The Current Population Survey response to Hurricane Katrina

After assessing employee safety and operations hurdles, the Bureau of Labor Statistics and the Census Bureau quickly began collecting new data on hurricane evacuees; jobless rates were sharply lower for those evacuees who returned home than for those who did not

Lawrence S. Cahoon, Diane E. Herz, Richard C. Ning, Anne E. Polivka, Maria E. Reed, Edwin L. Robison, and Gregory D. Weyland

Authors' affiliations are on page 50. The views expressed on methodological, technical, and operational issues are those of the authors and not necessarily those of the U.S. Census Bureau.

On August 29, 2005, Hurricane Katrina struck the coast of the Gulf of Mexico, devastating the city of New Orleans and surrounding Louisiana parishes, as well as gulf coast towns in Mississippi. The immediate emergency and the storm's widespread reach and long-lasting devastation presented unprecedented challenges to statistical agencies charged with measuring the economic situation in the affected areas and in the United States as a whole. At the time of the storm, the Bureau of Labor Statistics and the Census Bureau were discussing a proposed disaster estimation strategy for the Current Population Survey (CPS) program, the U.S. national labor force survey. However, no formal plan was in place for dealing with such a situation when Katrina struck the coast.

At news of the storm's approach, representatives from the two agencies, which cosponsor the monthly survey of approximately 60,000 occupied housing units, began meeting to discuss how different scenarios might affect operations and estimation. After landfall, when the severity of the damage became clearer, the two Bureaus met several times daily and worked between meetings to locate and support staff in the affected areas, assess problems with operations, and determine how to proceed with estimation and data dissemination. This article discusses the impact of Hurricane Katrina on CPS field staff, data collection operations, and estimation. Also described is a special set of questions added to the survey to measure the labor force status of Hurricane Katrina evacuees. The article concludes with lessons learned.

Overview of the CPS

The CPS is a monthly survey of about 60,000 occupied housing units that is used to produce timely statistics on the U.S. labor force, including the national unemployment rate, a major economic indicator.[1] CPS data also are used in conjunction with data from other BLS surveys to develop employment and unemployment statistics for the 50 States and the District of Columbia.[2] Each month, approximately 72,000 addresses across the country are selected for inclusion in the survey. Sample households are chosen in every State; however, the sampling rate (number of households selected per population) varies across States. Information on eligible households is kept in a database (the Master Address File) that is constructed on the basis of the most recent (2000) census and is updated with information from administrative sources, such as new-building permits. Nonresidential units, such as hotels, and permanent or temporary shelters (including schools and places of worship) are not in the CPS sample.

Each month, demographic data are collected on all household respondents and employment status information is collected on the civilian noninstitu-

tional population aged 15 years and older. The reference week for determining respondents' employment status is the week that includes the 12th of the month. Interviewing is conducted during the week that contains the 19th of the month. (See exhibit 1.) Through this process, each person in the household aged 15 years and older is classified as employed, unemployed, or not in the labor force.[3]

Once selected for inclusion, households are in the survey for 8 months in a "4–8–4" pattern. (Households are interviewed for 4 consecutive months, are not contacted for the next 8 months, and then are interviewed for 4 more months.) Typically, the first and fifth interviews are conducted by personal visit; most of the other interviews are done by telephone through a computer-assisted telephone interview conducted from field representatives' homes or a centralized Census call center. The CPS does not "follow" persons who move out of a sampled housing unit; rather, individuals living at the address at the time of the interview are included in the survey.

Hurricane Katrina made landfall on August 29, 2005. As shown in exhibit 1, it landed well after the August 2005 collection week and several weeks before the September 2005 survey reference period. From a CPS operations standpoint, this was nearly the best possible scenario: August data collection was not interrupted, and there were 3 weeks to evaluate the situation and respond before the next interviewing week.

Safety of Census Bureau field representatives

In the immediate aftermath of Hurricane Katrina's landfall in the Florida Keys, Alabama, Mississippi, and Louisiana, the Census Bureau's Atlanta and Dallas regional offices began contacting field representatives to ascertain their personal and family safety, their health status, and whether they incurred any damage to personal or government property. Because all these field representatives work from home rather than out of a central office, and because they frequently are in the midst of traveling to sampled households, contacting them can be a difficult process even under normal circumstances.[4]

With a hurricane plan in place that included provisions for emergency communications, the Atlanta regional office had relatively few problems finding its field representatives in the affected areas. Using the plan's procedures, Atlanta management learned quickly that two Alabama field representatives had lost their homes, but were safe, and that none of the four field representatives in the Florida Keys had incurred property damage or personal injury.

By contrast, the Dallas regional office had a difficult time finding its Louisiana and Mississippi field representatives. The disaster was of an extraordinary nature, and because Dallas had suffered fewer hurricanes than Atlanta, the Dallas office had a less developed disaster plan. The Dallas regional

Exhibit 1. Current Population Survey calendar, August–September, 2005

August 2005

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29 Katrina landfall	30	31			

September 2005

				1	2	3
4	5	6	7	8	9	10
11*	12	13	14	15	16	17
18	19	20	21	22	23	24 Rita landfall
25	26	27	28	29	30	

Survey reference week Survey collection period * Interviewing assignments made.

office field representatives suffered the same degree of loss and devastation as the general population in the affected areas: efforts to contact them were hampered by mandatory evacuations, downed telecommunications systems, widespread power outages, flooded or washed-out roads and bridges, and severely restricted or, in some cases, nonexistent postal services. Two days after the hurricane, fewer than half of the 174 field representatives in the 2 States had been contacted; after a week, 136 had been reached. The Census Bureau received assistance from the National Oceanic and Atmospheric Administration's field network in finding the missing field representatives. Two were still unaccounted for 3 weeks after the hurricane; after 6 weeks, all had been located. Ultimately, the Census Bureau learned that no field representatives lost their lives, but many suffered property damage.[5]

Many field representatives continued working, while others evacuated to less affected areas within Louisiana and Mississippi or to other States, including Texas, Colorado, Illinois, Georgia, Florida, and Washington. Some became interviewers at their new locations; others returned months later or relocated to new areas and got different jobs. As a result of the hurricane and these migrations, the Census Bureau's field workforce in the affected areas was seriously diminished. Additional assignments were given to those field representatives still in the area; as a result of the migration of much of the population in the affected areas, the extra tasks were not overly burdensome.

Assessing operations problems

In parallel with efforts to locate field representatives and assess their situation, the BLS-Census team evaluated the impact of the storm on survey operations and estimation. Regarding the impact on the survey sample—that is, how well the survey would cover the target population—the team asked the following questions:

- Who would be missing from the survey in September (and subsequent months)?
- How would missing some cases affect national employment and unemployment estimates?
- What could be done to maximize the accuracy of the estimates?

Nearly all members of the target population for estimation in the CPS—the civilian noninstitutional population—live in housing units, as defined by the survey. Thus, the sample designed to measure the civilian noninstitutional population does not include those living in shelters, hotels, or institutions such as hospitals and nursing care facilities. Each month, about 72,000 addresses are selected from the Master Address File, which is based on the most current decennial census (2000) and is updated regularly with information from building permit records and other administrative data. As normally collected, then, the survey would not include interviews with people staying in stadiums, temporary shelters, hotels, or other nonresidential units after the hurricane.

The team briefly discussed whether the Bureau of Labor Statistics and the Census Bureau should make a special effort to specifically measure the situation of these now out-of-scope groups. A decision was made not to undertake such an effort, because (1) it was not clear how to draw a sample that would represent the group, which was of unknown size and demographic composition, within the available time and resource constraints, (2) access to evacuees was limited, (3) evacuees were highly mobile, with many persons moving back into the scope of the CPS daily by relocating to existing residential units, including addresses other than those they lived in prior to the hurricane, and (4) no budget existed for that kind of operation. As regards the third of these issues, the high mobility of evacuees from shelters and hotels to residential units made it likely that some of these individuals would be interviewed twice. In addition, some of those who would have been interviewed in shelters would be represented by persons who had moved from shelters to residential units.

The team then assessed how many individuals might be missed in sample households in the affected areas and how to maximize the likelihood of contact with them in order to produce the most accurate local and national estimates possible. The team agreed that assignments would be made to all areas that were not under mandatory evacuation. On September 14, the day on which assignments were made for the September interviewing period (September 18–27), only Orleans and Jefferson Parishes, of all parishes in the New Orleans metropolitan area,[6] were under mandatory evacuation orders. Field representatives were instructed to attempt to visit or telephone households in all the other highly affected areas, including the five other parishes in the New Orleans metropolitan area and the counties along the gulf coast of Mississippi.

Knowing that many housing units would be vacant, destroyed, or inaccessible, the team reviewed procedures for handling such households to determine whether any changes should be made to maximize data quality. Each month, sampled households that are clearly eligible to be interviewed (households in which members of the civilian noninstitutional population reside) are classified as either "interviews" (if they were interviewed) or "Type A noninterviews" (households that were occupied and eligible, but in which residents were not contacted because no one was at home or for some other such reason). Other noninterviewed households are classified as "Type B noninterviews" or "Type C noninterviews." Type B noninterviews include housing units that are vacant, are unoccupied, or have no residents eligible for the CPS (be-

cause, for example, all occupants are in the Armed Forces). These households are coded as ineligible for the survey month, but are revisited throughout the remainder of the 8 months they are scheduled to be interviewed. Type C noninterviews include housing units that normally have no chance of residential occupancy, such as those which are demolished, condemned, or permanently converted to nonresidential use. The addresses of these households are removed from the list of those scheduled to be interviewed in subsequent months.

Under standard operating procedures, interviewers who were able to reach housing units that were destroyed or severely damaged by Hurricane Katrina would typically code such units as Type C, removing them from the sample slated for interview in subsequent months. However, ancillary information (such as that contained in Federal Emergency Management Agency (FEMA) and media reports) indicated that at some home sites where a unit was destroyed by the hurricane, a trailer might temporarily be used for housing during rebuilding. Such a trailer normally would not be picked up in the CPS sample frame, because the frame includes *new* construction housing units, but excludes most *reconstruction*. However, procedures were changed with September data collection: operationally, housing units destroyed or made uninhabitable by Hurricane Katrina would be coded as Type B noninterviews so that the addresses would be visited again for subsequent interviews (and so that residents would be interviewed were they living in a trailer on the property). This change in coding enabled the agencies to track the status of housing units in these areas and keep units in the sample for several months. The new procedures were used through December 2005, after which normal procedures were resumed.[7]

Finally, the team discussed how interviewers would handle situations in which evacuees had moved out of their residences and into CPS sample units. In the CPS, individuals identified at a household are asked if the location of that household is their "usual residence"—the one they normally sleep in and a place to which they "can return at any time." Those who report that they have a usual residence elsewhere, but either cannot return to it or don't know whether they can, are added to the roster of the household at which they have been located. Special instructions beginning in September 2005 reminded interviewers of this procedure and confirmed that such instructions applied to Katrina evacuees who could not (or did not know if they could) return to their prehurricane residences. Thus, evacuees would be surveyed across the country in households where they were living or staying. Because some evacuees would be found in CPS households, the team also began to consider asking additional questions about those evacuees.

Operations in the affected areas

When Census Bureau field representatives located respondents, they often found them dealing with personal property damage, loss of work, temporary relocation of their families into or out of their homes, and a lack of gasoline, electricity, telephone service, food, potable water, or other supplies. Still, the field representatives successfully completed some interviews in the affected areas only 3 weeks after the hurricane. Table 1 compares the number of completed interviews in the affected areas before the hurricanes hit in August 2005 (the survey collection week having occurred prior to the hurricane) and in selected subsequent months. *Completed interviews*

Table 1. Number of completed interviews, August 2005–November 2005 and June 2006, in selected areas affected by Hurricanes Katrina and Rita

Geographic area	2005				2006	Percent change from August 2005 to—			
	August	September	October	November	June	September 2005	October 2005	November 2005	June 2006
Louisiana	580	372	432	458	518	–35.9	–25.5	–21.0	–10.7
New Orleans metropolitan area	174	16	66	79	113	–90.8	–62.1	–54.6	–35.1
Orleans Parish	63	0	12	16	22	–100.0	–81.0	–74.6	–65.1
Jefferson Parish	62	3	32	33	49	–95.2	–48.4	–46.8	–21.0
Rest of New Orleans	49	13	22	30	42	–73.5	–55.1	–38.8	–14.3
Calcasieu Parish	34	13	5	30	38	–61.8	–85.3	–11.8	11.8
Rest of Louisiana	372	343	361	349	367	–7.8	–3.0	–6.2	–1.3
Mississippi	570	498	513	518	512	–12.6	–10.0	–9.1	–10.2
Hancock, Harrison, and Jackson Counties	78	46	55	58	65	–41.0	–29.5	–25.6	–16.7
Rest of Mississippi	492	452	458	460	447	–8.1	–6.9	–6.5	–9.1
Florida	2,335	2,313	2,326	2,368	2,341	–.9	–.4	1.4	.3
Texas	2,654	2,388	2,602	2,651	2,604	–10.0	–2.0	–.1	–1.9

are interviews in which enough information was collected to classify household members as employed, unemployed, or not in the labor force. The decline in the number of completed interviews reflects the fact that many housing units in the area were destroyed; thus, the number of residents declined accordingly. In surrounding areas, interviewers found more people than usual in some households, which had taken in evacuees.

In Louisiana, the parishes of the New Orleans metropolitan area were so heavily affected that only 16 interviews were conducted in September, compared with 174 in August—a 91-percent decline.[8] By June 2006, 113 interviews were conducted in the area—still off by 35 percent from August 2005. Outside the New Orleans metropolitan area, household responses in Louisiana were down by about 8 percent immediately after the hurricane; by March 2006, they were near pre-Katrina rates. For the State as a whole, interviews were down by 36 percent just after the hurricane and were still 11 percent below the August level in June 2006, the last month for which data were available prior to the publication of this article.

In Mississippi, the counties most heavily affected by Hurricane Katrina were Hancock, Harrison, and Jackson, which include the cities of Gulfport, Pascagoula, and Biloxi. In those counties, September responses were 59 percent of the August 2005 levels. By June 2006, the number of interviews remained 17 percent below August levels. For the State as a whole, interviews were down 13 percent immediately after the hurricane and remained 10 percent below the August 2005 level in June 2006.

September 2005 interviewing in Louisiana and Texas also was affected by the arrival of another hurricane. Hurricane Rita made landfall on September 24, 2005, and involved large-scale evacuations from the western half of Louisiana, the Texas gulf coast, and the Houston area during the survey collection week. Interviewers worked to secure as many CPS interviews as possible in those areas at the beginning of the week and were quite successful, given the mass migration. However, the number of completed interviews in September in Calcasieu Parish, Louisiana, was less than half of the August number. The figures for Texas in table 1 are typical for a "regular" hurricane such as Rita, with localized damage and temporary evacuations for most people. In September, 10 percent fewer interviews were conducted in Texas than in August; by November, however, response had returned to normal.

Survey estimation procedures

To evaluate, and hopefully minimize, the impact on the estimation of missing households in the affected areas, the BLS-Census Bureau team discussed the following questions:

- How are missing households handled in normal operations?
- Should any changes to operations be made in light of the Katrina situation?
- How well would CPS labor force concepts work for evacuees who were interviewed in CPS households inside or outside of the affected areas?
- What specifically could be determined about evacuees?

Normal estimation procedures. In the estimation process, interviewed households are weighted up to civilian noninstitutional population controls to represent all households. The CPS weighting has several steps, including a noninterview adjustment procedure (for Type A noninterviews) and a second-stage raking procedure that uses externally developed population controls.

The Type A noninterview adjustment compensates for nonresponse by increasing survey weights through a ratio adjustment of *eligible* housing units divided by housing units *responding* to the survey. Since different areas of a State can have different nonresponse rates, it is preferable to have several adjustments that combine like areas instead of having a single overall adjustment for the State. In Louisiana, the metropolitan areas of New Orleans, Baton Rouge, and Lafayette are combined for Type A noninterview adjustment. In the aftermath of Hurricane Katrina, the New Orleans contributions to both the numerator and the denominator were reduced.[9] That is, the adjustment would not result in the other metropolitan areas compensating for the New Orleans metro coverage shortfall. Changing the formula to add "other" Type B households—inaccessible or destroyed households—in the area to the numerator of the adjustment would be one way to have the other metropolitan areas compensate for New Orleans. This approach was tested, but not adopted, because the revised formula did not materially change the Louisiana estimates.

The use of civilian noninstitutional population controls in second-stage weighting also is a key component of the CPS. Population controls, including some State-level controls, are defined by geography, race, ethnicity, gender, and age. All of the controls are produced by updating the figure for the civilian noninstitutional population from the previous decennial census, using a variety of information on births, deaths, immigration, emigration, and interstate migration. A complex iterative raking procedure modifies CPS weights so that, for a given group of persons (defined by the same demographic variables), the CPS-weighted estimate of the civilian noninstitutional population will exactly match the CPS population control. The procedure compensates for undercoverage of certain demographic groups and reduces standard errors for key labor force estimates. Before the second-stage procedure is applied, CPS estimates of the civilian noninstitutional population do not match the controls and have standard errors associated with them. After the second-stage procedure, CPS estimates of the civilian noninstitutional population match the controls and have standard errors equal to zero. The pro-

cedure dramatically reduces standard errors for estimates that are strongly correlated with the population, particularly estimates of employment and the civilian labor force.

However, even with perfect coverage of the civilian noninstitutional population by the sample, the use of population controls introduces nonsampling error, because the controls are imperfect, especially at the State level. Under ordinary circumstances, the nonsampling error is unimportant compared with CPS sampling error. However, the population displacements wrought by Hurricane Katrina presented an extraordinary situation. The national civilian noninstitutional population level was unchanged, but there was plenty of anecdotal evidence regarding large shifts between States. This migration was problematic because the CPS population controls are defined at the State level. The post-Katrina civilian noninstitutional population controls would have much larger biases than usual, given that the existing information used to create those controls was not timely enough to reflect the displacements. For example, even if displaced persons from Louisiana were added to household rosters of other States, such as Texas, the Texas weights after second-stage weighting would not properly reflect the increase in population if just existing pre-Katrina information were used in computing civilian noninstitutional population controls. Thus, it was crucial that a methodology be developed so that the civilian noninstitutional population controls would reflect the interstate migrations caused by Hurricane Katrina.

Adjustments to population controls. Resources were allocated to find a reliable source of information about interstate migration. Among the sources considered were FEMA, the American Red Cross, and various other Federal agencies and private organizations. The Census Bureau ultimately obtained the U.S. Postal Service's National Change of Address (NCOA) file. The file was the only source with reliable, timely, and quantifiable data on interstate migrations that could be merged into the CPS estimation system to improve the civilian noninstitutional population controls. Using the NCOA file, the Census Bureau was able to quantify, on a regular basis, the number of movers between zip codes. However, the NCOA file does not include the demographic detail (for example, race, gender, and age) that is needed for State population controls. Consequently, statisticians at the Census Bureau overlaid the NCOA data with demographic data from the 2000 census for comparable census tracts[10] to create interstate migration estimates for the demographic groupings needed for reasonable civilian noninstitutional population controls. It was not possible to obtain and modify the NCOA data in time for the September estimates. However, new State population controls were implemented for State estimates and for special data on Katrina evacuees (see later) in October 2005. The new controls were incorporated into the production system for the national estimates in November 2005; the national population controls were unaffected.

Note that the first plan considered for September estimation of the national unemployment rate and other economic indicators came from a draft disaster plan that was being examined at the time that Hurricane Katrina hit. This plan assumed that a subpopulation (such as the city of New Orleans) was unreachable for interview and recommended calculating a national unemployment rate which removed that portion of the country from the population. Of course, those affected by the disaster would not be included in the national rate, but the latter would be accurate for the rest of the country; that is, economists would still be able to gauge the direction of the economy, minus the affected area. However, as the Katrina situation unfolded, it became clear that removing the evacuee population or the population living in a set of affected areas would not be a reasonable approach. Removing individuals who had resided in the affected areas from the estimates would have been suitable if the majority of individuals living in the area had died. Instead, the evacuees exhibited intrastate and interstate migration. This migration meant that the survey would pick up individuals who moved to other residential units, such as families' or friends' homes. In other words, although the areas could be removed from the total population, and new weights could be created to be equal to the total population minus those residing in the affected areas, the number of respondents found in sample households could not be symmetrically reduced. Data collected in the field confirmed that more individuals than usual were found in households in surrounding areas; thus, removing all individuals in the affected areas from the population control would have been inappropriate. For example, among completed interviews in Louisiana, the number of persons found per household was 1.73 in August 2005 (before the hurricane), but had increased to 1.85 in the fourth quarter of 2005.

In sum, in response to coverage and estimation problems associated with Hurricane Katrina, an ad hoc modification to the standard noninterview adjustment formula was considered and rejected. Problems with weighting due to State population controls that did not address rapid interstate migration were addressed with the NCOA database. Also, procedures for classifying addresses for which interviews could not be obtained were modified to permit hurricane-affected addresses to be eligible for interviewing in subsequent months. By November 2005, CPS estimates gave a more accurate representation of the employment situation of those affected by Katrina and reachable through CPS interviewing.

CPS concepts. Like the other BLS survey programs discussed in this issue of the *Review*, the CPS program evaluated the survey's concepts to determine how well they worked in light

of the disruption caused by Katrina. Specifically, the program asked how well CPS concepts of employment and unemployment relate to the situations of Katrina evacuees.

In the CPS, the labor force status of each respondent aged 15 or older is classified in accordance with the following concepts (the classification process is based on responses to many survey questions):

> *Employed*. Employed persons are (a) all those who, during the reference week, did at least 1 hour of work as paid employees, worked in their own business or profession or on their own farm, or worked 15 or more hours as unpaid workers in an enterprise operated by a member of the family, and (b) all those who were not working, but who had jobs or businesses from which they were temporarily absent because of vacation, illness, bad weather, childcare problems, maternity or paternity leave, a labor-management dispute, job training, or other family or personal reasons, whether or not they were paid for the time off or were seeking other jobs.
>
> *Unemployed*. Unemployed persons are all those who had no employment during the reference week, were available for work, except for temporary illness, and had made specific efforts to find employment sometime during the 4-week period ending with the reference week. Persons who were waiting to be recalled to a job from which they had been laid off also are included in this group and need not have been looking for work to be classified as unemployed.
>
> *Not in the labor force*. Persons not in the labor force are all those in the civilian noninstitutional population who are neither employed nor unemployed.

Because of the complexity of the computerized CPS instrument and the post-data-collection processes, it was not feasible to change the wording of the CPS questions or the pathways through the regular monthly survey. Indeed, in order to maintain comparability over time, it would be desirable not to adapt or change the concepts underlying the survey in response to the storm.

Fortunately, a question-by-question examination confirmed the fact that the basic CPS concepts were appropriate for determining the labor force status of evacuees interviewed in CPS households. Even in the wake of this unprecedented event, determining whether, for example, an individual did any work for pay in the previous week or had done anything to find work during the previous 4 weeks permitted reasonable labor force classifications. Further, in subsequent months, individuals who were displaced by the storm and who had not worked, did not expect to be recalled to a job, and had not looked for work in the previous 4 weeks (perhaps because they were trying to resettle in a new area) would be correctly classified as not in the labor force by means of the established questions. Additional detail from other CPS questions provided useful information as well. For instance, within the series of questions on employment, individuals who had a job in the previous week, but did not work, or who worked less than usual due to "weather-related" reasons are identified. These questions, then, proved useful for examining the immediate impact of many hurricanes, including Katrina. (See chart 1.) Similarly, the survey identifies those who are laid off from a job and do not know if they can return within the next 6 months.[11]

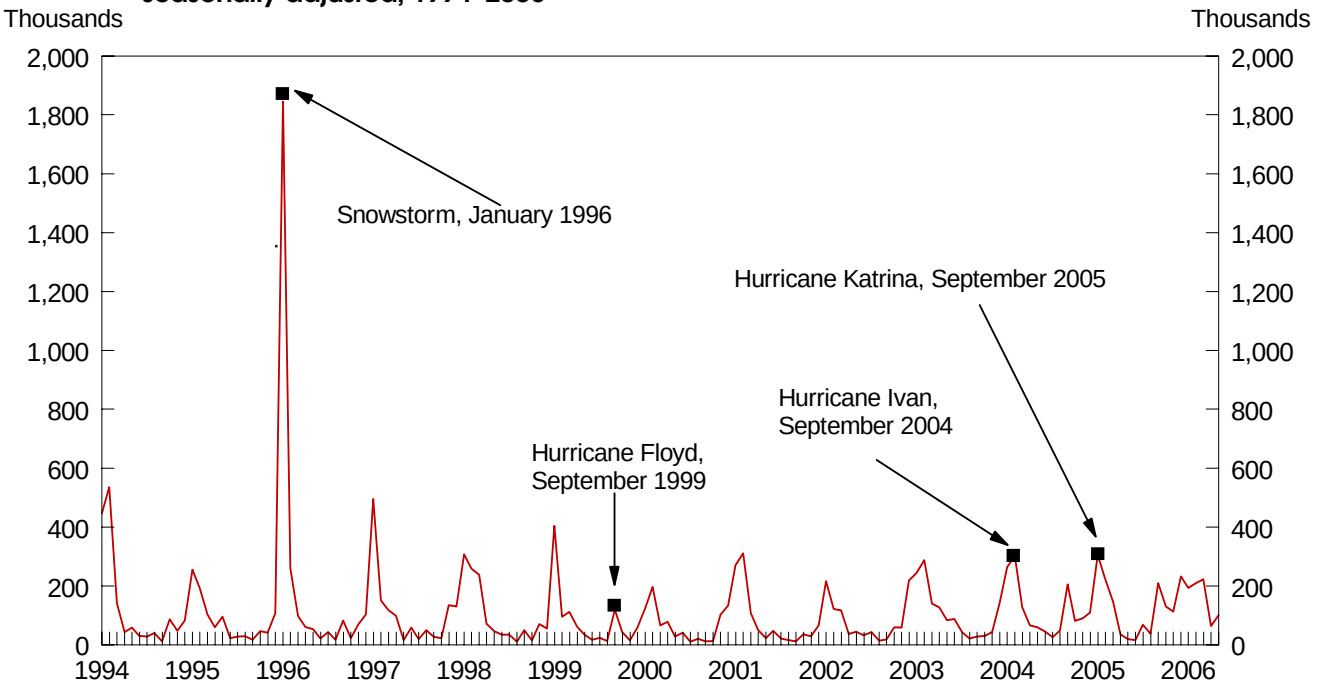
Collecting new information on evacuees

Because the CPS could be used to gather some information about evacuees living in households in the survey's sample, the BLS-Census Bureau team decided to add a limited set of questions targeted at evacuees. After lengthy discussions, a decision was made that would allow the estimation of the demographics and employment status of persons who had evacuated from their August residence due to Katrina, even if only temporarily; in addition, information would be gathered to differentiate the employment situation of those who returned to their former address from those who relocated elsewhere. Finally, information would be collected about where people evacuated from, in order to analyze the impact of the storm on individuals from different areas.[12] The new questions were to involve simple skip instructions and be placed in the instrument at a location that would minimize risk to the rest of the CPS. (See box, page 48.)[13]

The "Katrina questions" were administered to all CPS households across the country beginning in October 2005, less than 2 months after the hurricane. To identify evacuees, a question was asked of the entire household inquiring whether anyone living or staying there had evacuated, even temporarily, the place where they were living in August because of Hurricane Katrina. If the answer was "yes," interviewers later asked respondents which household members had evacuated.[14]

In October 2005, using the new questions, the survey identified approximately 400 respondents representing 791,000 evacuees.[15] The sample was large enough that the Bureau of Labor Statistics chose to release the statistics. Beginning in November 2005, a section about Hurricane Katrina evacuees was added to the monthly *Employment Situation* report. The original intent was to ask the additional questions only for a few months; interviewers would reask the questions of persons in households that were in the sample from one month to the next. However, evacuees' situations continued to be of great interest, and a decision was made to continue asking

Chart 1. Persons with a job, but not at work due to bad weather, nonagricultural industries, not seasonally adjusted, 1994–2006



SOURCE: Bureau of Labor Statistics, Current Population Survey.

the questions until October 2006, a full year after the first set of questions about the hurricane was fielded.

While extending the period over which these data were collected gave analysts a view into how the characteristics of evacuees evolved over time, it also provided some challenges. In the spring of 2006, a close look at the responses to the questions indicated that some respondents identified themselves or others as evacuees in one particular month, but did not do so the next month. This discrepancy indicated a probable undercount in the number of evacuees, as a single "yes" should have succeeded in identifying respondents as having ever evacuated. The Bureau of Labor Statistics and the Census Bureau held a focus group session with interviewers and learned that some respondents thought that the interviewer was asking about additional evacuees (beyond those mentioned in previous months) in subsequent months; others thought that the question was about everyone in the household except themselves. On the basis of these results, instructions to interviewers were improved prior to the June 2006 fielding of the survey, whereupon the number of evacuees identified increased.

In addition, over time, the ability to correctly attribute the reason individuals were not living at the address they had prior to the hurricane as being related to the hurricane diminished somewhat. For instance, an evacuee could have returned in September to the address that she had prior to the hurricane, but later left because of previous plans unrelated to the hurricane (such as moving to attend college). If she were interviewed, for example, at her new address in April, she would accurately report that she had evacuated her domicile due to Katrina, but she would not be identified as someone who had returned to (that is, lived at) her prehurricane address. Similarly, some evacuees who did not move back to their prehurricane addresses were assumed not to have done so because of the hurricane. To address this issue and obtain a better assessment of those who were not living at their prehurricane address for reasons unrelated to the hurricane, a few more questions were added to the supplement beginning in June 2006. (See box, page 48.)[16]

Thus, the questions appear to have undercounted evacuees from October 2005 to May 2006 and also misidentified a small number of "normal movers" as evacuees. Still, data on the employment status of those counted provided valuable insight into employment outcomes following the hurricane. Further, more comprehensive counts of evacuees in June 2006 showed the same general employment patterns for evacuees as did counts in October 2005–May 2006.

Between October 2005 and June 2006, increasing numbers of evacuees returned to their pre-Katrina residences. In the month after the hurricane, only about 39 percent of evacu-

CPS questions on Hurricane Katrina evacuees

The initial set of questions, HHSCREEN through KAT4, was asked beginning in October 2005. These questions were designed to measure the demographic and labor force characteristics of people who evacuated from their homes, even temporarily, due to Hurricane Katrina. KAT5 through KAT7, added to the survey in June 2006, were designed to indicate more specifically how many persons not living at their former addresses had returned to them for more than a short period, and to get a sense of how many "normal movers" (people who moved for reasons other than Katrina) the questions may have been picking up.

The *household screener* was asked immediately *before* the creation (for new sample households) for verification (for households interviewed the previous month) of the household roster. Other questions were asked immediately after the roster was verified.

Following are the questions added to the survey:

HHSCREEN — Is there anyone living or staying here who had to evacuate, even temporarily, where he or she was living in August because of Hurricane Katrina?

<1> Yes
<2> No

KAT1 — Earlier you indicated that at least one person in the household had to evacuate where he or she was living in August because of Hurricane Katrina.

Who was that? [*Enter all that apply.*]
PROBE*:* Anyone else?

KAT2 — In August, prior to the Hurricane warning, where (was NAME/were you) living?

[*Read if necessary.*]
<1> At this current address (in LA, MS, AL, FL)
<2> Louisiana (but not this address)
<3> Mississippi (but not this address)
<4> Alabama (but not this address)
<5> Florida (but not this address)
<6> Elsewhere in the U.S.

Question KAT3 is asked if the response to KAT2 = 2, 3, or 4. KAT4 is asked only if KAT2 = 1 (for persons at the address from which they evacuated). KAT3 and KAT4 are not asked for entries of 5 or 6 in KAT2.

KAT3 — What County, Parish, or City (was NAME/were you) living in prior to the Hurricane warning?

_____ [*Specify*]

KAT4 — When did (NAME/you) return to this address?

____ month ____ day

KAT5 — Did you move back, even temporarily, to the address you had prior to Hurricane Katrina? If yes:

KAT6 — How long did you stay?

- Less than 2 weeks
- 2 to 4 weeks
- A month or more

KAT7 — Why did you leave after returning?

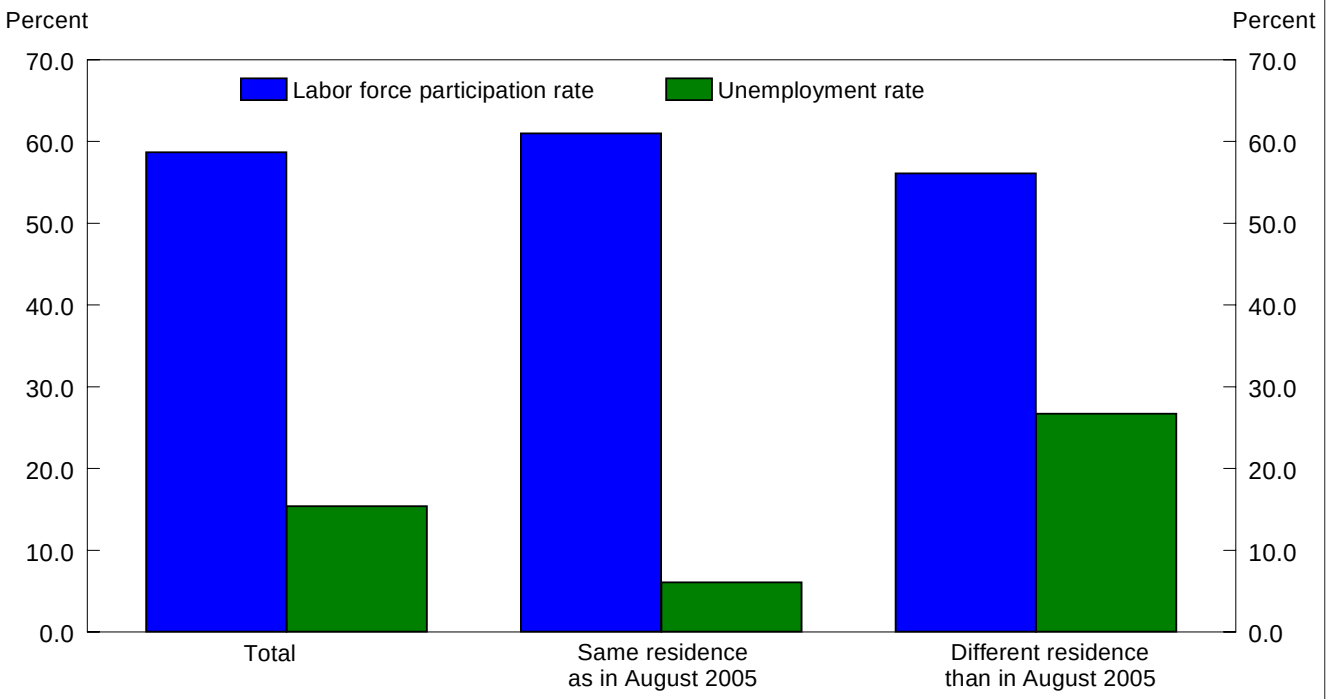
Specify _____

ees were again living at their former addresses; however, by June 2006, about 62 percent had reestablished residency at the home from which they evacuated. During the entire October 2005–June 2006 period, those who had not moved back to their former address were far more likely to be unemployed than those who had. Because monthly data are not seasonally adjusted, 9-month averages are presented in chart 2. As shown, evacuees who were again residing in their pre-Katrina residences were more likely (61 percent) to be in the labor force than were those who were living elsewhere (56 percent). The unemployment rate of those who had returned to their former homes (6.1 percent) was far lower than the rate of those who had not (26.7 percent).

Continuing concerns

The most pressing ongoing concern is that some CPS sample in the affected States no longer accurately represents where people are living. Some housing units in the frame may never be rebuilt, and a new frame must be redrawn in order for the

Chart 2. Labor force participation rates and unemployment rates of Hurricane Katrina evacuees, by location of residence, 9-month average, October 2005–June 2006



area to reflect those changes. In addition, to the degree that people relocate to new communities, such as large-scale FEMA trailer communities, those addresses should be added to the sample. The Census Bureau is currently analyzing and critiquing available lists of these areas for possible inclusion in the sample.

A second concern is that the new hurricane season, which began June 1, 2006, may lead to confusion when interviewers ask about Hurricane Katrina through December 2006. Alternatively, another severe storm could shift program priorities to measuring that storm's effects.

Lessons learned

The CPS program learned some important lessons in going through the process of responding to the situation wrought by Katrina.

Emergency preparedness in the field is critical. The Atlanta and Dallas regional offices of the Census Bureau, though prepared for contingencies and emergency communications, learned additional lessons from their experiences of Hurricanes Katrina and Rita. The two offices revised their natural-disaster plans and prepared lists of related items for staff and field representatives to complete before, during, and after disasters. Assignments to field representatives in areas threatened by hurricanes would henceforth be mailed out earlier than usual, and field representatives would be given the authority to operate as independent units if contact could not be made with the regional office. Senior field representatives would begin keeping a list of team members' names and multiple contact methods (making sure to send a copy to the regional office) and would now identify public locations where teams could meet, such as FEMA Offices. Field representatives would begin taking laptops along in evacuations and would regularly provide extensive contact information and location information.

Disaster planning for the questionnaire and for estimation is important. Quickly adding questions to the CPS presents design and operational challenges, potentially involving a substantial risk to core survey operations. The Bureau of Labor Statistics and the Census Bureau will continue to work together to devise methods for developing new questions, modifying the questionnaire quickly, and adjusting estimation procedures if necessary in response to future events.

The CPS is resilient. The CPS is not designed to measure the employment situation of individuals who are residing in shelters, hotels, or other places that are out of the scope of the

survey. To the degree that individuals living in those arrangements have employment characteristics different from those living in other residential units, bias exists in the estimates. However, for those who are residing in the types of housing units included in the CPS sample frame, the survey's concepts apply well over a wide range of situations, including natural disasters such as Hurricane Katrina.

The survey design also contributes to its resiliency. First, because the CPS uses a large sample of households across the 50 States and the District of Columbia, it will capture individuals who have been displaced. Second, because the survey is conducted monthly, it is possible to measure the employment status of individuals across the country very quickly. Thus, in a situation that involves extensive interstate migration between in-sample housing units, unexpected events can be incorporated into the estimation process if satisfactory population controls are available. Also, because CPS data are collected with interviewers either in person or on the phone, it is possible to adjust interviewing rules and procedures rapidly.

The capabilities and dedication of CPS interviewers are key to the survey's resiliency. With Katrina, as in other situations, interviewers did an excellent job of responding to procedural changes, learning quickly. They also exhibited a great deal of creativity and commitment to collecting the CPS data, sometimes in adverse situations and when many were suffering personal hardship. Finally, interviewers provided timely information that improved the continuity of operations to the regional and national offices.

Partnering with other Federal agencies is key. A highly collaborative BLS-Census Bureau partnership was critical to responding successfully to the survey and to meeting the estimation challenges brought on by Hurricane Katrina. Data collection and estimation are inextricably linked, and agencies collaborating on surveys must communicate effectively to make good decisions under tight deadlines. In responding to the situation brought on by Katrina, the Bureau of Labor Statistics and the Census Bureau met daily for many weeks, together analyzing the effects on operations and estimation and coordinating the implementation of decisions.

Other Federal partnerships also were critical to the response. Usual procedures did not permit the CPS population controls to be updated regularly enough to handle this emergency that involved rapid interstate migrations. Immediate change-of-address data were needed to measure the flow of individuals between States so that sample weights could be adjusted. The U.S. Postal Service's NCOA database provided a critical input to CPS estimation. Finally, the National Oceanic and Atmospheric Administration's assistance in finding Census Bureau field representatives also was critical. □

Notes

AUTHORS' AFFILIATIONS: Lawrence S. Cahoon is Assistant Division Chief for Census Design, Decennial Statistical Studies Division; Richard C. Ning is Chief, Labor and Crime Surveys Branch, Field Division; Maria E. Reed is Chief, Current Population Surveys Branch, Demographic Surveys Division; and Gregory D. Weyland is a survey statistician in the Current Population Surveys Branch, Demographic Surveys Division, all in the U.S. Census Bureau. Diane Herz is Chief, Division of Labor Force Statistics, Anne Polivka is a supervisory economist, Division of Employment Research, and Edwin Robison is a supervisory mathematical statistician, Division of CPS and LAUS, all in the Office of Employment and Unemployment Statistics, Bureau of Labor Statistics.

ACKNOWLEDGMENTS: The authors thank the following people for contributing to this article: at the Census Bureau, Harold Wood in the Atlanta regional office and Joseph Cavey in the Dallas regional office; at the Bureau of Labor Statistics, Peter Horner, Bernard Altschuler, and James Borbely.

[1] For a detailed discussion of CPS sampling, weighting, concepts, and estimation, see "CPS Technical Paper," on the Internet at **www.bls.gov/cps/home.htm**.

[2] See Sharon P. Brown, Sandra L. Mason, and Richard B. Tiller, "The effect of Hurricane Katrina on employment and unemployment," this issue, pp. 52–69.

[3] The Bureau of Labor Statistics publishes official estimates for persons aged 16 and older.

[4] Census Bureau field representatives often work on more than one survey. As a consequence, they may be away from home during much of the month, including the CPS collection week.

[5] According to the Census Bureau's Dallas office, 4 field representatives reported a complete loss of their homes; 35 could not access their homes or neighborhoods due to floodwaters; 9 reported that their houses were damaged and repairable, but were currently uninhabitable; and 20 reported that their homes suffered some damage, but were habitable.

[6] The New Orleans metropolitan area comprises Orleans, Jefferson, Plaquemines, St. Tammany, St. Bernard, St. John the Baptist, and St. Charles Parishes.

[7] Normal procedures for coding such cases as Type C noninterviews were resumed because it was agreed that, by January 2006 (5 months after Katrina made landfall), most property owners would have made an assessment about the viability of living in their current structures after repairs or tearing the structures down and leaving them vacant. Housing units that were still uninhabitable would be removed from the sample in accordance with normal CPS procedures. The Census Bureau continued to interview individuals in temporary living arrangements, such as trailers, at the location of sample households.

[8] Table 1 shows the level of geographic detail permitted by nondisclosure rules that protect the confidentiality of respondents.

[9] The smaller number of households interviewed would reduce the denominator of the adjustment factor. Fewer households would be included in the numerator as eligible to be interviewed, both because addresses classified as type B noninterviews and type C noninterviews are excluded and because immediately after the hurricane no attempts were made to conduct interviews in some areas.

[10] According to the Census Bureau, "census tracts are small, relatively permanent subdivisions of a county. Tracts are delineated by a local committee of census data users for the purpose of presenting data. Census tracts normally follow visible features, but may follow governmental unit boundaries and other non-visible features in some instances; they always nest within counties." See "Census Tracts and Block Numbering Areas"

(U.S. Census Bureau, Apr. 19, 2000) on the Internet at **www.census.gov/geo/www/cen_tract.html**.

[11] The completeness of the data depends on whether respondents are reached in sample households, an unusually large problem after Hurricane Katrina. Measures of the number of persons who had a job, but were not at work due to bad weather, reflect reductions in work hours during the survey reference week; in most cases, such reductions are highly affected by the timing of the weather-related event.

[12] Information on the county or parish where people lived prior to the storm also was originally seen as a method to inform counts of the interstate movements of the evacuee population; however the NCOA database proved to be an excellent and timely source of such information, so the CPS data were not used for that purpose.

[13] In an effort to add the questions quickly, the household screener and the first four questions were not subjected to cognitive testing prior to fielding. The full set of questions was cognitively tested prior to the addition of the last three questions in June 2006.

[14] This "household" question structure was adopted, as opposed to an "individual" structure asking each person whether he or she had evacuated due to the hurricane, to reduce burden and to ease programming of the instrument.

[15] Only an extremely small minority of those identified as evacuees did not receive the labor force questions, because they indicated that they had a usual residence elsewhere.

[16] Specifically, those not residing at the address they had prior to the hurricane were asked if they had moved back even temporarily. If individuals indicated that they had moved back, they were asked how long they had stayed at their former address, as well as why they had left. The latter question was to be answered in their own words, and because respondents might find the question sensitive, a decision was made to ask these "reasons for mobility" questions only of those who were in their fourth or eighth interview. (Cognitive testing of the questions indicated that discussing the process of leaving and returning to the affected areas was difficult for some respondents.)