

# **ASA Strategic Initiative: Workshop on Modifying Surveys in Response to Disruptions**

## **Session 1 – Disruptions during Data Collection**

### **I. Disruptions during Surveys of Energy Consumers**

**Presented by: Eugene Burns, Energy Information Administration**

- 4 major energy consumer surveys
  - Each 2-3 months in the field
  - Relate energy consumption to characteristics of energy consumers
  - Focus on the physical entities rather the social or economic entities
    - E.g. housing units and not households
- A disruption has an impact on:
  - Planning and design
  - Data collection
  - Processing
    - Imputation
    - Weighting
  - Analysis and dissemination
- Consumption survey estimates are made for large geographic areas
  - Reference period is a calendar year
  - Multi-stage probability sample
    - Sample size is about 5-6 thousand
  - Not structured to be sensitive to small area disruptions
- Nature and length of disruption dictate the problem and possible solution given the current sample design
- Effect of disruption on operations
  - Increase in unit nonresponse by changing the respondent's ability or willingness to participate
- Effect on estimation
  - Affects coverage or changes the sampling frame

- Sampling units can become unreachable or destroyed
- Example: Gulf War I
  - Data collection began on January 16, 1991
    - Respondents were likely to be distracted by TV reports
    - Decided to suspend survey and resume 3 months later
- Example: Northridge Earthquake
  - Earthquake struck during field interviewing
    - Suspended data collection and resumed 1 month later
- Example: Hurricane Katrina
  - Damage in some areas was so severe that they fell out of scope for the survey
    - Canceled further fieldwork
  - Post-Katrina Estimation
    - Need to judge if and how to adjust
    - Doubled the weight for a paired PSU to account for a “lost” PSU
    - In less affected PSUs, nonresponse adjustments were made at the household level since people in affected areas were still consuming energy
    - It is possible to make things worse by making an adjustment
- Questions:
  - How can periodic surveys be designed to handle disruptions?
  - Given a 2 PSU per stratum design is there an optimal method for adjusting for partial (vs. total) nonresponse to fieldwork disruptions?
    - Or should we handle it on a case-by-case basis?

## **II. The Loss of Sample Households in Disaster Areas**

**Presented by: Shannan Catalano, Bureau of Justice Statistics**

- NCVS, started in 1972, was designed to get at the incidence of crime not captured by police reports and also able to examine victimizations in greater detail than is possible with police data
- Sample

- 6 rotation groups
- Nationally representative multistage stratified household based survey
  - 1<sup>st</sup> stage: PSUs counties (groups) or large metropolitan areas
  - 2<sup>nd</sup> stage: PSUs are grouped into strata
  - 3<sup>rd</sup> stage:
    - Large PSUs are assigned their own strata
    - Remaining PSUs are combined in strata and weighted with probability proportional to size
- Data collection is currently undergoing automation
- Cannot really produce small area estimates due to disclosure limitations
- Weighting
  - Base weight
  - Weighting control factor to account for subsampling
  - Household non-interview adjustment
  - Within household non-interview adjustment
  - Ratio adjustment for 1<sup>st</sup> and 2<sup>nd</sup> stages of selection
- In 2005, there were 650 PSUs
- Post-Katrina
  - Fewer interviews
  - More noninterviews
    - Change in classification from Type C to Type B
  - Percent change
    - Interviews down 21.6%
    - Noninterviews up 61.8%
- Effect on personal victimization by region (region is the lowest level that they can provide estimates)
  - Possible regional effect
  - In rural areas, there was a significant difference, but due to disclosure limitations they cannot identify where that was
- At the national level there was no difference between pre and post Katrina estimates

- Status of sample households in FEMA areas – there was little change since the 6 months post-Katrina

### **III. Canadian Labor Force Survey**

#### **Presented by: Mark Kinack, Statistics Canada**

- The Labor Force Survey (LFS) is the source of the official estimate of unemployment in Canada
- Types of disasters and disruptions:
  - Interviewer strikes
    - Became unionized a couple of years ago
  - Public service strikes
  - Natural and man-made
- Disruptions potentially have an adverse effect on data quality
  - Lowering of response rates
  - Affects reliability by increasing the variance of the estimates
- Statistics Canada developed a Business Continuity Plan
  - Initiative to identify key requirements and establish priorities
  - Develop contingency plans for mission critical programs
  - Regularly reviewed and updated if necessary
  - Tested via simulated disasters
  - Details a number of scenarios and adjustments for these scenarios
- Statistics Canada also developed a Disaster/Catastrophe Effects (DCE) Component
  - Existing questions in the LFS were not providing sufficient information
  - During the power outage of August 2003, the information they gathered was not sufficient for what GDP needed, so they gave a supplementary paper questionnaire and incorporated that data into the GDP estimates
    - The results from the paper questionnaire were well-received
    - Estimated that 11 million hours were lost
    - Estimated that 7 million hours of overtime were added

- Ultimate impact: change in the direction of the GDP estimate from positive to negative
  - Built into the current system which can be easily customized and activated as needed
    - There is a control file that contains the information regarding the questions, edits, introduction, etc.
    - Activation is controlled through a flag at the dwelling level
  - The current DCE is relatively simple with 4 questions
    - Because of historical interest, current DCE questions are limited to effects on hours worked
  - Cannot activate in time to measure effects of disasters that occur during current month reference week
  - A potential modification to the DCE is to expand the content
    - Keep in mind that the priority is always to collect the main survey information – anything else is an afterthought
- Some issues for discussion
  - Is it preferable to collect the information more quickly rather than in subsequent months following the disruption
  - Anytime anything “special” is done, extra training is needed. So, what are the training implications for the field staff implementing new questions on such short notice?

### **Session 1 – Discussion**

- Might want to estimate the disruption at a local level, but then smooth it out at a national level
- Use of a weighting adjustment versus a perturbation of the data
  - The presentations focused on weighting adjustments.
  - This decision depends on what we are trying to accomplish
    - If the disruption is an inconvenience then it may be best to adjust by weighting (nonresponse adjustments, etc.)
    - If the disruption affects the estimates then it may be best to perturb

- When it has a direct impact on the survey estimate, then we would want to measure it
  - This could also impact future estimates
- There are effectively 2 analytical questions we are trying to answer
  - What would have happened if the disruption did not occur?
    - Hypothesis: If it is a localized disruption, then at the national level (or larger scale level) we are likely to observe no major effect.
  - What is the impact of the disruption?
    - The real effect is on what you are trying to measure – does the disruption directly affect the variables measured?
    - Hypothesis: If the disruption has a direct impact on the key survey variables, then you are likely to see an impact.
      - E.g. Katrina probably had an effect on the labor force status for New Orleans, surrounding areas and possibly LA and TX
      - Katrina created situations where it wasn't possible to measure labor force status: employees didn't know if they had a job, employers couldn't find their employees to pay them.
  - The answers to these questions depend on the magnitude of the disaster or disruption
- When talking about disruptions is it possible to categorize them?
  - Type
    - Effect on the characteristics being measured by the survey
    - How will the estimates be affected?
  - Magnitude
    - If small scale, then smaller domain estimation is more likely to be affected
  - Duration
    - A disruption that lasts a week with no lasting effect, then we might want to smooth it out

- A disruption that is longer in duration than we would want to measure it
- How do we deal with nonresponse in light of a disruption?
  - Weighting adjustments
  - Propensity models
- If the disruption is large enough, then what additional information do the government and society need, if any, to get through the disaster?
  - Do we tack on questions to existing surveys?
    - Keep in mind that the current process to get questions approved is quite lengthy
      - OMB has a fast emergency approval system
  - What is the process in Canada to get a new question (or set) approved?
    - The power outage in 2003 was the 1<sup>st</sup> time this came up in Canada
    - A request from senior management to add questions came in
    - Assessed whether or not it was feasible to add questions and if it was, would they be able to obtain reliable information
    - The decision making process in Canada was strictly internal to Stat Canada
    - All 9 programs have Business Continuity Plans with courses of action thought out in advance for many possible situations.
      - Each one has a Disaster/Catastrophe Effects (DCE) component
      - Disasters are simulated periodically to test the plans.
        - Helps determine which surveys are in the field and operating
        - US has something similar but not as extensive as Stat Canada
      - All agencies have been mandated to make similar plans but work is still in progress.
- Perhaps there needs to be a procedure for emergency approval in OMB guidelines pertaining to:

- How to modify questionnaires in the presence of a disruption?
    - Should be a relatively quick process
- CPS is thought to be able to handle disruptions more easily because the Census Bureau has more data collection centers throughout the country
- A localized disruption can influence your ability to collect data across the nation. Recall that BLS had one CATI center in the Louisiana Region.
- In the wake of a disruption
  - Obstacles present themselves that an organization has never thought of
  - Realize the level of vulnerability
- What about residency rules?
  - How do we define the criteria?
    - In some disruptions, sample members sometimes do not even know what their status is (e.g. are they still employed, living at that address)
  - Normally hotels are excluded in surveys, but if a proportion of the population/sample is displaced to hotels (and other temporary shelters) should there be an attempt to get to those people?
    - Have to worry about safety issues for field representatives
      - Displaced sample members might be hostile toward a field representative because there is an appearance that the government wants to solicit participation for the survey, but it is seemingly not helping the sample member's situation
    - Might see higher response rates – people just happy to talk with someone
- How to modify the sample feasibly?
  - Dependent on what the sampling unit is (e.g. addresses)
  - In the NCVS, since it was a household based survey, they decided not to incorporate anyone that was in a shelter (during Katrina)
  - In a panel survey, perhaps they should be excluded and weighted down if it was believed that they could return to their usual place of residence



- If they could not return, then they should be interviewed their temporary place
- In an energy survey, it is possible to lose a household completely, but can still obtain energy consumption information but do not have the household characteristics
- Possible to use Primary “Alternate” Sampling Units
  - In case a disruption affects a particular PSU, then you could use these in their place
  - Should be related to what the survey is ultimately measuring and whether the disruption has an impact on what the survey is measuring
  - There is a concern that the “Alternate” PSU is not like the PSU it is replacing
  - This is like using a paired-sample
- Requested to change the direction of the discussion to disruptions where a significant amount of the area may be affected, not the whole area
- With CATI, multiple samples could be put into the field and it is possible to simulate would happen if a disruption occurred
  - These were commonly used in the past, then, through a lot of effort, gradually phased out
  - Still used in NCS
- The Canadian Labor Force Survey collects information on the labor force status, not of the population
  - It is highly possible to use the LFS to collect different information (rostering or demographics of the household)
  - In other words, if a disruption affected another one of the Canadian surveys can use the LFS to collect some of that information
- Do you have any way of measuring population change used to sample and produce estimates? Weighting mechanism alterations may be needed.
- What happens when your sample is suddenly not representative?

## **Session 2 – New Data Products and Data Adjustments in Response to Disruptions**

### **I. The Katrina Index**

**Presented by: Allison Plyer, Greater New Orleans Community Data Center**

- Co-published with Brookings
- Katrina Index:
  - Monitors the social and economic recovery of the city and the region
  - Purpose: to get regular public and political attention to recovery effort
  - Mirrored the Iraq Index
  - Created a list of indicators they believed would feed into this index and spent 2 months identifying data sources
    - E.g. average home sale price and unemployment rates
- Demand for the Katrina Index is high
- The Katrina Index helped establish where the outstanding needs were
- Challenges
  - There is a lack of organized, publicly accessible data at the metropolitan and lower levels
  - There is a lag in data reporting
  - Sometimes reporting is irregular
  - Sometimes reporting is terminated

### **II. New Census Bureau Data Products to Meet Unanticipated Needs**

**Presented by: Lisa Blumberman, Census Bureau and Office of Management and Budget**

- PEP
  - Monthly and annual estimates of total populations
- ACS
  - Produces socioeconomic and housing data by demographic characteristic
  - Did not begin to collect data on group quarters until January 2006

- The first thing Census did after Hurricane Katrina did was to find the field representatives
  - Next, they determined that there should be immediate changes to data collection
- PEP decisions after Hurricane Katrina
  - Proceed with normal production schedule
  - Needed to add a special product
    - Was basically a data table
    - Estimate of household population size for the 117 FEMA designated counties as of 01/01/2006
    - Estimate of cumulative net migration as of 01/01/2006
  - They had close collaboration with the US Postal Service
    - Made use of the emergency change of address file
    - Were able to update monthly controls used in CPS
- ACS decisions after Hurricane Katrina
  - Immediate changes were needed to continue emergency data collection effort
  - Continued with plans to produce first set of full sample 2005 ACS estimates
  - Added a special product
    - 2 sets of estimates covering 2 time periods for 4 profiles
      - January to August 2005
      - September to December 2005
    - Due to confidentiality concerns and reliability thresholds, at the county-level they were only able to release estimates for approximately 20 counties
    - Therefore they defined geographic areas that made sense
      - They were able to conform to MSAs
      - Labor areas
- The special products put quantitative evidence to what they heard
- Conclusions (what they learned)

- Standard products could not meet the needs
- Development of special products involved creativity
- Truly was a team effort by Census staff and partners (internal and external collaboration)
  - This allowed for these special products to be produced

### **III. Adjustments to Payroll Survey Processing to Reflect Employment Impacts of Hurricane Katrina**

**Presented by: Angela Clinton, Bureau of Labor Statistics**

- Current Employment Statistics sample represents about one-third of total employment
- Preliminary research
  - Identify firms in the disaster area and determine if they closed operations because of Hurricane Katrina
  - Wanted to gain an understanding of a possible baseline
- Methodological changes for the September CES
  - Impute zeros for nonrespondents in flooded/damaged areas
    - Usually if they are nonrespondents, then they get imputed as non-zeros based on establishments around them
    - Normally they do not impute zeros, this is accounted for in the birth and death of establishments
  - Modified adjustment procedures for business births in flooded/damaged areas
  - Reweighted to reflect nonresponse
  - Conducted several runs of estimation to quantify impact of Katrina on employment
- BLS overstated the drop in CES employment using adjustment procedures
  - The use of the imputation and zeros is where the losses came from
- BLS would have understated using no adjustment

## Session 2 – Discussion

- In ACS, they start with a mail out, then go to telephone interviewing, then face-to-face. During a disruption, do they follow and should they follow the potential respondent?
  - ACS is an address based sample, so it is believed that they should not be following
  - Overall, for the CATI and CAPI portions, they did very little (since these interviews are a limited resource, they saved the interviews for later)
    - The mail out was not affected because it went out before Hurricane Katrina
    - If they were not delivering mail to the address, then they did not make a telephone call
    - By October, they modified mailing procedures and did not ask new questions, but included modified letters specifying that people living in the household because of Katrina should be included in the reported figures
    - By November, everything was back to normal
- Another potential “special” product might be to find out where displaced people go after a disruption
- Were there any extra resources provided in order to produce the special products?
  - In the examples cited, the development of the special products was part of an ongoing effort, so no special resources were allocated
- There are two types of non-response 1) “don’t know” 2) “don’t have time”.
  - “No” is often an easier answer to give than the real answer.
- In the CES, there is a distinction between inaccessible versus accessible and a refusal. These should not be imputed as zeros, in what ways did CES manage to identify this distinction?
  - The establishments that were imputed as zeros were ones that they usually get data from
  - Imputing zeros for New Orleans is the correct thing to do

- Ultimately, this estimate contributes to the Louisiana estimate which in turn contributes to the U.S. estimate
  - What about displacement of jobs? Were there any adjustments made to account for the fact that jobs moved?
    - The goal to make an estimate for 1 area is in conflict with estimating for another area
- During a disruption, in surveys with large samples what is the effect on the controls?
  - ACS left off controls for the state. This was a very difficult decision and research is still in progress assessing whether or not it worked.
- Is there an effect from mode changes during a disruption?
  - For instance, during the Power Outage in 2003, LFS did a supplemental questionnaire on paper. What effect, if any, did this have on data quality, comparability?
  - Different modes tend to have very different demographics.
- Perhaps it might be necessary to coordinate a special topic on disaster to OMB?
  - This is already done by FEDSTATS
  - Something easily used by mayors, etc.
- Might be beneficial to develop partnerships with local area disaster response teams
  - After Katrina, Census employees went across the country to emergency preparedness workshops. Respondents shared informational needs and response protocol (would help with sampling). It was a huge success.
  - This would help in planning and assessing emergencies
- What is the effect on data quality when collecting data during, or shortly after, a disruption?
  - For ACS, they did not know what the new product would look like
    - They expected to see huge hits in data quality but it actually looked like it was actually higher
    - Field economists reported that respondents were so happy to talk with someone that it appeared that item nonresponse decreased

- After a while many evacuees got guinea pig fatigue.
- In trend analyses, there is this tendency to get concerned when there is a huge shift or change in the trend. In light of a disruption, how do we deal with the fact that a change in the trend is highly possible?
  - Some of the seasonality adjustments used before the disruption may no longer be applicable
- Continuing the survey during the disruption should inform the projection/estimate, not vice-versa.
  - There was a great deal of internal discussion on whether or not to use controls.
  - There wasn't really anything reliable available to use as a control.
  - Controls couldn't help with New Orleans specifically but they may be helpful for larger area estimates.
- Is there anything that can be done on an ongoing basis to make sure that controls are always available?
  - Basically be better prepared!
  - Want to have some weight based on the sample and how close it is to the disruption or how heavily influenced by the disruption it is
    - A localized disaster, then possible that "new" controls are not needed
- Census designated an emergency response team to know who to go to in case of an emergency
- What about available resources?
  - QCEW spent resources trying to locate business (increased travel funds) and worked very closely with the Louisiana State Office
  - If resources were available and the opportunity was there what would we want to ask people who were affected and/or displaced by the disruption?
    - Note that following people who were displaced takes resources away from what the survey was primarily established to do
    - It may be helpful to study this once and use the information gained to do adjustments later on. Multiple adjustments may be needed.

- What is the information that you would need if you had to do an adjustment?
  - Look at quality as relevance, timeliness, and accuracy – a disruption is a different situation, we do not want to repeat what we would have done without a disruption
  - The features of interest may be different; consistency in timing may not be as important, etc.
  - What about the data would be different?
    - Lower quality
    - Disruption directly affects the main survey outcomes?
- ACS developed an out-of scope quality measure to capture administrative non-interviews
  - Consider situations like the National Finance Center where the Center and many employees moved up to Pennsylvania temporarily. People with existing, non-damaged houses may have moved for work.
  - They survey only captured people who moved back into regular housing – group housing was missed.
- CPS only interviewed people who were in-scope
  - Did not want to change methods without knowing the impact
- Develop a plan to propose to congress to study the impact on method changes
  - Existing systems will not be useful unless they come up with a plan on how to handle the disruption and all the associated consequences (data collection, estimation and dissemination)
- It would help to be aware of alternative frames.
- Katrina may not be an anomalous event.

### **Session 3 – Changes to Surveys for Additional Data Collection due to Disruptions**

#### **I. Quick-Response: Changes to Existing Surveys to Address Significant Events Presented by: Carol House, National Agricultural Statistics Service**

- Disruptions are common in Agricultural surveys
  - Not an issue as to whether or not there will be one, but one of which type



- NASS produces more than 500 national level reports per year
  - Plans on having disruptions throughout surveys
- Disruptions have an impact
  - From a data user point of view, the information is important and critical
  - From an economic point of view, the market can react
    - Some want some official number that will settle things down
- The intervention also has an impact
  - Depends on the time series information at the county, state and national level
  - Modeling the yield for various agricultural products
    - The following can upset the time series:
      - If make no changes in the survey and miss things
      - Make changes but collect different information
- Guidelines for making survey changes
  - Many times the changes cannot be implemented quick enough since the time periods to both collect data and conduct analyses are very short in agricultural surveys
  - Can the change add value?
    - Quality – in the broad sense of relevance
    - Timeliness – should we change the timeframe for collection and publication
    - Accuracy
  - Do we have the resources?
    - Money – not usually getting an infusion of money from congress
      - Can potentially look to within own resources
      - Can look for outside sources
    - Timeframe – usually a tight timeframe
      - Must have a staff that can get the necessary work done
  - Must also provide complete transparency for data users
    - A deviation in any aspect of what you already do must be well documented

- Put notice in reports, press releases, etc.
- Example 1: Recent freeze in mid-January in CA
  - Devastation to orange crops in CA
  - How did it affect the survey?
    - From fall to June usually produce monthly estimates
      - Wanted to produce an estimate for CA when they did for FL
      - Realized that it was too quick to produce something for February so they produced an estimate in January and then again in April
    - They moved the April survey up to March and did a follow-up to see how the crops were doing
      - Measured a 20% loss in CA
      - They were anticipating an 80% loss and potentially having to pay disaster payments to farmers
      - However, did not measure fresh market versus juice
        - In a freeze, it is possible to save the oranges for juice
    - End result: put something out a month early
- Example 2: Infestation of Asian Soybean rust
  - Added questions at the last minute to an existing survey to find out the effects on planting intentions and awareness of the disease
- Example 3: USDA Ban on Clearfield 131
  - During data collection about farmers' expectations on yield
  - After the ban, it was hypothesized that farmers were likely to change their minds
  - Recontacted farmers as to what their new expectations were

## **II. Methodological Issues with Adding Questions Quickly to an Ongoing Health Survey of Children with Special Health Care Needs**

**Presented by: Kathleen S. O'Connor, Centers for Disease Control and Prevention, National Center for Health Statistics**

- Question: What has been documented in the literature pertaining to what has happened in the RDD world in light of a disaster?
  - Not all that much with respect to survey methods
  - Most deals with statistical applications (e.g. modeling)
- It is necessary to collect information about disaster plans but make it manageable
- Thought: Some data, no matter how bad, is better than no data
- Concerns in the absence of well-defined norms
  - How do these issues vary across subpopulations?
  - What is the burden of participation?
  - Through a multidisciplinary approach we can help ameliorate some of those issues
- The track record for RDD surveys in disasters is not bad
  - They are thought to be successful because we use RDD surveys for reasons similar to the problems that disasters present us with
- In the survey under consideration, they added questions about Hurricane Katrina
  - Used FEMA line to manage and control field work
  - Collected 750 complete interviews
  - Data collection was spread over 2 years
- Cannot be reactive, have to be proactive

### **III. Changes to the Current Population Survey in Response to Hurricane Katrina**

**Presented by: Diane Herz and Sandra Mason, Bureau of Labor Statistics**

- BLS and Census Priorities
  - Realized that the population affected by Hurricane Katrina was highly mobile
    - Decided to attempt to maximize the response rate among those in-scope
    - Interviewing was conducted in all accessible areas
    - Uninhabitable households are typically removed from the sample, but modified procedures to keep them in

- Reviewed CPS concepts (employment and unemployment) to make sure that these concepts still made sense
- Clarified interviewer instructions
  - Usual residence elsewhere (URE) – made sure that they were able to return to household
- Impact of missing households on estimation procedures
  - Non-interview adjustment
  - Second-stage raking – controlled to population totals
  - By October they adjusted population controls
- Added special Hurricane Katrina questions
  - Problem: there was a low month to month match rate to the added evacuee question
    - The longitudinal edit was not being done
- Lessons learned:
  - Emergency preparedness in the field is critical
  - Disaster planning for questionnaire and estimation is important and the solutions vary
  - Quick response is important
  - Partnerships with other agencies and institutions are critical
- Local Area Unemployment Statistics (LAUS)
  - Extended time series model to include a model that accounted for the shocks
    - This model assumes a lot is known
      - When the disturbance first occurs
      - How long it lasts
      - Response pattern
  - Modification: Apply more weight in state supply inputs
    - Needed to account for the fact that more unemployment insurance claims were being filed
- Conclusions

- Katrina effects were not evident in state CPS samples, but in the CES and UI series
- Identifying outliers in real time was difficult

### **Session 3 – Discussion**

- What is the operational risk to the overall theme or objectives of the survey?
- Data quality issue – develop a research agenda focusing on “what if” scenarios
- Issue: the expectations that analysts and people have regarding the consequences or implications of a disruption might too heavily influence how we adjust for the disruption and thus they may try to match the “story” of the data to meet their own expectations of the consequences
- Need to look at the analytical objectives of a survey in conjunction with the type of disaster
  - Sometimes producing the standard time series or estimate is sufficient
- Quality needs to be looked at in terms of relevance – the same product may or may not apply in the new situation
  - In the aftermath of Katrina, for many people, even if we could have located them and asked our normal survey questions, they may not have been able to answer.
- The population of interest during a disturbance needs to be determined a priori
- For publication after a disruption, what do we report the data to be a description of?
  - Does the underlying concept change completely?
  - Does the analytical method change?
- Operational decisions
  - Migration/displacement of study population
    - Have to be careful about double counting sample members
  - Weighting
    - Is not just an issue of what you can do, but what you can do given the time constraints

- Weighting methods must be tested in advance – it's too big of a risk to alter systems on the fly.
      - Many times you have systems in place that cannot be easily tweaked with
    - What if controls are not available?
    - Is there an easy way to come up with adjusted population control totals quickly?
      - If unable to, then go with what is available
        - For one survey, population controls were received in late October
          - Had Census run the estimates with and without these population controls
            - At the national level, there was no real difference
            - At the state level, there appeared to be discrepancy
  - Must examine each level separately
  - Don't want to adjust your sample based on irrelevant/wrong information
  - Obtaining controls is an especially big concern for monthly estimates.
  - Sometimes the sample may be better than the control.
  - Change of address forms may be heavily biased.
  - There probably will not be one source of data that provides correct population controls, but if several sources are put together, then perhaps it is possible to get something that is approximately correct – similar to those in the early days of surveys.
- It would be nice to know what post-stratification does.
  - What happens when part of the population leaves the frame?
- We need to look at what the effects of all these issues are, write them down and then study them.

- Surveys should take a broad view and not be specific to their domain
  - We want to capture as much information as possible
  - Run into the possibility of overburdening the respondent further with a battery of questions
    - E.g. loading up the CPS with additional questions
  - Which survey we might use to ask additional questions may depend on the characteristics of the survey
    - Periodicity of the survey
      - Remember that in monthly surveys, there is usually a time constraint
    - Mode of the survey
      - RDD surveys are highly “mobile”
    - If personal interviews are needed, an existing survey must be used.
- Even when we add a question to a survey it usually takes awhile
  - Have to make sure that the question(s) we are adding are measuring correctly the underlying construct
  - It can be hard to get rid of new questions

## **Session 4 – Cross Cutting Issues**

### **I. Presenting Geo-Coded Data on Maps**

**Presented by: Steve Cohen and Richard Clayton, Bureau of Labor Statistics**

- Aggregation of data is possible on a map
- A picture may potentially put in better perspective what you can do
- After Hurricane Katrina, it was evident that the damage was relatively concentrated
- Provided counts back to the state of LA about businesses suffering various types of damage
  - Represented by dots on maps
  - However, at what point does a “dot” become a disclosure issue?
- In light of this disclosure issue, took the dots and dispersed them randomly

- However, does not reflect reality
- Potentially spreading out dots to places that do not exist anymore
- Possible to represent dots proportional to the density of employees where the center of the dot is the location of the business, but it is still possible to identify which business it is
- Question: Why is disclosing the location of a business so confidential?
- Question: How do we evaluate the quality of a map?
  - With numerical data – release marginal totals and not individual cells
  - Present intervals instead of actual numbers
    - Modified  $L^2$ -norm
  - Use a utility function to assess which data disclosure scheme is better than another one

## **II. Building and Maintaining Public Trust in a Suddenly Changing Environment**

**Presented by: Gerald W. Gates, Census Bureau**

- Using and reusing data that we already have
  - Survey data gets out of date very quickly so how do we update it?
  - Negotiations help get data from other sources
    - Integration of other data requires that you build relationships
      - E.g. had to build a relationship with FEMA after Hurricane Katrina
- Issues affecting availability, access and use of data
  - Is it compatible with the law?
  - Policy – sensitive to public concerns
  - Confidentiality – disclosure risk in data products
- There is this public perception that government agencies are already sharing information (legally or illegally)
  - Mixing of statistical and non-statistical uses
- Risk mitigation
  - Vulnerability is really from the inside



- There should be a functional separation between statistical and non-statistical uses of data
- Do not want there to be any surprises
- How long should we keep this information?
- Building and maintaining trust through data stewardship
  - Involves looking at operations, development of contingency plans
  - Make sure that the information we collect, process and disseminate is in compliance with regulations
- Develop a research agenda
  - Disclosure research – protect confidentiality of data products
  - Access – it is not good if we cannot use the data
  - Measuring public attitudes and impact on behavior
  - FCSM interest group on privacy concerns
    - What do we know and what don't we know?
- Continuing to get access to these data is going to be hinged on getting through policy

### **III. Future of Public Health Emergency Data**

**Presented by: Sally Phillips, Agency for Healthcare Research and Quality**

- Focus on the pandemic flu
  - We need data to assess and know the population health care needs and demographics
  - Assess impact on care
  - What is the demand for care?
    - Being able to anticipate pre-event health care needs is important
- Once we create the registry data with special needs, there is an expectation that their needs will be met if a disaster is to occur
  - However, there is also a concern about privacy
- Data needs for response to an event:
  - Impact of event
  - Determine response to event

- Determine how to measure the success of the response
- Linking survey data to actual action plan is critical
- What new data is essential during a disaster?
- How can these data be collected quickly and efficiently?
- How can existing data be used to support the response to a disaster?
- Data needs for recovery
  - What is the health care picture before an event?
    - Use this for the response effort
- Just because we can conduct a survey during an event does not mean we should.
  - If the data are not essential (mission critical), then there is no business collecting them
- Data needs to be accessible for multiple uses and in multiple forms
- There should be a process to identify data gaps
- If we are collecting data before, during and after an event
  - The data need to be in a central place
  - Anticipate what kind of data we should collect before the event occurs
- Pandemic flu – plan for it!
  - What do we want to gather during the potential outbreak with a limited staff?
  - Setting that agenda now is essential!

#### **Session 4 – Discussion**

- Question: Does it really matter if we disclose the location of a business?
  - This type of publication is highly useful and highly desired
  - Are we naïve in the government to think that someone is not already publishing that information anyways?
  - What is a sufficient perturbation of the data?
- With geocoded data in the presence of Hurricane Katrina it is possible to overlay the map with the level of water

- If used by emergency response teams, we would need the geographic information precisely
- Question: Should we protect data that is already readily available (e.g. available through Google)?
  - Even if data is publicly available, if confidentiality is pledged, the statistical agency is bound to uphold the pledge
  - Some protection is built in with inaccuracies.
  - Hopefully we can get rid of this problem through administrative processes
  - Example – restaurants. Every restaurant out there wants their location known.
  - Example – A hazardous waste facility “discovered” because of a survey was given a really hard time from the neighborhood and didn’t respond afterwards
  - Has there been a government decision about whether or not a location can be disclosed?
    - By CIPSEA, we cannot legally disclose location – the technical question we are looking at is what would we need to change so that it is acceptable?
  - What is the public perception?
    - About 10 years ago Census asked a privacy question and many respondents believed that once one government agency collected the information, then all government agencies had access to the information
    - Respondents tend to think that all of the government has their information when it’s given to any one agency, even if told otherwise.
      - If told the agencies will share, respondents will probably say that they shouldn’t
    - However, with this type of data available, public perception may change, which can make a bigger impact.

- Is there a sense as to what establishments' expectations are about privacy?
      - Mostly anecdotal - businesses probably think that agencies should share information
      - If they don't, then this creates an extra burden on the respondent
  - How far will the respondent let us go?
    - Then we can start integrating any other data sources
    - Perhaps we should try to implement something and see how far the respondent will let us go
  - A lot has to deal with the laws that are already in place used to collect the data
    - Legal issues can probably be "fixed" if you can decide what needs to be "fixed"
  - Must reach some appropriate balance between common sense and confidentiality
    - It is possible to present information in a little more generic form – we could protect "wages" but publish "total employment"
- A study was conducted on address lists – they attempted to match the address list to postal lists
  - Low level of matching
  - Census is currently updating their geographic TIGRE maps
    - Some roads were apparently in the wrong place
- Question: What is special or different about disclosure issues in a disruption context?
  - Potentially mixing statistical data for non-statistical uses
  - Using statistical data for how to manage the response to the disruption should not be done rashly
  - How far can we go with non-statistical uses of data?



- Data sharing agreements are already going on across the country, particularly with data brokers. Maybe we can watch the issues they encounter to give insight to what may be appropriate for the government.

### **Research Agenda**

- Goal: To identify and develop substantive research programs that could potentially be funded by the NSF
- During Hurricane Katrina an entire CPS population moved out of scope for the survey
  - Question: Do we interview them?
  - Under current CPS practices, we do not interview people temporarily living in hotels, superdomes, etc.
  - If we were to interview them, then we could construct an area frame to find out where these people are and then draw a probability sample
  - Other issues, such as safety concerns for field representatives, arise as a consequence of interviewing these people
- During disruptions there will always be compromises and tradeoffs
  - In terms of collecting data, anything is better than nothing
  - In terms of continuing operations, there are three types of data to collect each with their own temporal and political characteristics:
    - Ordinary data
    - New data at the onset of the disruption
    - New data to assess the impact of the disruption
  - We need tools for framing these decisions
- One technique that could be implemented to sample displaced people is adaptive sampling
  - We could generalize this to discuss issues related to sampling
    - If we changed the sampling procedures by using multiple frames, then how do we combine them?
    - How do we incorporate the multiple frames into our analyses?

- Most surveys sample addresses and by some linking rule, these addresses are linked to people
  - Other methods are possible, for example, sampling where people are at a particular moment.
  - We need to explore these rules and perhaps update them for sampling during a disruption
- There are issues regarding estimation and analysis in the presence of a disruption
  - Propensity modeling as a possible solution, or modeling in general
  - How do we find good benchmarks and how do we assess the quality of those benchmarks?
  - How do our imputation procedures change or should they even change?
    - If historical data are available, then it is possible to conduct a simulation study to investigate the impact of changing the imputation procedure because of a disruption.
  - If the disaster is localized, has an impact on what the survey is measuring and the objective of the survey is to produce a national estimate, then how should the consequences of the disaster be incorporated into the national estimate?
- There are a plethora of cognitive issues that arise
  - Currently, a change in CPS takes years and years
  - During a disruption, how do we get these changes approved more quickly?
  - How do we train our staff quickly and efficiently on the fly?
- Data quality seemingly becomes more important
  - What is the effect on nonresponse bias?
  - In the presence of a disaster, it is possible to have atypical housing units so interviewing them could introduce some bias
- Perhaps we should begin with classifying the different types of disruptions
  - How does it disturb data collection?
  - What are the relevant dimensions of the disruption?

- Length/duration
  - Intensity
  - Consequences (e.g. loss of electricity, displacement of target population)
  - Consider computer virus geography – a disruption of this nature would have a completely different type of geography.
- What is the relationship between the type of disruption and what the survey is attempting to measure?
- As an example, suppose there was a computer virus
  - If data were collected via computer, then this would adversely affect the data collection process
  - If the survey gathered “economic” data, then a computer virus might affect these data as well
- In doing this, we are not only classifying but we are prioritizing our tasks
- From the above discussions, three main areas have been identified for which research can be extended and it may be useful to think of these in a “continuing operations context”
  - Measurement
  - Design
  - Estimation
- **Measurement**
  - Rules for classification and rostering are no longer applicable
  - How do people affiliate with households?
  - There is a break in the conceptual structure of the survey
    - We are potentially changing concepts
      - For example, under the current definition of unemployment, after Katrina, there were concerns that unemployment would drop to zero and, since this doesn’t fit a user’s general idea of unemployment, CPS and BLS might lose credibility
      - Another example would be a casino destroyed by the hurricane keeping all its employees on the payroll. These



people are counted as employed but in this situation, counting these people as employed doesn't match your gut instinct of what it means to be employed.

- Gross change, which is normally a secondary issue, may become a primary issue
  - Straying from traditional concepts
  - Changing definitions
  - Question: How do these changes affect data quality?
    - Related to relevance, accuracy of reporting and timeliness of data collection
- There are new screening issues
- Can we develop and implement an intricate classification scheme?
  - If we change the current procedures, will the new ones be just as good?
  - How do we incorporate these into the existing systems?
  - Are the changes practical, i.e. can we get them to work?
  - How do these changes align with what the survey is measuring?
- It is important to understand the level of non-sampling error under non-traditional situations
  - There is likely to be an increase in error or risk since we are not functioning under a traditional scheme
  - The objective becomes to characterize the error since we would be unlikely able to eliminate it
- How does scope change as a consequence of a disruption?
  - If the target population becomes displaced, then how do we define in-scope and out-of-scope cases?
    - Do these definitions change?
  - What happens if the respondent is reachable, but the disruption affects the respondent's ability to provide the information?
    - Is there a method to model this uncertainty?
    - Should we attempt to measure the construct differently?

- We should potentially expand our “don’t know” categories.
  - Making the questions open-ended may be good on the fly.
  - Should we use the method normally used in the survey to capture uncertainty? It may no longer be appropriate since the quantity of uncertain answers is so much larger.
  - Maybe we should try to capture why they don’t know.
- Changing questions:
  - How do you know if you need to change a question?
  - How do you know what to change it to?
  - How fast can you put it out?
- How do we change an instrument and how quickly can we implement these changes?
  - This would be more difficult in the presence of elaborate skip patterns
  - What types of questions are ok?
    - For example, different sets of questions would be appropriate for home phone and cell phone because of the respondent’s environment
  - How will the data before and after the changes be combined?
    - How do you account for the bias introduced by different questions and procedures?
  - If you change the procedures, then when do you go back to the original procedures?
    - What is the “tipping point”?
  - Some operational issues can’t be dealt with until they occur, but we could have something generic, already tested, available for decisions that must be made quickly.

- It may be necessary to address, in a generic sense, various business issues in advance
  - There are budgetary concerns
  - Easy to get approved additional questions
  - Operational issues – can we implement in CATI, CAPI or PAPI
  - Training of staff
  - Tabulations and analyses
  - Potential cost modeling projects:
    - Model costs under a normal paradigm and then investigate what the effects of a change to that cost structure are
- If we classified disruptions, then we might be able to anticipate certain problems
  - We could conduct cognitive tests and be ready to implement new structures and changes
  - We should understand what decisions need to be made
  - We could set up expected problems and have “switches” to turn them on when necessary.
  - Having a plan in advance also helps reduce cost and risk.
  - Central coordination is essential to label core priorities.
- It is always important to keep in mind the purpose of the survey
  - Should we supplement the existing survey
  - Should we change the existing survey
- Investigate ancillary data products that have the potential for use
  - Use of administrative records to get at quick and dirty estimates
  - Attempt to obtain an inventory
  - What are the effects on variance and bias (mean squared error)?
  - Can/should these methods be used during regular production?
  - How can these be blended?
- How does the measurement of the disruption relate to current measurement in the survey?

- We may want to create an additional measure while not changing what you are currently measuring
  - Provide two sets of analyses:
    - Adjust out the disruption
    - Characterize and incorporate disruption into the estimate
  - The above is related to seasonal adjustment – oftentimes we want to know what the estimate is with and without the effect
- How do we measure change without destroying the “national” concept?
- **Design (Sampling)**
  - A robust sampling design
    - Robust to the disruption
      - Related to level of clustering within the sample
    - Robust in the sense of being easily changeable
      - Could potentially be modified on the fly
  - Groupings of design issues
    - Robust (off-line): spatially and temporally dispersed, not highly clustered
    - modification of existing designs (surveys already in the field)
    - development of new designs (surveys developed on the fly)
  - Development of a new sampling design
    - Prior planning in anticipation of a disruption
    - Adaptive sampling
    - Make use of old panels from other surveys (e.g. CPS)
    - Develop alternate frames in advance
    - Non-traditional alternate frames
      - Of group quarters (e.g. hotels, shelters)
      - Temporary housing units (e.g. trailers)
    - Continue to sample addresses?
  - Modification of an existing design
    - Implement multiphase samples
    - Add a supplemental sample

- Potentially make use of a CDC System called Epi Info
  - Currently this is used to quickly assess medical needs
- What are the sample design issues resulting from:
  - A mandatory quarantine?
  - An unreachable population?
  - Unreliable infrastructure (e.g. a whole telephone exchange gets eliminated)?
- Use as an example the Power Outage of 2003 in Canada
  - In the LFS, they primarily gather economic data – power outage had a direct affect on productivity and other economic concerns
  - Expand the module to capture health concerns
  - Suspend other surveys and replace with an omnibus survey
  - Possible to switch to a paper survey provided that there are a limited number of questions that you wanted to ask
  - In a different type of disruption, may decide to suspend the LFS, but use the infrastructure to collect other information
    - Of course, if this poses too much of a burden on the respondent, then do not do it!
    - Can be extended to agencies, does not just pertain to surveys (e.g. use the structure of Agency A to help Agency B)
- It is also important to think about data processing under a less than ideal setting (e.g. no power)
- What are the design issues associated with each of the main governmental surveys?
- Literature review:
  - Study developing countries where the infrastructure is not developed and learn how they conduct surveys
  - Johns Hopkins University
  - Fritz's work
  - Iraq surveys

- Biostatistical literature – censoring
  - World experience
- Build partnerships where they don't already exist
  - With disaster relief efforts/teams
  - Disease monitors – find out how and what they do to monitor the spread of disease
  - Digital government
  - Hospitals
    - It is possible to capture information through hospital check-ins
- Multiple frame sampling
  - Valid representation of an area that is being disrupted might require the use of an area frame as a supplement to the previously used frame(s), at least to ascertain the magnitude of the undercoverage of the original frame. Estimates that use both frames efficiently then need to be constructed. I am not sufficiently familiar with the relevant literature to know whether there are still major theoretical/methodological issues, but I have to assume that there is still research to be done in practical and useful methods adapted to the special case of an area under disruption.
- **Estimation and confidentiality**
  - Is there a change in a parameter to be estimated?
    - For example, typically would have estimated immunization rates for New Orleans, but because of Hurricane Katrina it was not possible; therefore, they only did it for Louisiana
    - There could be changes in geographical and demographical characteristics – make use of different subpopulations
    - Also make changes to the temporal scale
    - Look at estimates/projections with and without the disruption
      - Idea of a counterfactual – what would have happened?
  - Different methods for imputation

- Given the available covariate information is there a way to fill in the missing data?
- How do we obtain population controls?
- In some disasters, we are dealing with such a specialized population
  - Should they be used?
  - If so, how should the estimation procedure be modified?
- If you want to measure the impact of the disruption, then you may need additional information (e.g. population controls).
- Bias and variance issues
- Operational risk
- Multiple comparisons
  - Making changes to one estimation procedure within a survey may have an impact on another estimation procedure within that same survey
- By incorporating data from all these different frames, we could potentially end up with a sample, but we are not quite sure what it is a sample of
- How do we draw inferences from a displaced population with incomplete samples?
  - The usual assumptions are not valid
- Look into sensitivity analyses
  - Produce before we release the numbers
  - Peer reviewed
- How do we present data that is economically useful but still protects the confidentiality of the respondent?
  - Research what the respondents' expectations are about confidentiality in general as well as during a disruption
- Study the effect of nonresponse on survey estimates during a disruption
- Composite estimation
  - How to incorporate data from additional sources (e.g. other surveys)?

- Do we have any understanding as to what the effect a disruption would have on data quality?
  - Related to outside the affected area
  - Related to inside the affected area
    - Potential ill-will toward field representative – “about time someone showed up!”
- How do we model “flakey” data?
  - Bias, variance and data quality issues
  - Do we know if we are undercounting (or over counting)?
- In Canada, they observed an effect on response rates due to SARS
  - Sentiment was – another government survey but the government is not doing anything to remedy the problem
- What are the coding/outlier detection/editing issues?
  - Perhaps the usual rules are no longer applicable and they need to be redefined
  - How do we (easily) make changes to the systems in place?
- Using random/imperfect/model-based controls
  - As noted several times during the workshop, it is far from clear that existing control totals are still relevant once an area is under a severe disruption.
  - One topic of potential interest is how to use other types of auxiliary information, which might be imperfect.
  - For instance, supposed that you have aerial photos that delimit a flood zone, so that it is possible to estimate the number of housing units that are lost or inaccessible (by comparing with previous photos).
  - This information would certainly be useful, but it is also likely to be itself an estimate. A research project would be how to incorporate that type of auxiliary information, while also accounting for the fact that the "control" numbers are themselves random.
- Combining randomized survey and purposive estimates



- I view this as a special case of composite estimation, where we are looking for a way to combine two estimators in such a way that the overall precision of the procedure is maximized.
- This is an old problem, but there is still no good general answer to it. It is definitely worth more research, at least for the special case of areas under disruption.
- Capturing and incorporating uncertainty observed in the survey variables themselves
  - The question here is what to do in cases in which the answers to the questions in a survey become ambiguous.
  - For instance, in an employment survey, the person might want to be able to say "I don't know whether I am employed or not, because I cannot reach my place of employment." At a conceptual level, one would like to be able to obtain an answer that says, for instance, "40% likely to be employed" (which raises all kinds of question phrasing and eliciting questions!).
  - Then, from an estimation perspective, how would we use this type of response in constructing survey estimators for the area under disruption?
  - How could one construct an estimator that includes a model for the variability in the questions themselves, in addition to the sampling variability?