

**Review of Changes to the Measurement of Disability in the
2008 American Community Survey**

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In 2008, the American Community Survey (ACS) changed the way it asks about disability. Superficially, the differences between the 2007 questions and the 2008 questions may seem unremarkable, however there are critical distinctions between the conceptual frameworks encompassing the two question sets. This paper describes some of these distinctions and demonstrates that the 2008 questions should not be used to make comparisons to earlier ACS disability estimates.

From the lessons learned during these surveys and other national disability data collection efforts, a proposal for new ACS disability questions was made and questions were tested in the 2006 ACS Content Test Survey. The *2006 ACS Content Test Evaluation Report Covering Disability* report showed the impact of the new question set in comparison with the old set and established some expectations for the kind of estimates the 2008 ACS would produce. This paper addresses the effect of the change on the production estimates and assesses expectations from the Content Test.

Development and Testing for the 2008 ACS Disability Items

Prior to 2008, the ACS and Census 2000 questionnaires asked about 6 disability concepts, captured through 3 questions, each with 2 subparts, shown in Figure 1. The first question asked people aged 5 years and older about long-lasting conditions. Sensory disability was determined by “blindness, deafness, or a severe vision or hearing impairment,” and physical disability was determined by “a condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying.” The second question asked whether because of a physical, mental, or emotional condition lasting 6 months or more, does this person have any difficulty doing specific activities. Mental disability was determined by difficulty “learning, remembering, or concentrating,” and self-care disability was determined by difficulty “dressing, bathing, or getting around inside the home.” The last question asked people aged 15 years and older about difficulty with other activities. Go-outside-home disability was determined by difficulty “going outside the home alone to shop or visit a doctor’s office,” and employment disability was determined by difficulty “working at a job or business.”

Figure 1. Questions 15 – 17 (Disability Questions), 2007 ACS Questionnaire

F Answer questions 15 and 16 ONLY IF this person is 5 years old or over. Otherwise, SKIP to the questions for PERSON 2 on page 10.

15 Does this person have any of the following long-lasting conditions:

	Yes	No
a. Blindness, deafness, or a severe vision or hearing impairment?	<input type="checkbox"/>	<input type="checkbox"/>
b. A condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying?	<input type="checkbox"/>	<input type="checkbox"/>

16 Because of a physical, mental, or emotional condition lasting 6 months or more, does this person have any difficulty in doing any of the following activities:

	Yes	No
a. Learning, remembering, or concentrating?	<input type="checkbox"/>	<input type="checkbox"/>
b. Dressing, bathing, or getting around inside the home?	<input type="checkbox"/>	<input type="checkbox"/>

G Answer question 17 ONLY IF this person is 15 years old or over. Otherwise, SKIP to the questions for PERSON 2 on page 10.

17 Because of a physical, mental, or emotional condition lasting 6 months or more, does this person have any difficulty in doing any of the following activities:

	Yes	No
a. Going outside the home alone to shop or visit a doctor’s office?	<input type="checkbox"/>	<input type="checkbox"/>
b. Working at a job or business?	<input type="checkbox"/>	<input type="checkbox"/>

By 2003, the data-user community had begun voicing their dissatisfaction with the disability questions on Census 2000 and the ACS. In response, the OMB Interagency Committee for the ACS convened an ACS Subcommittee on Disability Measurement and asked the National Center for Health Statistics (NCHS) to take the lead in assessing the adequacy of the Census disability questions. All federal agencies were invited to participate.

The subcommittee recognized that as a concept, disability involves social factors that are both internal and external to the individual, often making its measurement in surveys difficult. At the same time, researchers were looking to evaluate the social participation of the population with disabilities regarding access to employment and education. The subcommittee found that surveys could identify certain aspects of disability and estimate a population who would be likely to experience restrictions in participation due to physical, social and other environmental barriers.¹

Using the conceptual framework of disability described in the International Classification of Functioning, Disability, and Health (ICF), the subcommittee proposed initial questions. Versions of these questions were cognitively tested to assess the face validity and determine the effect of using certain terms and qualifiers. Miller and DeMaio (2006) summarized their findings and made recommendations for which versions should be included in the 2006 ACS Content Test.

The Content Test sampled about 62,900 residential addresses in the contiguous United States, using a split panel comparison of the proposed question set (test questions) with the original questions set used in the 2003-2007 ACS (control questions). From proposed research questions, selection criteria were established on which the test version would be evaluated and implementation recommendations would be based. For the disability questions, two selection criteria were: (1) whether the rates of nonresponse for the test questions were less than or equal to those for the control questions; and (2) whether the measures of reliability for the test questions were better than or equal to that of the control questions. Due to the lack of a “gold standard” and the understood conceptual differences between the two versions, achieving targeted prevalence rates was not a criterion for selection.

Figure 2. Questions 16 – 18 (Disability Questions), 2008 ACS Questionnaire

16 a. Is this person deaf or does he/she have serious difficulty hearing?
 Yes
 No
 b. Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?
 Yes
 No

F Answer question 17a – c if this person is 5 years old or over. Otherwise, SKIP to the questions for Person 2 on page 12.

17 a. Because of a physical, mental, or emotional condition, does this person have serious difficulty concentrating, remembering, or making decisions?
 Yes
 No
 b. Does this person have serious difficulty walking or climbing stairs?
 Yes
 No
 c. Does this person have difficulty dressing or bathing?
 Yes
 No

G Answer question 18 if this person is 15 years old or over. Otherwise, SKIP to the questions for Person 2 on page 12.

18 Because of a physical, mental, or emotional condition, does this person have difficulty doing errands alone such as visiting a doctor's office or shopping?
 Yes
 No

Brault, Stern and Raglin (2007) found in their evaluation of the 2006 ACS Content Test that the test questions performed better than the control questions. The test questions had equal or better nonresponse rates and the measures of reliability showed that the test questions performed better item by item and for the overall disability recode. In addition, Brault, Stern and Raglin found that the test questions resulted in different prevalence rates than the control questions. The ACS subcommittee recommended implementing the proposed set of questions, shown in Figure 2.

¹ Altman (2006), adapted from a presentation made by Scott Brown to the ICDR Conference *Developing Improved Disability Data*, July 12-13, 2006, Washington, DC.

Nonresponse and Imputation

Given the size and scope of the ACS, nonresponse is both a data quality concern and budgetary concern. In order to improve survey-level response rates, the ACS employs three modes of data collection – mail response, computer-assisted telephone interviewing (CATI), and computer-assisted personal interviewing (CAPI). The ability for ACS data to be collected through the mail helps keep the cost of data collection lower than if the full 250,000 addresses per month sample were collected through Field Representative (FR) interviews. Only when respondents fail to return the mail form do they get assigned to the CATI and CAPI collection modes. Operations such as Failed-Edit Follow-Up (FEFU) and Telephone Questionnaire Assistance (TQA) attempt to reduce the amount of individual item nonresponse.²

Table 1. Percent Disability Item Nonresponse for the Total Population (weighted)

Age Group	Percent Disability Item Nonresponse							
	Disability status	All disability items	Hearing difficulty	Vision difficulty	Cognitive difficulty (age 5+)	Ambulatory difficulty (age 5+)	Self-care difficulty (age 5+)	Independent living difficulty (age 15+)
Overall	5.4	3.8	4.0	4.2	4.6	4.7	4.6	4.6
AGE GROUPS								
Under 5	5.3	5.0	5.1	5.2	-	-	-	-
5 to 14	5.5	4.4	4.6	4.6	5.0	5.1	5.0	-
15 to 64	5.1	3.5	3.6	3.9	4.2	4.3	4.3	4.4
65 and older	6.8	4.0	4.5	5.3	5.9	6.0	5.9	6.2

Source: 2008 American Community Survey

Nonresponse rates for the total population in the 2008 ACS are shown in Table 1. Individual disability items had nonresponse rates between 4.0 percent and 4.7 percent, with 3.8 percent of respondents not responding to all age appropriate disability items. In addition, 5.4 percent of respondents did not respond with enough information to determine overall disability status.³ Figure 3 shows that in housing units (HU), mail nonresponse rates were nominally higher than those in the CATI and CAPI modes. The GQ population has high item nonresponse rates, in part due to the inaccessibility of some residents for interviews.⁴

Compared with nonresponse rates for disability items in past ACS surveys, the item nonresponse rates shown Table 1 and for the mail collection mode are higher than would be expected, likely the

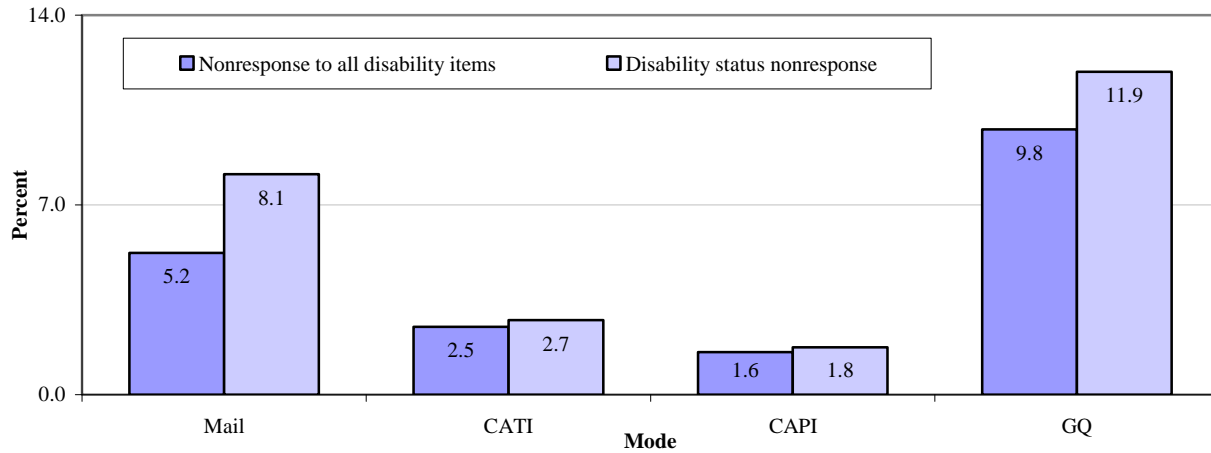
² Failed Edit Follow-up operations are used to collect missing information from two categories of failed mail cases: (1) coverage failures, where either more than 5 people are in the household because the mail form can only accommodate up to 5 household members, or where the number of people listed in the household is different from the number of people for whom answers have been provided; and (2) content failures, where two or more critical items or a specific number of other required items were not answered. For more information, see U.S. Census Bureau, *Design and Methodology*, American Community Survey, Washington, DC, 2009, available at <http://www.census.gov/acs/www/Downloads/dm1.pdf>.

³ Because disability status is determined by responses of “yes” to at least one disability question, nonresponse to “with a disability” occurs when a respondent fails to answer all age-appropriate disability items or when there are combinations of “no” and missing responses. Valid response occurs when the respondent answers “yes” to at least one question or “no” to all age-appropriate questions.

⁴ For ease of demonstration, the “disability status nonresponse” and “nonresponse to all” rates can be used to establish a range of item nonresponse for the items.

result of two contributing factors. First, respondents who were sampled at the end of 2007 but returned their mail forms during the beginning months of 2008 (“late returns”) were included as part of the 2008 ACS sample but their questionnaire did not include the new questions on disability. Operationally, the values for the disability questions were blanked. Second, due to budgetary issues, FEFU operations were scaled back from April through September. FEFU content failure collection was reduced by about 40 percent, however, coverage failure collection operations were not affected. The decline in content failure FEFU collection operations would be expected to slightly increase item nonresponse rates.

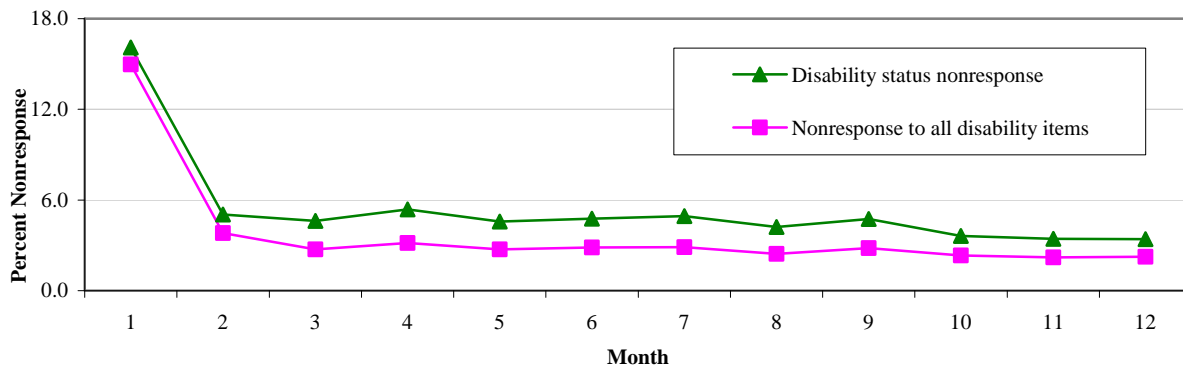
Figure 3. Percent Nonresponse for the Total Population by Mode



Source: 2008 American Community Survey

Shown in Figure 4, the late returns contributed to high nonresponse rates in January. When these late returns are excluded from the analysis, the rate of nonresponse to all disability items decreases to 2.6 percent. As late returns are only associated with the change-over from one question set to another, this is a *transitional* effect that would not be present in future data collections. Figure 4 also shows a slight increase in nonresponse between March and April and a slight decrease in nonresponse between September and October that are suggestive of the effect that the FEFU scale-back had on disability item nonresponse.

Figure 4. Monthly Disability Nonresponse for the Total Population



Source: 2008 American Community Survey

The Census Bureau handles invalid and missing data in the ACS by running an edit procedure that uses assignments and hot-deck imputation to fill in missing data. The hot deck imputation procedure for allocating values of disability status use the respondent's age, sex, employment status, and school enrollment status to find respondents of similar socioeconomic status from whom disability status is donated. Respondents who fail to answer all age-appropriate disability questions are jointly imputed the set of values, thereby maintaining response patterns. Individual item allocations then address missing values where at least one but not all disability items require imputation. Detailed tables B99181 through B99187 provide tabulated imputation information about the civilian noninstitutionalized population for available geographies.⁵

Measuring Disability in National Surveys

The disability question set was developed with the understanding that the ACS needed to be able generate reliable prevalence estimates of a population of people with a disability for a large number of geographies. Estimates of the number and percent of people with a disability would be used by federal, state, county and local governments to assess the impact of policies intended to reduce discrimination and improve participation in community activities.

Other national surveys have measures of disability but they differ from the 2008 ACS in several ways. These differences not only affect the overall estimate of disability prevalence, but also reflect slight variations in the prevalence of individual disability items. The Survey for Income and Program Participation (SIPP), for instance, uses around 80 questions about activity limitations in its supplemental questionnaire on disability, resulting in a prevalence estimate of 54.4 million people with disabilities in 2005.⁶ The SIPP questionnaire also asks about the severity of certain activities distinguishing those who have some difficulty from those who cannot perform an activity at all.

Certain methodological differences also must be considered when making comparison between surveys. The mode of collection can affect how people respond due to the presence or absence of a field representative (FR). The FR may provide information that could help respondents interpret the questions or cause respondents to shy away from revealing personal information due to existing social stigmas. In addition, communication-related difficulties might exclude participation in certain collection modes. For example, a person with vision difficulty could have difficulty completing a paper questionnaire. The multiple modes of collection in the ACS help to alleviate coverage bias by capturing those who could be missed by any one mode of collection.

The lack of a "gold standard" for benchmarking is a hurdle to establishing the validity of a new measure. Conceptual frameworks have helped to identify and acknowledge aspects of disability that are not included in various definitions but the extent to what can be considered a disability is, in itself, a barrier. Nevertheless, the comparisons shown in this paper to prior ACS and SIPP estimates are illustrative of how the 2008 ACS estimates fit in the context of measuring disability.

⁵ Available online at <http://factfinder.census.gov/>.

⁶ Brault, Matthew, *Americans with Disabilities: 2005*, Current Population Reports, P70-117, U.S. Census Bureau, Washington, DC 2008.

Prevalence of Disability Items

Despite the lack of a gold standard, questions about difficulty in certain key areas were essential to establishing an inclusive measure of disability. Any measure of disability should include concepts from the three domains of disability – communication, mental and physical– and should include Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) measures.

The communication domain is a category of disability that involves limitations to a person’s ability to communicate with others. This domain was represented by question 16 of the 2008 ACS, which had two subparts, shown in Figure 2. *Hearing difficulty*, as it is labeled, was determined by subpart (a), which asked people of all ages, “Is this person deaf or does he/she have serious difficulty hearing?” *Vision difficulty* was determined by subpart (b), which asked, “Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?” The ACS reports that about 10.4 million individuals or 3.5 percent of the civilian noninstitutionalized population experienced difficulty hearing. About 6.8 million people or 2.3 percent of the civilian noninstitutionalized population experienced difficulty seeing.

The mental domain encompasses limitations that stem from psychological or neurological conditions. In the 2008 ACS questionnaire, question 17a collected information about disability in the mental domain. This question, labeled as *cognitive difficulty*, asked respondents aged 5 years and older, “Because of a physical, mental, or emotional condition, does this person have serious difficulty concentrating, remembering, or making decisions?” About 13.4 million people or 4.8 percent of the civilian noninstitutionalized population 5 years and older were estimated to have cognitive difficulty in 2008.

The physical domain contains a wide range of limitations, but generally relates to respiratory, metabolic, and musculoskeletal body functions associated with movement. The ACS focuses on *ambulatory difficulties* in question 17b of the 2008 questionnaire, which asked respondents aged 5 years and older, “Does this person have serious difficulty walking or climbing stairs?” In 2008, about 19.2 million people or 6.9 percent of the civilian noninstitutionalized population 5 years and older had an ambulatory difficulty.

ADL questions attempt to capture difficulty with basic activities around the home associated with caring for oneself. Question 17c in the ACS questionnaire, labeled here as *self-care difficulty*, asked whether respondents aged 5 years and older had “difficulty dressing or bathing?” An estimated 7.2 million, or 2.6 percent of the civilian noninstitutionalized population 5 years and older, had a self-care difficulty.

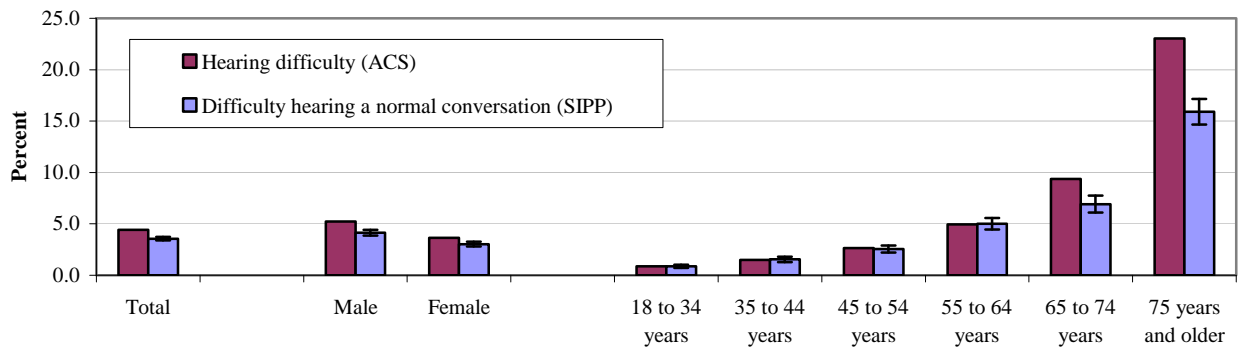
IADL questions attempt to capture difficulty with slightly more complex activities than ADLs. Labeled *independent living difficulty*, question 18 of the ACS questionnaire, asked respondents aged 15 years and older, if “Because of a physical, mental, or emotional condition, does this person have difficulty doing errands alone such as visiting a doctor’s office or shopping?” About 13.2 million people, or 5.5 percent of the civilian noninstitutionalized population 15 years and older, reported an independent living difficulty.

Overall, 36.1 million people, or 12.1 percent of the civilian noninstitutionalized population reported at least one of the six types of disability asked about in the 2008 ACS.

Comparisons to the SIPP

The SIPP topical module on functional limitations has been an established source for detailed disability data since the 1980's. The most recent tabulations from this survey are highlighted in *Americans with Disabilities: 2005* (P70-117), using data from the 2004 panel. The SIPP estimates of disability used in this paper are conceptually different from ACS estimates but measure similar topics. As such, the purpose of the comparison is to illustrate that estimates of similar concepts can result in similar prevalence rates. The similarity of two estimates does not imply that the two represent the same population. Furthermore, the interpretation of any statistical difference should be limited to discussion about the differences in the questions being used to measure the populations. Data users should not interpret differences to mean that the population of people with the disability in question has changed over the time frame between the two surveys (2005 to 2008).

Figure 5. Comparison of ACS and SIPP Hearing Difficulty Measures for the Civilian Noninstitutionalized Population 18 Years and Older

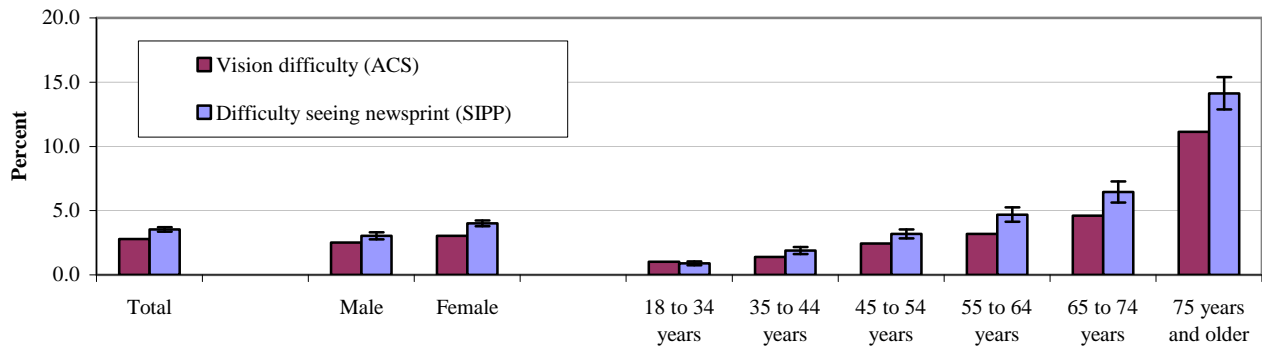


Note: The error bars shown represent the margin of error of the estimates at the 90 percent confidence level. A margin of error is a measure of an estimate's variability. The larger the margin of error in relation to the size of the estimate, the less reliable the estimate. Margins of error for ACS estimates are too small to be visible in this figure. For further information about the accuracy of estimates, including standard errors and margins of error, from the ACS see <http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm>, and from the SIPP, see [http://www.census.gov/sipp/sourceac/S&A04_W1toW12\(S&A-9\).pdf](http://www.census.gov/sipp/sourceac/S&A04_W1toW12(S&A-9).pdf).

Sources: 2008 American Community Survey and 2004 Survey of Income and Program Participation

Figure 5 shows that estimates of hearing difficulty in the ACS are statistically higher than similar hearing difficulty estimates in the SIPP, overall and for males and females. The two measures are not statistically different for the age groups under 65 years; however, the two measures start to diverge as age increases. While the ACS does not specify explicit types of hearing impairment or use of assistive devices, the SIPP question on hearing difficulty asks “Does this person have difficulty hearing what is said in a normal conversation with another person?” or if the respondent had indicated use of a hearing aid, it asks “Does this person have difficulty hearing what is said in a normal conversation with another person, even when wearing his/her hearing aid?” Because the SIPP explicitly defines difficulty in relation to hearing a conversation, it implicitly excludes other types of hearing difficulty. In addition, cognitive research for the ACS Content Test showed that most respondents interpreted the use of a hearing aid to presume hearing difficulty, whereas the SIPP exempts difficulty that is corrected by the device. These two factors suggest that the ACS hearing difficulty question is more inclusive and would capture higher rates of hearing difficulty, especially among hearing aid users.

Figure 6. Comparison of ACS and SIPP Vision Difficulty Measures for the Civilian Noninstitutionalized Population 18 Years and Older

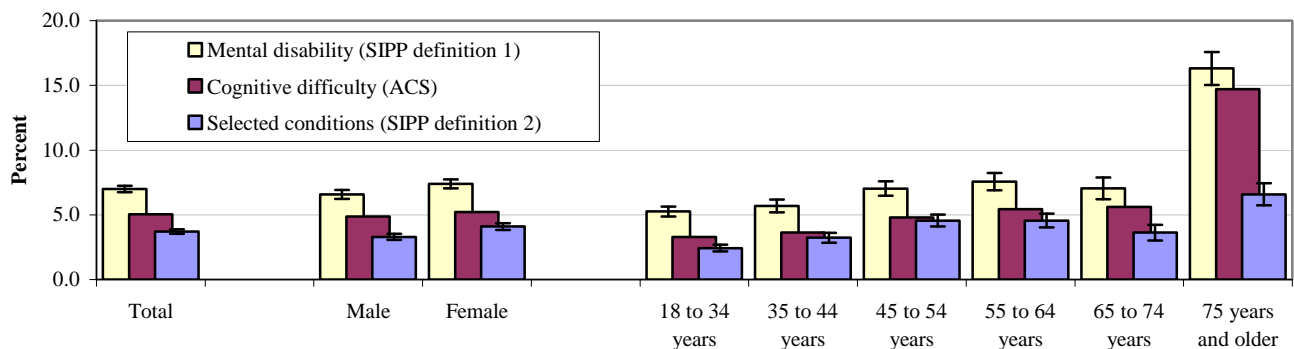


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Sources: 2008 American Community Survey and 2004 Survey of Income and Program Participation

Estimates of vision difficulty in the ACS are statistically lower than similar estimates in the SIPP, both overall and for males, females, and almost all age groups, as shown in Figure 6. The measures are not statistically different among the population 18 to 34 years old. The SIPP questions on vision difficulty ask, “Does this person have difficulty seeing the words and letters in ordinary newspaper print even when wearing glasses or contact lenses if he/she usually wears them?” While the ACS question does not specifically define vision difficulty in relation to a particular activity, it does contain the language “serious difficulty seeing” which may lead respondents with lesser degrees of difficulty to answer “no.” The severity qualifier could be responsible for apparent differences between the SIPP and ACS estimates.

Figure 7. Comparison of ACS and SIPP Mental Disability Measures for the Civilian Noninstitutionalized Population 18 Years and Older

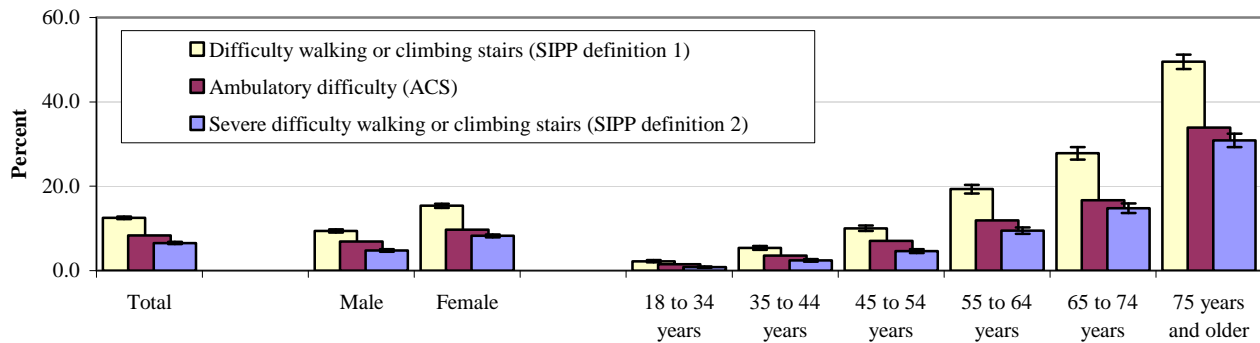


Note: The error bars shown represent the margin of error of the estimates at the 90 percent confidence level. A margin of error is a measure of an estimate’s variability. The larger the margin of error in relation to the size of the estimate, the less reliable the estimate. Margins of error for ACS estimates are too small to be visible in this figure. For further information about the accuracy of estimates, including standard errors and margins of error, from the ACS see <http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm>, and from the SIPP, see [http://www.census.gov/sipp/sourceac/S&A04_W1toW12\(S&A-9\).pdf](http://www.census.gov/sipp/sourceac/S&A04_W1toW12(S&A-9).pdf).

Sources: 2008 American Community Survey and 2004 Survey of Income and Program Participation

Comparing the cognitive difficulty measure from the ACS with mental disability measures from the SIPP presents some challenges. There is no one measure of mental disability in the SIPP that is conceptually similar to the ACS measure. Instead, by looking at two related measures of mental disability in the SIPP, one more inclusive and the other more restrictive⁷, it is possible to see how the ACS cognitive difficulty estimates fit in respect to other definitions. Figure 7 shows that the ACS cognitive difficulty prevalence estimates fall between the two SIPP measures for all sex and age groups.⁸ Intuitively, the ACS measure appears to capture more specific aspects of cognitive functioning than the inclusive mental disability measure but captures aspects of the mental disability that the more restrictive SIPP measure does not. Among the younger age groups, the ACS estimate appears to resemble the more restrictive measure, however in the older age groups, the estimates appear more like the general mental disability measure.

Figure 8. Comparison of ACS and SIPP Difficulty Walking or Climbing Stairs Measures for the Civilian Noninstitutionalized Population 18 Years and Older



Note: The error bars shown represent the margin of error of the estimates at the 90 percent confidence level. A margin of error is a measure of an estimate's variability. The larger the margin of error in relation to the size of the estimate, the less reliable the estimate. Margins of error for ACS estimates are too small to be visible in this figure. For further information about the accuracy of estimates, including standard errors and margins of error, from the ACS see <http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm>, and from the SIPP, see [http://www.census.gov/sipp/sourceac/S&A04_W1toW12\(S&A-9\).pdf](http://www.census.gov/sipp/sourceac/S&A04_W1toW12(S&A-9).pdf).

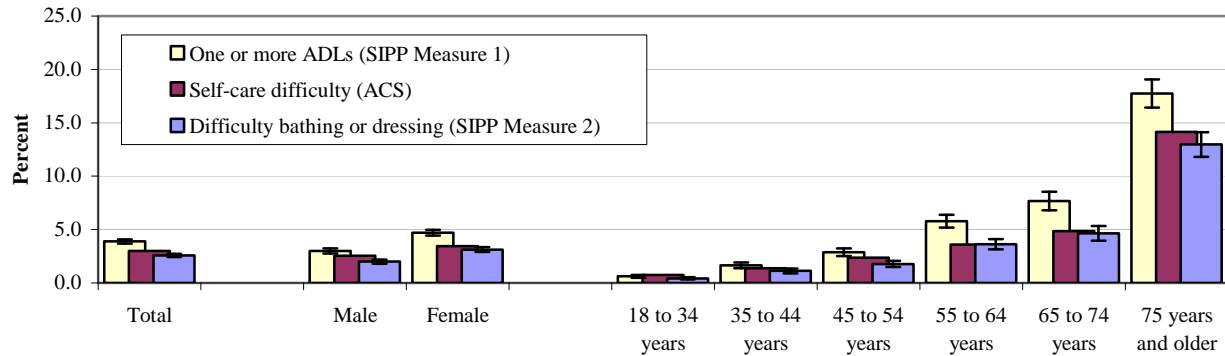
Sources: 2008 American Community Survey and 2004 Survey of Income and Program Participation

For estimates of ambulatory difficulty, the SIPP provides degrees of severity against which the ACS measure can be portrayed. Whereas the ACS measure asked about serious difficulty walking or climbing stairs, the SIPP measure asks about difficulty with each activity and follows up with questions about whether the respondent can perform the activity at all. The resulting measures show two levels of difficulty walking or climbing stairs. As shown in Figure 8, the ACS ambulatory difficulty measure falls in between the two SIPP measures, implying that it may capture difficulty that is more severe than the basic SIPP measure of difficulty walking or climbing stairs, but less severe than the measure of being unable to perform at least one of the activities.

⁷ The mental disability measure (definition 1) in the SIPP is defined by the reporting of a learning disability, mental retardation or some other developmental disability, Alzheimer's disease, a mental or emotional condition that interfered with everyday activities, or had difficulty managing finances. The selected mental disability symptoms measure (definition 2) is defined by the reporting of mental or emotional conditions that interfere with everyday activities. Definition 1 is more inclusive whereas definition 2 is more restrictive.

⁸ The percent with a cognitive difficulty in the ACS among people aged 45 to 54 years was not statistically different from the percent with selected mental disability symptoms (SIPP definition 2).

Figure 9. Comparison of ACS and SIPP Activities of Daily Living (ADL) Measures for the Civilian Noninstitutionalized Population 18 Years and Older

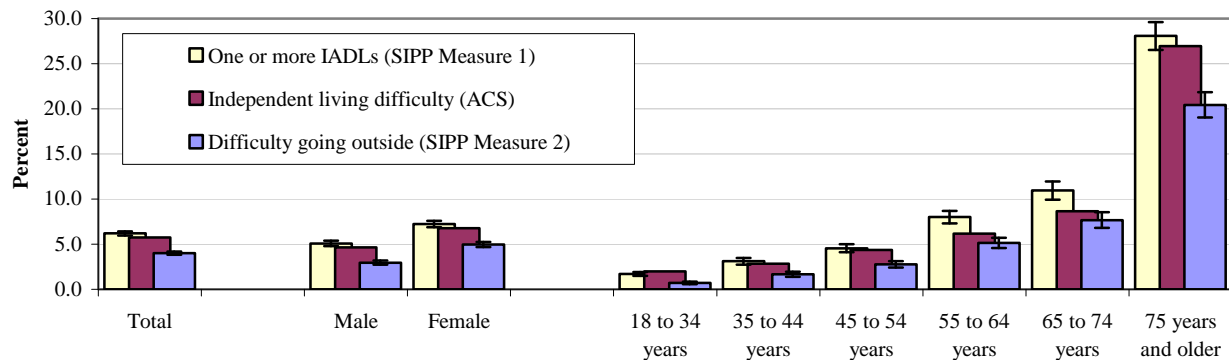


Note: The error bars shown represent the margin of error of the estimates at the 90 percent confidence level. A margin of error is a measure of an estimate's variability. The larger the margin of error in relation to the size of the estimate, the less reliable the estimate. Margins of error for ACS estimates are too small to be visible in this figure. For further information about the accuracy of estimates, including standard errors and margins of error, from the ACS see <http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm>, and from the SIPP, see [http://www.census.gov/sipp/sourceac/S&A04_W1toW12\(S&A-9\).pdf](http://www.census.gov/sipp/sourceac/S&A04_W1toW12(S&A-9).pdf).

Sources: 2008 American Community Survey and 2004 Survey of Income and Program Participation

ADL and IADL measures in the SIPP are determined by item-by-item questions of activities, similar to ADL and IADL scales used other health survey instruments. This allows the ACS self-care difficulty estimate to be shown against estimates combining all ADL difficulties and just those of bathing and dressing. Figure 9 demonstrates that the ACS measure falls between the prevalence of people with at least one ADL and those with difficulty bathing and dressing.⁹ The apparent relationship between the SIPP and ACS questions is expected given that prior research by Rogers and Miller (1997) found a count of ADLs presented better construct validity than a single question measure; however, a single measure could be useful as a proxy indicator.

Figure 10. Comparisons of ACS and SIPP Instrumental Activities of Daily Living (IADL) Measures for the Civilian Noninstitutionalized Population 18 Years and Older



Note: The error bars shown represent the margin of error of the estimates at the 90 percent confidence level. A margin of error is a measure of an estimate's variability. The larger the margin of error in relation to the size of the estimate, the less reliable the estimate. Margins of error for ACS estimates are too small to be visible in this figure. For further information about the accuracy of estimates, including standard errors and margins of error, from the ACS see <http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm>, and from the SIPP, see [http://www.census.gov/sipp/sourceac/S&A04_W1toW12\(S&A-9\).pdf](http://www.census.gov/sipp/sourceac/S&A04_W1toW12(S&A-9).pdf).

Sources: 2008 American Community Survey and 2004 Survey of Income and Program Participation

⁹ The percent with a self-care difficulty was not statistically different from the percent with difficulty bathing or dressing (SIPP measure 2) for people aged 55 to 64 and 65 to 74 years.

Figure 10 shows that the ACS independent living difficulty estimates follows a similar trend with the SIPP measures of IADL limitations – both the one or more IADLs measure and the difficulty going out measure – as the ADL questions did in Figure 9.¹⁰ Like the ADL measure, the independent living difficulty estimate appears to be a useful indicator of IADL limitations.

While looking at individual disability items in the SIPP is useful, the overall definition of disability is very different from ACS and should not be used to make comparisons.

ACS Disability in the 2007 and 2008

Because of the conceptual differences between the 2007 and 2008 ACS disability questions, the Census Bureau does not encourage data users to make comparisons between the 2008 disability estimates and prior ACS disability estimates. Differences between the estimates from 2007 and 2008 are reflective of both the real change in disability status and the difference in measurement. The combination of these two factors can be cumulative, resulting in apparent differences that may appear larger than what really occurred, or offsetting, resulting in what appears to be no change when change may have occurred. This effect may occur for both individual items and for the overall disability status measure.

Table 2. Comparison of 2007 ACS Sensory Disability to 2008 ACS Hearing/Vision Difficulty Recode for the Civilian Noninstitutionalized Population 5 Years and Older

Age group	2008 ACS Hearing or vision difficulty				2007 ACS Sensory disability				2008 - 2007 differences	
	Number	MOE [†]	Percent	MOE [†]	Number	MOE [†]	Percent	MOE [†]	Number	Percent
5 years and older	14,786,038	69,880	5.3	0.1	11,696,680	59,046	4.2	0.1	3,089,358*	1.1*
5 to 14 years	514,093	13,493	1.3	0.1	429,274	12,224	1.1	0.1	84,819*	0.2*
15 to 34 years	1,375,301	20,589	1.7	0.1	1,122,692	20,682	1.4	0.1	252,609*	0.3*
35 to 64 years	5,535,981	39,919	4.6	0.1	4,251,539	32,210	3.6	0.1	1,284,442*	1.1*
65 to 74 years	2,459,611	24,444	12.4	0.1	1,847,155	20,713	9.6	0.1	612,456*	2.7*
75 years and older	4,901,052	31,363	28.3	0.2	4,046,020	24,915	23.6	0.1	855,032*	4.7*

[†] The margin of error (MOE) is a measure of an estimate’s variability. The larger the margin of error in relation to the size of the estimate, the less reliable the estimate. For further information on the accuracy of estimates, including standard errors and margins of error, see <http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm>. The margins of error shown here are at the 90 percent confidence level.

* Statistically different from zero at the 90 percent confidence level

Sources: 2007 and 2008 American Community Surveys

Before 2008, the ACS contained a single sensory question that identified people who had “blindness, deafness, or a severe vision or hearing impairment.” As shown in Table 2, roughly 14.8 million people aged 5 years and older (5.3 percent) reported either a hearing or vision difficulty in the 2008 ACS while 11.7 million people (4.2 percent) reported a sensory disability in the 2007 ACS. About 3.1 million (1.1 percentage point) more people reported difficulty to what appears to be the same measure. The difference between the 2008 recode and the 2007 sensory disability

¹⁰ The percent with an independent living difficulty was not statistically different from the percent with one or more IADLs (SIPP measure 1) in the 35-to-44 years, 45-to-54 years, and 75 years and older age groups. Among people aged 64 to 75 years, the percent with an independent living difficulty was not statistically different from percent with difficulty going outside (SIPP Measure 2).

measure may be attributed to a misunderstanding of the 2007 sensory question caused by the two concepts conjoined under one question. Some respondents may have misreported their sensory disability status having answered “no” to one part of the question and not responded to the other.

Table 3. Comparisons of 2008 ACS Disability Items with Similar Concepts[§] from the 2007 ACS for the Civilian Noninstitutionalized Population 5 Years and Older

Disability Type	2008 ACS				2007 ACS				Difference	
	Number	MOE [†]	Percent	MOE [†]	Number	MOE [†]	Percent	MOE [†]	Number	Percent
5 Years and older										
Cognitive difficulty	13,425,171	69,022	4.8	0.1	15,967,663	64,685	5.8	0.1	-2,542,492*	-1.0*
Ambulatory difficulty	19,189,449	79,182	6.9	0.1	25,909,285	79,977	9.4	0.1	-6,719,836*	-2.5*
Self-care difficulty	7,203,018	48,294	2.6	0.1	8,373,856	47,957	3.0	0.1	-1,170,838*	-0.4*
18 Years and older										
Independent living difficulty	12,915,318	63,170	5.7	0.1	12,476,987	50,525	5.6	0.1	438,331*	0.1*
5 to 17 years										
Cognitive difficulty	2,068,781	23,271	3.9	0.1	2,684,454	27,613	5.1	0.1	-615,673*	-1.1*
Ambulatory difficulty	365,131	12,654	0.7	0.1	614,540	12,580	1.2	0.1	-249,409*	-0.5*
Self-care difficulty	450,978	11,537	0.9	0.1	449,927	11,034	0.8	0.1	1,051	0.0
18 to 64 years										
Cognitive difficulty	7,695,235	50,012	4.1	0.1	8,815,769	47,198	4.7	0.1	-1,120,534*	-0.6*
Ambulatory difficulty	9,628,591	56,968	5.1	0.1	14,009,649	56,857	7.5	0.1	-4,381,058*	-2.4*
Self-care difficulty	3,332,551	35,362	1.8	0.1	4,151,991	31,465	2.2	0.1	-819,440*	-0.5*
Independent living difficulty	6,531,154	47,490	3.5	0.1	6,122,542	30,915	3.3	0.1	408,612*	0.2*
65 years and older										
Cognitive difficulty	3,661,155	36,268	9.8	0.1	4,467,440	30,381	12.3	0.1	-806,285*	-2.5*
Ambulatory difficulty	9,195,727	39,619	24.7	0.1	11,285,096	43,856	31.1	0.1	-2,089,369*	-6.4*
Self-care difficulty	3,419,489	32,722	9.2	0.1	3,771,938	29,069	10.4	0.1	-352,449*	-1.2*
Independent living difficulty	6,384,164	41,263	17.2	0.1	6,354,445	34,326	17.5	0.1	29,719	-0.4*

[†] The margin of error (MOE) is a measure of an estimate’s variability. The larger the margin of error in relation to the size of the estimate, the less reliable the estimate. For further information on the accuracy of estimates, including standard errors and margins of error, see <http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm>. The margins of error shown here are at the 90 percent confidence level.

* Statistically different from zero at the 90 percent confidence level

[§] For each disability type, the label used for the 2008 ACS measure is also used to identify the 2007 measure of the similar concept. “Cognitive difficulty” is used for mental disability in 2007, “Ambulatory difficulty” for physical disability, “Self-care difficulty” for self-care disability, “Independent living difficulty” for go-outside-home disability.

Sources: 2007 and 2008 American Community Surveys

The other four disability items in 2008 also appear to show differences from their similar measures in the 2007 ACS, as shown in Table 3. When the mental disability question in 2007, which asked about “difficulty learning, remembering, or concentrating,” was modified into the cognitive difficulty question, which asked about “serious difficulty concentrating, remembering, or making decisions,” the estimate went from 16.0 million to 13.4 million people, a difference of about 1.0 percentage point in the prevalence rate for the civilian noninstitutionalized population 5 years and older. Among the population 65 years and older the difference in the rate was about 2.5 percentage points.

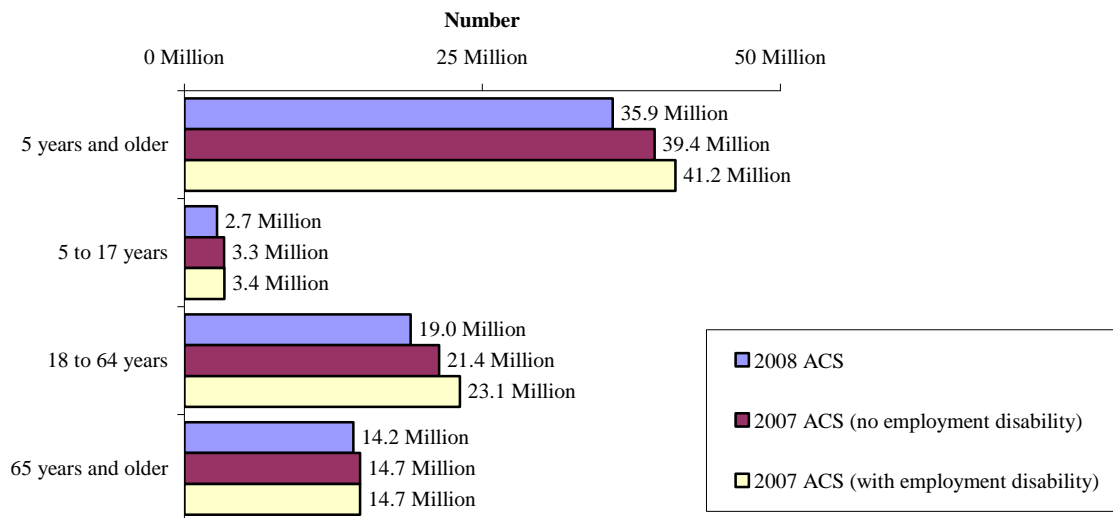
Physical disability in 2007 changed from asking about “a condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying” to focusing on serious lower body functions of walking or climbing stairs in the 2008 ambulatory difficulty question. This resulted in a 6.7 million-person difference in the estimate or about a 2.5

percentage point decrease, as seen in Table 3. Again, the population 65 years and older experienced the greatest impact, dropping from 31.1 percent for physical disability to 24.7 percent for ambulatory disability.

The change from self-care disability to self-care difficulty, which went from “difficulty dressing, bathing, or getting around inside the home” to “difficulty dressing or bathing” resulted in the estimate going from 8.4 million to 7.2 million people, or a difference of about 0.4 percentage points. Among 5-to-17-year-olds, the observable differences for both the number and percent were within the intervals of survey error, appearing as if no change occurred. Among the population 65 years and older, the number and percent decreased by about 352,000 people and 1.2 percentage points, respectively.

Independent living difficulty and its complimentary measure, go-outside-home disability, displayed a small, but significant, observable difference. The difference in the number of people was about 438,000 and the difference in the prevalence rates was about 0.1 percentage points. While overall, the 2008 measure appears to capture more people with difficulties than the 2007 measure, among the population 65 years and older, the prevalence rate was 0.4 percentage points lower and the number of people was not statistically different. The increase in the number and percent of people with difficulty captured in the 18-to-64-year age group appear to drive the overall increase.

Figure 10. Number of People in the Civilian Noninstitutionalized Population 5 Years and Older with a Disability in the 2007 and 2008 ACS

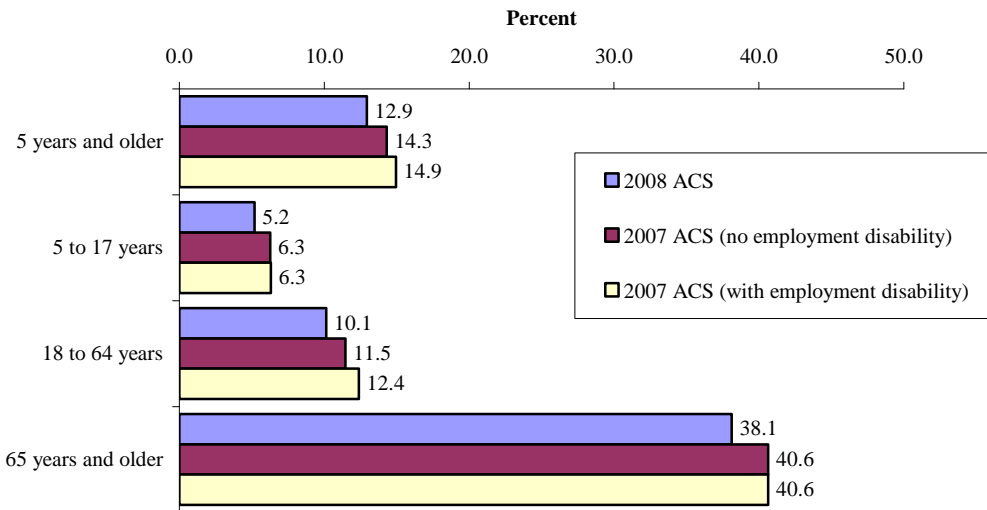


Sources: 2007 and 2008 American Community Surveys

A notable difference between the 2008 and 2007 ACS surveys is the dropping of the employment disability question. Studies of Census 2000 and the ACS by Stern (2004) and the cognitive testing by Miller and DeMaio (2006) demonstrated that respondents had difficulty understanding the intended meaning behind the employment disability question. In order to show difference in the overall disability status measures for 2007 and 2008, the number and percent of people with a disability in 2007 is presented both including employment disability (2007 production estimate) and without employment disability.

Figures 10 and 11 show the number and percent of people with a disability in the three measures of disability for the 2007 and 2008 ACS civilian noninstitutionalized populations 5 years and older. In the 2007 ACS, when employment disability is excluded from the definition of disability, the estimate of people with a disability declines from 41.2 million to 39.4 million. In the 2008 ACS, also without an employment disability measure and changed questions on the other disability types, the estimate was 35.9 million people. In terms of percentages, the 2007 ACS estimates decline from 14.9 percent to 14.3 percent and the 2008 ACS estimate was 12.9 percent of the civilian noninstitutionalized population 5 years and older.

Figure 11. Percent of the Civilian Noninstitutionalized Population 5 Years and Older with a Disability in the 2007 and 2008 ACS



Sources: 2007 and 2008 American Community Surveys

Dropping the employment disability from the 2007 measure had little impact on the percentage of people with a disability in the 5-to-17 age group and has no difference on the percentage in the 65-and-older age group, as employment disability is not relevant for most of these populations and therefore excluded from the overall definition of disability. For the population 5 to 17 years old, the 2007 ACS estimate was 6.3 percent, whereas the 2008 ACS estimate was 5.2 percent. Among the population aged 65 years and older, the 2007 ACS estimate was 40.6 percent and the 2008 ACS estimate was 38.1 percent. For the working age population (18 to 64 years old), the disability rate was 10.1 percent in 2008, compared with 11.5 percent in 2007 without employment disability and 12.4 percent with employment disability.

Consistently, we see that the changes made to the questionnaire items in 2008 have an overall downward effect on the estimates of disability prevalence, confirming expectations from the 2006 ACS Content Test. This change does not reflect a real decrease in the number of people with a disability, only that there is an observable difference in the measurement of disability at the national level between the two years.

Conclusion

As the data suggest, there are significant differences in the estimates of disability status in the ACS from 2007 to 2008; however, given the difference in the questionnaire, one should not interpret these changes as real differences in the number or percent of people with disabilities. While real change may have occurred, the effect of the questionnaire change may obscure any observable differences in the estimates.

Furthermore, users should be conscious about the definition of disability used when looking at estimates from different years of the ACS and when looking across other national surveys. As comparisons to estimates from the SIPP demonstrate, similar concepts may result in similar prevalence rates, however, slight differences in the conceptual definitions of measures do affect prevalence estimates.

Source and Accuracy of Estimates

The data in this paper are from the 2004 SIPP, 2007 ACS, and 2008 ACS. The population represented (population universe), unless otherwise stated, is the civilian noninstitutionalized population. In the ACS, this includes the population living in households and excludes people living in institutions and military group quarters.

Statistics from surveys are subject to sampling and nonsampling error. All comparisons presented in this report have taken sampling error into account and are significant at the 90 percent confidence level unless otherwise noted. This means the 90 percent confidence interval for the difference between the estimates being compared does not include zero. Nonsampling error in surveys may be attributed to a variety of sources, such as how the survey was designed, how respondents interpret questions, how able and willing respondents are to provide correct answers, and how accurately the answers are coded and classified. To minimize these errors, the Census Bureau employs quality control procedures throughout the production process, including the overall design of surveys, the wording of questions, review of the work of interviewers and coders, and statistical review of reports.

The ACS and SIPP weighting procedures use ratio estimation, whereby sample estimates are adjusted to independent estimates of the national population by age, sex, race, and Hispanic origin. This weighting partially corrects for bias due to over- or undercoverage, but biases may still be present, for example, when people missed differ from those interviewed in ways other than age, sex, race, and Hispanic origin. How this weighting procedure affects other variables in this survey is not precisely known. All of these considerations affect comparisons across different surveys or data sources.

For further information on the source and accuracy of SIPP estimates, go to <http://www.census.gov/sipp/source.html>. For further information on source and accuracy of ACS estimates, go to <http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm>.

References

Altman, Barbara, "Measuring Disability in a Survey or Census Context: Parallel Work Advancing the Field," Presented at the *2006 StatsRRTC State-of-the-Science Conference, The Future of Disability Statistics: What we Know and Need to Know*, Arlington, VA, October, 2006.

Beaghen, Michael and Lynn Weidman, *Statistical Issues of Interpretation of the American Community Survey's One-, Three-, and Five-Year Period Estimates*. 2008 American Community Survey Research Memorandum Series, U.S. Census Bureau. Washington, DC, 2008

Brault, Matthew, Sharon Stern, and David Raglin, *2006 ACS Content Test Evaluation Report Covering Disability*, U.S. Census Bureau, Washington, DC, 2007.

Brault, Matthew, *Americans with Disabilities: 2005*, Current Population Reports, P70-117, U.S. Census Bureau, Washington, DC 2008.

Miller, Kristen and Theresa DeMaio, *Report of Cognitive Research on Proposed American Community Survey Disability Questions*, U.S. Census Bureau, Washington, DC 2006.

Rodgers, Willard and Baila Miller, "A Comparative Analysis of ADL Questions in Surveys of Older People" *Journal of Gerontology: Series B*, 52B (Special Issue), pp. 21-36, 1997.

Stern, Sharon, "Counting People With Disabilities: How Survey Methodology Influences Estimates in Census 2000 and the Census 2000 Supplementary Survey," U.S. Census Bureau, Washington, DC, 2004.

World Health Organization (WHO), *International Classification of Functioning, Disability, and Health (ICF)*, Geneva, Switzerland, 2001.