this group tend to be retired and have retirement benefits that provide them with a source of income along with assets that provide additional income from savings and/or dividends.
- **Class 4** (8% of sample): Adults in Class 4 differ from those in Classes 1, 2 or 3 in that they report living in poverty and also receiving food stamps, but tend to report no income from retirement, savings, or dividends. As a result, they have no assets to provide them with a source of income beyond work and/or public assistance.

43 The LCA identifies a set of classes or groups based on a set of probabilities associated with a set of characteristics, as well as the differences in the prevalence of each characteristic across the identified groups or classes. For example, a high probability indicates a strong likelihood that a given characteristic is present, while a low probability indicates a strong likelihood that a given characteristic is absent.

44 E. Kramarow, H. Lentzner, R. Rooks, J. Weeks, & S. Saydah, Health and Aging Chartbook. Health United States, 1999. Hyattsville, MD: National Center for Health Statistics, 1999, Table 60.

- **Class 5** (9% of sample): Adults in this class tend to be retired and poor. They have a high likelihood of reporting that they receive social security but also of reporting income that is at or below government standards for poverty. Like those in Class 4, adults in Class 5 also tend to report that they receive no income from savings and/or dividends.

Table 10 shows the results of the LCA for each component of wealth status. The values in each cell represent the likelihood that an individual in that class possesses the characteristic listed at the top of each column. These probabilities help to characterize the presence or absence of each characteristic for a given class or group of adults and also reveal how each class differs from the other classes across the group of status characteristics. For example, a high probability indicates a strong likelihood that a given characteristic is present, while a low probability indicates a strong likelihood that a given characteristic is absent. The average HALS score for each class, along with the percentage of the total population composing each class, are also shown.

Table 10:

Latent Class Analysis of Adults Based on Wealth Status

Class Profiles	Percent in Class	HALS Average	Probability								
			Savings interest	Dividend Income	Other retirement/ survivor/disability	Social Security/ Railroad Income	Supplemental Security Income	Other Income	AFDC/Welfare	Food Stamps	Poverty
Class 1: Working adults with high likelihood of having savings or dividends, low likelihood of poverty	33%	309	.87	.58	.07	.02	.01	.13	.01	.00	.02
Class 2: Young adults with low likelihood of both poverty and additional assets	37%	260	.14	.01	.04	.10	.01	.17	.00	.01	.17
Class 3: Retired adults with high likelihood of additional assets	13%	255	.84	.47	.55	1.0	.03	.10	.00	.01	.05
Class 4: Adults with high likelihood of poverty and receiving food stamps, low likelihood of additional assets	8%	243	.04	.01	.03	.09	.13	.20	.63	.89	.80
Class 5: Retired adults on social security, with high likelihood of poverty, low likelihood of additional assets	9%	211	.14	.03	.19	.72	.33	.10	.07	.20	.71

As expected, the mean HALS proficiency varies by type of resources. As can be seen in Table 10, the mean HALS proficiency score is highest for working adults who report having additional assets such as income from savings or dividends and lowest for retired adults living below the poverty level. The average difference between these two groups is 98 points or 1.6 standard deviations. The mean HALS score is 44 points higher for retired adults receiving retirement benefits and income from savings and/or dividends (Class 3) than for retired adults living in poverty, on social security, with no additional assets (Class 5). This average difference is 72% of a standard deviation.

This analysis also enables us to look at two groupings of elders who have very different health literacy skill profiles. In 1997, one out of ten persons 65 years of age and older was living in a family with income below the Federal poverty line. The poverty rate was higher among older Black and Hispanic adults compared with older White persons.[45]

Furthermore, as can be noted in Table 11, the mean HALS score is higher within each of the class groups for those with a higher educational attainment. For example, retired adults with educational experience beyond high school have a higher mean HALS score than do those who have not completed high school or obtained a GED. This is true for retired adults with additional assets as well as for those retired adults living in poverty. Retired adults who have additional resources (Class 3) and whose education is beyond high school have a higher mean score on the HALS than do each of the other classes who have not completed high school or obtained a GED and all but Class 1 of those who earned a high school degree or GED. Similar results are seen in Table 11 for adults in Class 4, despite their economic condition.

Table 11:

Average HALS Proficiency by Wealth Status and Level of Education

Wealth Status	Less than High School	High School or GED	Beyond High School
Class 1: Working adults with high likelihood of having savings or dividends, low likelihood of poverty	273	291	321
Class 2: Young adults with low likelihood of both poverty and additional assets	218	267	293
Class 3: Retired adults with high likelihood of additional assets	216	257	285
Class 4: Adults with high likelihood of poverty and receiving food stamps, low likelihood of additional assets	217	264	281
Class 5: Retired adults on social security, with high likelihood of poverty, low likelihood of additional assets	188	240	261

[45] E. Kramarow et al., 1999, figure 4.

HALS and Health Status

Health surveys routinely include self-reports of health status. These self-reports correlate highly with mortality.[46] Studies indicate that minority men and women at every age report worse health than do non-Hispanic White persons. Adults over the age of 65 report worse health as well.[47] Unfortunately, the commonly used question on health surveys ("rank your health") was not asked on the 1992 NALS. However, the background questionnaire for the NALS did contain nine questions relating to the presence or absence of various health conditions and did inquire about health-related restrictions on daily activities such as work or schooling. As is noted earlier, the background questions included the presence or absence of: physical, mental, and/or health conditions; visual and/or hearing difficulty; learning disability; mental or emotional conditions; mental retardation; speech and/or physical disability; long-term illness; other health impairments; and restrictions on ability to work or go to school based on health status. A latent class analysis (LCA) used for the examination of the HALS findings identified four classes by health status. The four classes by health status are as follows:

- **Class 1** (77% of sample): This group of adults is characterized by the absence (or low probability) of their reporting any type of health condition or long-term illness.
- **Class 2** (11% of sample): Adults in this group are somewhat likely to report having either a visual or hearing condition but not one that interferes with their ability to work or go to school.
- **Class 3** (8% of sample): Adults in this group are highly likely to report having multiple physical conditions or long-term illnesses, some of which restricts their ability to work or go to school. Having a condition that limits their ability to attend classes or participate in work is a characteristic that distinguishes this group of adults from those in Classes 1 or 2.
- **Class 4** (4% of sample): Adults in this group are very similar to those in Class 3 but are more likely to have multiple conditions and are almost certain to have a condition which restricts their ability to work or go to school.

46 E.L. Idler & Y. Benyamini, "Self-reported Health and Mortality: A Review of Twenty-seven Community Studies," *Journal of Health and Social Behavior,* 38, 1997: 21-37.

47 E. Kramarow et al., 1999, figure 10.

Table 12:

Latent Class Analysis of Adults Based on Health Status

Class Profiles	Percent in Class	HALS Average	Restricting Health Problems	Physical Disability	Long-term Illness	Difficulty Seeing	Difficulty Hearing	Other Impairments	Learning Disability	Emotional Disorder	Speech Disability
			Probability								
Class 1: Low likelihood of any health condition	77%	281	.00	.00	.01	.01	.02	.01	.01	.00	.00
Class 2: Moderate likelihood of a non-interfering vision or hearing problem	11%	238	.07	.07	.08	.27	.29	.15	.11	.03	.06
Class 3: High likelihood of a restricting health condition	8%	240	.89	.61	.36	.15	.12	.22	.04	.06	.00
Class 4: High likelihood of multiple, restricting health conditions	4%	195	.95	.78	.69	.56	.43	.45	.19	.20	.16

As shown in Table 12, the majority of the NALS respondents (77%) reported no health conditions and no restrictions on their ability to work or attend school. The average HALS score was higher for those in this group (Class 1) than for those in any of the other groups (Classes 2-4). Those respondents who reported no health conditions and no restrictions on their ability to work or attend school (Class 1) had a mean health literacy proficiency of 281 (Level 3 proficiency). All others have mean proficiencies at Level 2 or below. Those reporting that they had health conditions but that these conditions did not restrict their ability to work or attend school had mean proficiencies that were some 40 points below those in Class 1. Those who reported multiple conditions which did place some restriction on their ability to work or attend school (Class 4) had a mean proficiency of 195, a difference of some 86 points or 1.4 standard deviations from those in Class 1.

Table 13:

Average HALS Proficiency by Health Status, Level of Education, and Country of Birth

Health Status	Total	Level of Education			Nativity	
		Less than High School	High School or GED	Beyond High School	U.S.	Other
Class 1: Low likelihood of any health condition	281	233	275	310	290	217
Class 2: Moderate likelihood of a non-interfering vision or hearing problem	238	202	247	285	247	160
Class 3: High likelihood of a restricting health condition	240	204	255	281	248	182
Class 4: High likelihood of multiple, restricting health conditions	195	169	235	248	201	123

In addition to the average health literacy proficiency by health status, both Table 13 and Table 14 illustrate a relationship between health status and a number of additional background characteristics including level of education, nativity, race/ethnicity and age. For example, within levels of education, those in Class 4 (who report conditions that place some restrictions on their ability to work or go to school) perform on the HALS significantly below those whose health conditions do not prevent them from engaging in these activities. In addition, their HALS proficiency is significantly below those adults who report no health condition or long-term illness.

We see a similar pattern for those born in the United States compared with those born in other countries. As is illustrated in Table 13, native-born adults without any restrictions on their ability to go to school or work have higher health literacy proficiencies (with scores of 290, 247, 248) than do those who immigrated to the United States, across the three classes.

Similarly, as is illustrated in Table 14, participants who report racial and ethnic minority status have lower health literacy scores than do White adults. Generally, across all groups, older adults score lower than do younger adults. These findings are not surprising in light of documented health disparities.

Table 14:

Average HALS Proficiency by Health Status, Age, and Race/Ethnicity

Health Status	Age				Race/Ethnicity				
	16-29	30-45	46-65	> 65	Black	Hispanic	Asian	White	Other
Class 1: Low likelihood of any health condition	285	291	277	241	251	222	254	294	252
Class 2: Moderate likelihood of a non-interfering vision or hearing problem	252	255	236	211	210	191	185	251	234
Class 3: High likelihood of a restricting health condition	267	269	244	212	215	189	223	249	205
Class 4: High likelihood of multiple, restricting health conditions	241	226	203	174	163	150	154	209	183

HALS and Reading Engagement

Public health and medicine rely heavily on the written and spoken word to disseminate information related to health alerts, scientific findings and their implications, health promotion and protection advice, preventive strategies, and patient information. Furthermore, expectations are high. U.S. adults are often expected to have sophisticated background knowledge such as knowledge of the various organs of the body or an understanding of how anthrax or asbestos might interact with the body. They are expected to have or to master those skills needed for comparing and contrasting complex health care plans, filling out forms, or advocating for rights as they interact with health and social service agencies. Health-related information is readily found in newspaper or magazine articles as well as documents such as insurance applications, nutrition labels, medicine prescriptions, and benefit packages. However, the form, structure, and language of these materials and the information therein may make retrieval of pertinent information easy or difficult, an appealing or arduous task.

Background questions on the NALS included whether or not participants read newspapers, magazines, books, or brief documents such as charts, recipes, or pamphlets. In addition, questions were asked on the NALS concerning which contents in a newspaper are read, how many magazines are read, what types of books or brief documents are read, as well as whether they were read for work or home. These variables, examined through Latent Class Analysis (LCA) resulted in the identification of four classes of adults by reading engagement:

- **Class 1** (23% of sample): This group of adults is characterized by the broad range of materials they report reading across all the contents — newspapers, magazines, books, and brief documents for home and work.
- **Class 2** (27% of sample): This group of adults is characterized by the fact that they tend to report being engaged with prose materials (books, magazines, and newspapers), but have a low probability of reporting that they read brief documents for either home or work.
- **Class 3** (16% of sample): Adults in this group are distinguished by the fact that they are highly engaged in reading brief documents at work. They also tend to have moderate probabilities for reading books, magazines, and newspapers, but these probabilities are lower than for adults in Class 2.
- **Class 4** (34% of sample): Adults in this group are the least engaged readers. They report almost no reading of brief documents at work or at home and low likelihood of reading other content as well. The probability of their being engaged in reading newspapers, magazines, and books is below 20 percent.

Table 15:

Latent Class Analysis of Adults Based on Reading Engagement

Class Profiles	Percent in Class	HALS Average	Probability: Read brief documents at work	Read books	Read magazines	Read newspapers	Read brief documents at home
Class 1: High likelihood of reading broad range of materials at home and work	23%	300	.96	.81	.80	.72	.65
Class 2: Moderate likelihood of reading books, magazines, and newspapers; low likelihood of reading documents at home and work	27%	290	.23	.60	.61	.55	.27
Class 3: High likelihood of reading documents at work; moderate likelihood of reading books, magazines, documents at home	16%	281	.93	.42	.39	.24	.48
Class 4: Low likelihood of reading any materials	34%	237	.04	.13	.15	.12	.11

As can be noted in Table 15, the average HALS scores vary by level of reading engagement, as measured by the probabilities of reading prose materials and the use of documents at home and at work. Many health-related materials are in document format and consist of lists, forms, or charts. Interestingly, those who report reading the broadest range of materials (Class 1) also have the highest average HALS scores, particularly as compared to those who report little prose and document reading (Class 4), who have the lowest average HALS scores. Researchers have not yet calculated the amount of health-related materials in document format. However, these findings indicate that reading engagement is positively correlated with HALS proficiency and that those with the most limited experience in using printed and written information are likely to experience difficulty in successfully performing many health-related literacy activities.

Within each of the class groups for reading engagement, the average health literacy proficiency scores increase with each level of educational attainment, as is illustrated in Table 16. For example, the average HALS scores at all levels of reading engagement are higher for those with educational experience beyond high school than for those with a high school diploma or GED. At the same time, among those who did not complete high school, those with high reading engagement have a higher HALS average score than do those with low reading engagement. Overall, those adults who report moderate engagement with reading (all but Class 4) and who have a high school degree/GED or beyond have Level 3 literacy proficiencies.

Table 16:

Average HALS Proficiency by Levels of Reading Engagement and Levels of Education

Reading Engagement	Less than High School	High School or GED	Beyond High School
Class 1: High likelihood of reading broad range of materials at home and work	256	284	315
Class 2: Moderate likelihood of reading books, magazines, and newspapers; low likelihood of reading documents at home and work	253	278	310
Class 3: High likelihood of reading documents at work; moderate likelihood of reading books, magazines, documents at home	238	278	305
Class 4: Low likelihood of reading any materials	201	257	283

The plethora of health information in the popular press, on the airways, and on websites can be overwhelming. Health information is presented in prose format as well as in documents. Readers are also expected to understand mathematical concepts such as risk or to calculate percentages. Overall, navigating the various sources of information, comprehending the messages, and accomplishing important health-related tasks will be difficult for those adults without a high school degree/GED and who do not engage in reading at home or work.

HALS and Civic Engagement

Numerous questions relating to civic participation were included in the NALS. Background questions included queries about how much information about the world people sought from newspapers, magazines, radio, television, and friends and family; about the use of libraries; and about voting in national elections. These items were combined under the rubric of "civic engagement" and were examined through Latent Class Analysis (LCA). This analysis resulted in the identification of five classes of adults by their civic engagement:

- **Class 1** (8% of sample): This group of adults is characterized by broad engagement in civic-related activities. They have a high likelihood of getting information from a broad set of sources in both print and non-print media. They also report using a library frequently. They do not rely on television for their information. They vote.
- **Class 2** (34% of sample): This group of adults is similar to Class 1 in that they get a lot of information from newspapers and magazines. They are also likely to get information from television and radio. They are considerably more likely than Class 1 to rely on friends and family for information and less likely to use a library. They tend to vote.
- **Class 3** (27% of sample): Adults in this group are similar to those in Class 2 except that they are not likely to use a library frequently, they rely less on friends and family, and they are less likely to get information from magazines or radio. They tend to vote.
- **Class 4** (24% of sample): Adults in this group tend to get their information from family or friends, radio, and television. There is a relatively low probability that they get a lot of their information from either newspapers or magazines and a low probability that they use a library frequently. They have an almost equal likelihood of voting as not voting, oftentimes because they are ineligible.
- **Class 5** (7% of sample): Adults in this group are the least engaged from a civic perspective. They tend not to get information from newspapers or magazines, and they tend not to use a library. Their primary source of information is television. They tend not to vote.

Table 17 shows the LCA for the five groups (classes) described above, in terms of various components of civic engagement (information sources, use of libraries, voting).

Table 17:

Latent Class Analysis of Adults Based on Civic Engagement

Class Profiles	Percent in Class	HALS Average	Get information from newspapers	Get information from magazines	Get information from radio	Get information from family	Get information from television	Use library	Vote
			Probability						
Class 1: High likelihood of voting and getting information from broad range of sources; low likelihood of using television as information source	8%	311	.93	.76	.72	.56	.00	.67	.84
Class 2: High likelihood of getting information from a broad range of sources, including television; moderate likelihood of using library	34%	283	.99	.92	.80	.83	.72	.48	.67
Class 3: High likelihood of getting information from newspapers; moderate likelihood of using other sources of information; low likelihood of library use	27%	267	.89	.45	.54	.44	.74	.22	.70
Class 4: High likelihood of getting information from family, radio, and television; moderate likelihood of using newspapers and magazines as information sources; low likelihood of library use	24%	263	.50	.33	.82	.79	.74	.27	.45
Class 5: Moderate likelihood of getting information from family, radio, and television; low likelihood of using newspapers, magazines, and library	7%	210	.05	.03	.37	.38	.56	.10	.35

As can be noted in Table 17, those adults who tend not to vote or use a library and whose primary source of information is television (Class 5), have significantly lower HALS scores (210) than do those adults who vote, use the library, and get information from a broad range of sources (311). Health is a popular topic and is commonly addressed in all media. Although no studies have compared various sources of health information to determine the best channel of health communications, early studies of direct-to-consumer advertisements on television, a relatively recent advertising campaign, offer insights. The advertisements present benefits and risks in different formats, and viewers may be more likely to identify and recall benefits than they are to note risks.[48]

Furthermore, within each of the class groups for civic engagement, the average HALS score increases with each level of educational attainment, as is illustrated in Table 18. For example, the average HALS scores at all levels of civic engagement are higher for those with educational experience beyond high school than for those with a high school diploma or GED. At the same time, among those who did not complete high school, those with high civic engagement have a higher HALS score than do those with a low civic engagement.

Table 18:

Average HALS Proficiency by Civic Engagement and Level of Education

Civic Engagement	Less than High School	High School or GED	Beyond High School
Class 1: High likelihood of voting and getting information from broad range of sources; low likelihood of using television as information source	260	287	322
Class 2: High likelihood of getting information from a broad range of sources, including television; moderate likelihood of using library	244	272	307
Class 3: High likelihood of getting information from newspapers; moderate likelihood of using other sources of information; low likelihood of library use	226	270	300
Class 4: High likelihood of getting information from family, radio, and television; moderate likelihood of using newspapers and magazines as information sources; low likelihood of library use	214	272	304
Class 5: Moderate likelihood of getting information from family, radio, and television; low likelihood of using newspapers, magazines, and library	171	251	285

[48] K.A. Kaphingst, W. DeJong, R.E. Rudd, & L. Daltroy, "A Content Analysis of Direct-to-consumer (DTC) Television Prescription Drug Advertisements," *Journal of Health Communication,* 2004.

Portraits of U.S. Adults

Latent class analysis enabled us to present portraits of groups of adults who are likely to have limited health literacy proficiency. Adults with limited health literacy proficiencies are generally those adults who have not completed high school or obtained a GED, have health-related restrictions on their ability to attend school or work, are members of minority population groups, and who have immigrated to the United States. Furthermore, compared with adults who have strong health literacy proficiencies, those with limited proficiencies are:

- More likely to report living in poverty with no income from retirement, savings, or dividends,
- Less likely to report reading prose and documents, and
- Less engaged in civic activities. They are less likely to vote or to use a library, and they rely on television as a primary source of information.

Adults with low HALS proficiency are less engaged with the "information economy" that is shaping life in the United States in the 21st century. Overall, expectations and literacy related demands on the population are increasing in all sectors, including the health sector. Those without needed literacy skills are disadvantaged.[49]

[49] A. Tuijnman, "The Importance of Literacy in OECD Societies, in *Literacy, Economy and Society: Results of the First International Adult Literacy Survey*. Paris, France: Organisation for Economic Co-operation and Development, and Ottawa: Statistics Canada, 1995.

The published findings from the NALS served, over time, to draw the attention of health researchers and practitioners. Those in the health fields had long known of strong associations between education (as measured by grade completed), and health (as measured by health status, morbidity, and mortality). However, health researchers had not closely examined components of education to explore explanations for this association or the pathways linking education and health. Literacy skills have historically been considered the foundation skills of education. Findings from the NALS provided a wake up call for those among us who assumed a stronger relationship between years of schooling and the literacy skills needed to succeed in today's society. For example, some 16 to 18 percent of adults who terminated their education with a high school diploma or GED performed at Level 1 on the three literacy scales of the NALS, while another 34 to 38 percent were estimated to be at Level 2. These data also encouraged explorations of implications for health and for health policies.

Implications for Health Outcomes

Most of the researchers examining links between literacy and health outcomes have used one of two health-related reading tests designed for rapid assessments in clinical settings. The most commonly referenced assessment tools are the Rapid Estimate of Adult Literacy in Medicine (REALM)[50] and the Test of Functional Health Literacy in Adults (TOFHLA).[51] Because of the availability of these tools, researchers were able to explore differences among patients based on reading skills for a variety of health-related outcomes. A growing body of literature cites limited literacy as an inhibiting factor in accessing health information and preventive services, in comprehending illness and disease components, for understanding regimens and medications, and for outcomes such as hospitalization or disease management.[52] Consequently, these measures of reading ability have shaped the research agenda in the nascent field of health literacy and contributed to the current awareness of the importance of literacy to health outcomes.

However, while these reading assessment tools offer insight, they do not constitute measures of health literacy. Health researchers will benefit from a rigorous measure of health literacy that goes beyond word recognition or reading comprehension to differentiate between prose and document literacy, to examine oral exchange, and to calibrate quantitative skills. Adults apply prose reading skills to gather health information from newspapers, magazines, or booklets and to help them make decisions about their health, the health of others, and the health of their communities. Adults need document reading skills in order to make use of the charts and graphs found in health materials including food, product, and medicine labels. Specific types of writing skills are critical for completing open entry forms. Math skills are needed to calculate risk, compare benefits, determine timing, measure medicines, and use scales found in tools such as a peak flow meter. Patients need presentation skills to provide a narrative to a health worker who must understand illness onset and health history. A broad descriptive vocabulary is needed to present symptoms and feelings, to advocate for entitlement programs or rights, or to offer informed consent. HALS findings indicate that large percentages of vulnerable or at-risk groups in this country do not have adequate skills to meet many of the health-related demands they are likely to encounter. The full impact of the mismatch between the average skills of U.S. adults and the sophisticated demands of the U.S. health system has not yet been assessed.

It is worth noting that assessments such as the NALS and the IALS focus primarily on how well adults can read, understand, and use information associated with a broad range of printed and written materials. Skills associated with listening and speaking, while important, typically are not measured because of the costs and difficulty associated with measuring them. Yet it is likely that these skills are critically important for successfully negotiating the public health system in the United States.[53]

[50] T. Davis et al., 1991.

[51] Williams et al., 1995.

[52] R.E. Rudd, B.A. Moeykens, & T. Colton, 2000; also annotated bibliographies on the web site: www.hsph.harvard.edu/healthliteracy.

[53] I. S. Kirsch, 2001.

Implications for Health Disparities

The Institute of Medicine (IOM) Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care concluded that racial and ethnic minorities tend to receive a lower quality of healthcare than do non-minorities and are less likely to receive even routine medical procedures than are European Americans. The IOM committee noted the need for focused research on the impact of patient, provider, and institutional contributions to racial and ethnic disparities in care in order to better understand and eliminate these disparities. However, the committee strongly noted that patient-level attributes are not the major sources of health care disparities — which are rooted in historic patterns of discrimination and segregation. Thus, while the committee acknowledged the benefit of culturally appropriate education to improve people's knowledge about accessing care and to improve people's ability to participate in health-related decision-making, it strongly suggested that the greater burden of education lies with providers and institutions.[54] At the same time, however, findings from the HALS analysis indicate that members of minority population groups who are poor, lack resources, and have less than a high school education are likely to have limited literacy skills. This may well increase already existing disparities in health care. Consequently, attention to literacy skills and to the burden of poorly designed processes and materials may contribute to an understanding of needed change.

Implications for Research

Reviews of the literature reveal several research gaps.[55] First, health-related activities undertaken by healthy adults when they are at home, at work, or in the community have not been systematically studied. Research in the new field of health literacy has primarily been focused on patients within health care settings. The settings have not included dental or mental health services. Furthermore, health researchers have not yet considered the complexity of health-related tasks within these settings or within other health-related contexts such as home or work. The 300 or so assessments of the level of difficulty of health material contributed to an understanding of the mismatch between the complexity or reading level of materials and the reading skills of the intended audiences. A critical next step would be an examination of activities and tasks linked to print materials followed by assessments of whether the structure and organization of the materials facilitate or impede needed action. The earlier discussion of the *Tempra* materials illustrates the importance of considering how the intended audience will use the material and of designing materials to meet the needs of the user.

Broadening the Scope of Inquiry: The vast majority of literacy-related studies in the health fields has, to date, been narrowly focused on adults as patients and on their ability to read patient education and health care related materials. Close to 50 studies support an association between people's ability to read printed health texts and a variety of health outcomes and have set an initial foundation for future research. This report contributes to developments in this new field by offering a health activities framework for examining health activities both within and among a range of health contexts including but not limited to health care settings. These contexts or settings include home, work, and community.

The health activities framework also serves to organize a broad range of health-related literacy tasks. It is drawn from a commonly used model and includes activities undertaken to promote health, to protect health, to prevent disease, to engage in health care and maintenance, and to navigate health systems. As a result, the framework spans various health tasks such as purchasing food and products, interpreting information about air and water quality, using medicine, applying for insurance, and offering informed consent.

This report offers a focus on health literacy proficiencies because we were able to code and extract those tasks on a number of existing literacy surveys that are health-related. As a result, this report yields initial and insightful health literacy proficiency findings. The sophisticated measures used in the various adult literacy surveys further enabled us to base our analysis of health literacy proficiencies on tasks already calibrated for levels of difficulty.

[54] B.D. Smedley et al., 2003.

[55] R.E. Rudd, B.A. Moeykens, & T. Colton, 2000.

Focusing on Activities and Tasks: We note and illustrate that materials are not the only determinant of the overall difficulty of health-related activities. The complexity of the text itself cannot fully explain the challenges faced by adults as they use health materials. Any future attempts to study health literacy needs to take into account not only the range of materials associated with health literacy but also the kinds of processing that will be required to understand and use the information contained in various parts of these texts. Similar analyses are needed for oral exchange. In addition, observational studies and field inquiries can provide insight into the experiences of adults as they use a variety of health-related materials to accomplish everyday tasks.

The analysis presented here is based on the 191 health tasks used in literacy surveys and offers an initial examination of health literacy proficiency that moves beyond assessments of materials or word recognition and reading comprehension. The health-related tasks used in this analysis range from simple to complex and represent tasks undertaken in each of five health contexts. This study provides a national benchmark for looking at health literacy and for examining changes over time, within multiple health contexts, and for a variety of health-related tasks.

In addition to identifying the health literacy levels of at-risk and vulnerable populations, this study maps these proficiencies against a set of health-related tasks and not just general literacy skills. At the same time, this study shows that the distribution of health-related literacy is not independent of general literacy skills at a population or subpopulation level. While clearly some unique procedural and declarative knowledge is needed to function in health contexts, those with more general literacy skills will also be more likely to have stronger health literacy skills. The illustrated differences in literacy proficiencies based on educational attainment, poverty, and access to resources, and on majority versus minority status, indicate powerful effects of social factors. These findings set a foundation for future examinations of literacy as a mediating factor in health disparities.

Future research in the area of health literacy needs to be grounded on an understanding of the tasks adults need to perform in everyday activities related to health. A next step should entail a rigorous sampling of the range of health tasks. These tasks need to be identified across and within multiple health contexts and need to be calibrated, as was done for the NALS, for level of difficulty.

Developing New Tools: Overall, new tools may be needed to support and further health literacy research. To date, the majority of studies comparing health outcomes among those with limited reading skills and those with adequate or strong reading skills have applied one of two commonly used assessment tools. However, researchers have used various forms of these tools or made modifications in the tool itself or the scoring of the findings, making a comparison of findings across studies difficult.

In order to develop a more rigorous assessment of health literacy, greater insight is needed into the range of oral communications and written texts associated with various health-related activities. Thus, it may be useful to fund research studies that focus on the collection and analysis of such communications across various contexts and settings. A sampling of these texts could be analyzed in terms of vocabulary, content, or linguistic structure and compared across health-related activities or compared to those found in other contexts. Additional research could focus on the cognitive demands associated with various uses for these materials. The "tasks" or demands associated with these materials could also be compared with a more generic set of literacy tasks. Consequently, these analyses could serve as the basis for the development of new measures and assessments of health literacy.

Implications for Action

As was noted earlier, *Healthy People 2010* includes a health literacy objective: *improve the health literacy of persons with inadequate or marginal literacy skills.* The U.S. Department of Health and Human Services' action plan to achieve this objective includes changes in professional practice and in bureaucratic demands.[56] Adults trying to apply health information would benefit from clearer written and oral communication and improvements in the design of charts and graphs, for example. They might benefit even more if materials were designed, not only to provide information, but with tasks and audiences in mind. Materials designed from the user's perspective, based on a clear understanding of the purpose the materials serve, will lessen the burden on the user.

The Institute of Medicine report *To Err is Human* focuses on medical errors that are responsible for an immense burden of patient injury, suffering, and death. The report notes that human errors are induced by system failure.[57] Similarly, while limited literacy skills are important considerations, so too are the faulty assumptions or poor communication patterns of the health systems. As researchers rigorously delineate tasks associated with health activities and analyze the skills adults need in order to engage in health promoting action, they will be able to correct underlying assumptions or prevailing expectations. Study findings could offer insight to health planners and program developers who will be challenged to address change on individual as well as institutional levels. Attention to multiple health contexts moves beyond a vision of adults as patients and considers a full spectrum of health-related activities that adults engage in. Research inquiry can be expanded and opportunities for efficacious interventions can be enriched if the full spectrum of health activities is on the agenda.

Finally, this analysis indicates that increases in health may be linked to a stronger investment in education, most especially in poor and disadvantaged communities. Curricula in both the K-12 and adult education sectors already include instructional objectives related to skills needed for health activities such as evaluating sources of information, computing time, measurement and scaling, using and interpreting charts and graphs, estimating risk, or comparing and contrasting arguments. Action plans for these objectives need to be implemented. At the same time, educational opportunities for health professionals, administrators, and communicators need to be expanded based on a clearer understanding of literacy, an awareness of existing literacy skills among U.S. adults, and recognition of the very high expectations and demands within our society.

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[56] R. Rudd, *Objective 11-2, Improvement of Health Literacy in Communicating Health: Priorities and Strategies for Progress.* Washington, DC: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2003.

[57] L.T. Kohn, J. Corrigan, & M.S. Donaldson (eds), *To Err is Human: Building a Safer Health System*. Washington, DC: The National Academies of Science, 2001.

The various surveys from which the 191 health-related literacy tasks were selected represent different populations having various demographic characteristics. Current methodologies provide researchers with the tools needed to evaluate the performance of people even when they have been administered somewhat different tasks and when they represent different samples and populations studied over time.[58] These methodologies have been used with both student surveys such as the National Assessment of Educational Progress (NAEP) and the Programme for International Student Assessment (PISA) as well as the adult surveys discussed in this report. Therefore, even though the populations studied varied somewhat across the different surveys, the subsets of literacy tasks and the scoring rubrics that were common across the surveys were kept constant and their item parameters checked for their stability across each of the surveys. Over the years, the same item parameters have been found to fit very well to each of the subpopulations within a country as well as across countries with different languages.

Once the health-related literacy tasks had been scaled, the stability of the new item parameters was verified across each of the surveys to ensure they fit well. More than 58,000 respondents from across the various adult surveys were used to estimate and verify the health-related literacy item parameters. Because the focus of the current study is the U.S. population, the creation of the HALS used only samples from the U.S. The model used for the scaling the health literacy items from the NALS data is the two-parameter logistic (2PL) model from item response theory.[59]

Item response theory (IRT) is a mathematical model for the probability that a particular person will respond correctly to a particular item from a domain of items. This probability is given as a function of a parameter characterizing the proficiency of that person, and two parameters characterizing the properties of that item – difficulty and discrimination. One of the strengths of IRT models is that when their assumptions hold and estimates of the model's item parameters are available for the collections of items that make up the different test forms, all results can be reported directly in terms of the IRT proficiency. This property of IRT scaling removes the need to establish the comparability of number-correct score scales for different forms of the test.

The stability of the item parameters must be checked across the various survey populations to ensure the comparability of the data and the stability of the newly established scale. The common item parameters must fit well in order to justify the use of the new item parameters and to establish the stability of the new HALS. Five different approaches were used to evaluate the stability of the item parameters including: A graphical method which allows us to observe the item characteristic curves for various populations; three statistical indices which estimate the fit of each item for each population against the common item parameter (X2 statistic, the Root Mean Squared Deviation statistic, and the weighted Mean Deviation); and the impact of the item parameter on the overall proficiency estimate of a particular population. Deviations are based on the difference between model-based expected proportions correct and observed proportions correct at 41 equally spaced ability scale values. The fit of the health-related literacy tasks was remarkably good based on any conventional standard and, therefore, a single set of common item parameters could be used to describe all survey samples.

58 (i) K. Yamamoto & J. Mazzeo, "Item Response Theory Scale Linking in NAEP," *Journal of Educational Statistics* 17.2, 1992: 155-175; (ii) K. Yamamoto, "Scaling and Scale Linking," in *Technical Report on the First International Adult Literacy Survey*. Washington, D.C.: U.S. Department of Education, National Center for Education Statistics, 1994.

59 F. Lord, *Applications of Item Response Theory to Practical Testing Problems*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1980.

HALS is a new scale. Even though it is based on pre-existing items from various literacy surveys, the properties of this new scale had not been previously defined. That is, the scale could range from 0 to 100, from 200 to 800 or within some other pre-selected range. The procedure to align the health literacy activities scale with the NALS scales was based on matching two moments of the proficiency distributions – the mean and standard deviation. In this study, the provisional proficiency distribution based on the health scale was matched to the distribution of means of three NALS scale proficiency values (m=271.562 and sd=65.380). This allowed us to do a linear transformation that defines the HALS on a scale ranging from 0 to 500 having the same mean and standard deviation as the three NALS proficiency scales.

One of the benefits of the HALS lies in the fact that it uses items from existing large-scale surveys of adults. Several researchers reviewed each literacy task to determine how well it fit into the health activities framework described in this report. This adds content relevance to the scale because each item was judged to be representative of a type of health activity, thus focusing the measurement on tasks that broadly define health literacy rather than general literacy. Each of the 191 items that make up the HALS had been administered to nationally representative samples of adults. Because a large number of adults responded to each item, we were able to check how well each item behaves psychometrically. For example, each item was checked for differential performance by subsets of samples. In addition, each item was checked to determine how well it fits onto the overall scale.

Other pieces of information relating to the validity of the HALS stem from our understanding of the construct and what contributes to the difficulty of each item and its position along the health scale. The NALS database links the HALS to an extensive set of background information. This link also contributes to the validation of the HALS. Using this information, we are able to see the correlations between the HALS and a wide range of background characteristics that include age, gender, race/ethnicity, level of education, country of birth, health status, and wealth.

Appendix B:
Comparison of Mean Scores on the HALS and the NALS by Selected Background Characteristics

Mean Scores on the HALS	Selected Background Characteristics	Mean Scores on the NALS		
		Prose	Document	Quantitative
272	TOTAL	272	267	271
	By Race/Ethnicity			
285	White	286	280	287
239	Black	254	230	224
216	Hispanic	213	213	212
	By Age			
224	> 65	230	217	227
	By Gender			
272	Male	272	269	277
271	Female	273	265	266

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