May 30, 2007

MEMORANDUM FOR   Cheryl Landman
                   Chief, Demographic Surveys Division

FROM: Ruth Ann Killion*(Signed)*
                   Chief, Demographic Statistical Methods Division

Subject: Weighting Specifications for The American Time Use
                   Survey (ATUS) for 2006 (Doc.#ATUS-16)

> *Note:* *These specifications have been revised to reflect changes made to the raking procedure for the 2006 ATUS weighting. The 2006 weighting changes the raking procedure after the non-response adjustment by raking to (1) gender by race-ethnicity by day-of-week (weekday, weekend) cells, then to (2) gender by household type by educational attainment by day-of-week cells, then to (3) age (in 5-year groups) by gender by day-of-week cells. The new raking procedure is explained in Sections IV.F.5 and IV.F.6 of this specification. See Doc.#ATUS-13 for the raking procedure for the 2005 ATUS weighting [3].*

> *These specifications also drop the SCHIP adjustment factors because SCHIP cases were made eligible for ATUS starting with the sample selected from the November 2004 CPS (the January 2005 ATUS panel).*

> *These instructions concern public-use replicate weighting for the ATUS. Now that we have passed the phase-in period for CPS in ATUS, we have proposed that DSD-CPS run the public-use replicate weighting and CPSB in DSMD continue the verification. CPSB in DSMD will temporarily run the public-use replicate weighting until DSD-CPS can take over the processing. We assume that will take place before the 2007 ATUS weighting. Details of this process are provided in Section IV.A.*

I.   OVERVIEW

The American Time Use Survey (ATUS) weighting process will produce person-level weights that can be used to produce quarterly and annual average estimates. The weighting will include adjustments to account for selecting the ATUS sample households from the monthly interviewed Current Population Survey (CPS) sample (sample from the State Children's Health Insurance Program (SCHIP) Survey was eligible for ATUS beginning in January 2005). ATUS will also include adjustments to account for noninterviews and for the unique aspects of the survey design, such as selection of one person per household and the use of

designated days. The weighting procedure, as described below, assumes processing based on activities reported for a day in a particular calendar month.

II.   INPUT FILES

A.   Input Files 1 to 3: Edited ATUS Data Files

These <u>monthly</u> person-level files contain the edited responses to the ATUS questionnaire, activity codes, and sampling information such as the state subsampling factor, the within-stratum sampling interval, and the within-household sampling factor. Also needed for weighting are: the CPS weight after the first-stage adjustment, sample month, and longitudinal identifier.

Name these files in the following format and put copies in the following directory on the ESPB machine in DSD:

/espb/timeuse/temp/weight/<yyyymm>/atus<yyyymm>.sas7bdat

B.   Input Files 4 to 9: CPS Internal Microdata Files for running CPS monthly weighting through the first-stage

These files contain sample and interview information for every case in the full CPS, including the SCHIP expansion cases. These files are used to run the CPS public-use monthly weighting through the first-stage to obtain Output Files 2 through 7. Data items needed include:

- Person and household records for interviewed households (HRINTSTA=1); housing unit records for Type A (HRINTSTA=2) and Type B (HRINTSTA=3) noninterviews; and housing unit records for first-month Type C noninterviews (HRINTSTA=4).
- The CPS/SCHIP sample flag (GECPSCHP), stratification PSU (GESTRPSU), county (GECO), frame (GEFRAME), and final hit number (GEHITNO) to match to the public-use replicate factor file (Input File 10). Note that the CPS/SCHIP sample flag (GECPSCHP) has a value of "1" if the unit is in sample for CPS and a value of "2" if the unit is in sample for SCHIP.
- The weight after applying the weighting control factor to the full-sample weight to obtain the CPS weight (HWWCWGT). Section IV.A provides further details of this process.

These files are located in the following directory on the CPSCOMP machine in DSD:

/data<b>/<mmmyy>cps.sas7bdat

where b is the month (1-12). The jan06cps.sas7bdat file is in /data1, the feb06cps.sas7bdat file is in /data2, etc. The ATUS sample processed through replicate weighting for a given ATUS quarter will consist of CPS records from 6 previous months, beginning 7 months before the last ATUS processing month of the quarter. For example, if the January-March 2006 ATUS quarter needs to be weighted, use August 2005 through January 2006. This is due to the fact that cases interviewed for a given ATUS quarter come from as many as 6 different months of sample.

C. Input File 10: Public-Use Replicate Factor File for computing total variance (160 replicates)

This file contains the replicate factors for creating public-use replicate weights for the replicate samples used for variance estimation. It is used from July 2005 onward for computing total variance.

This file is located in the following directory on the DSMDE1 machine in DSMD:

/cpsb/prod/rep/repfac2000_total_pu.sas7bdat

D. Input File 11: CPS Internal Microdata File for generating controls

CPS composite and second-stage weights from this file will be used to generate controls (this file is for the CPS month corresponding to the ATUS panel code for the middle month in the quarter being processed), which will be used in the raking stage of the ATUS weighting. Data items needed include:

- Race/Ethnicity (Non-Hispanic/black alone, Non-Hispanic/non-black alone, and Hispanic, any race) (PRBLNONB, PEHSPNON)
- Gender (PESEX)
- Age (category varies by race/ethnicity classification) (PEAGE)
- Educational attainment (completed high school or GED, did not complete high school or GED) (PREACAT)
- Household Type (household with children or household without children) (HRLONGID, PULINENO, PRPERTYP – internal version) Note that this 'household type' does not strictly correspond with ATUS Household Type, since the four original categories have been collapsed into two.[1]

This file is located in the following directory on the CPSCOMP machine in DSD:

_____

[1] For ATUS, an adult must be at least 18 years old. This hierarchical classification system assumes that a household does not fall into the previous category. For example, a household classified with at least one child between 6 and 17 inclusive does not have any children under age 6.

/data<b>/<mmmyy>cps.sas7bdat

where b is the month (1-12). For quarterly weighting, use the file for the middle month of the quarter. For example, for January-March 2006, use the February 2006 file.

E. Input File 12: CPS Replicate Weights after the Second-Stage Adjustment for 15 year olds

This file contains the full-sample weight after the CPS second-stage adjustment, plus replicate weights after the second-stage adjustment for replicates 1 through 160 for CPS sample persons 15 years of age. For quarterly weighting, use the file for the middle month of the quarter with Input File 11. For example, for January-March 2006, use the February 2006 file.

This file is located in the following directory on the ESPB machine in DSD:

/espb/incoming/cps/ssrp_atus15_<mmyy>.sas7bdat

F. Input File 13: CPS Replicate Weights after the Composite Weighting Adjustment

This file contains the full-sample weight after the CPS composite weighting adjustment, plus replicate weights after the composite weighting adjustment for replicates 1 through 160 for CPS sample persons 16 years of age and older. For quarterly weighting, use the file for the middle month of the quarter with Input File 11. For example, for January-March 2006, use the February 2006 file.

This file is located in the following directory on the CPSCOMP machine in DSD:

/cpsrepwgt/cmrp<mmyy>.sas7bdat

III. OUTPUT FILES

A. Output File 1: Edited ATUS Data File Including Household (HH) Members

This file is a concatenated file of Input Files 1 through 3, with all HH members included. Place a copy of it in the following directory on the ESPB machine in DSD, with the indicated file name format:

/espb/timeuse/processing/weight/allmem<yyyy>q<b>.sas7bdat

where yyyy is the year and b is the quarter (1, 2, 3 or 4).

B.   Output Files 2 to 7: CPS Public-Use First-Stage-Replicate Weight Files

These files contain the CPS public-use first-stage replicate weights for all ATUS sample persons in Input Files 1 through 3. They contain the full-sample weight after the CPS first-stage adjustment (FSWGT0), plus replicate weights after the first-stage adjustment for replicates 1 through 160 (FSWGT1-FSWGT160) for CPS sample cases. These weights are based on the combined CPS/SCHIP baseweights. The layout for these files is in Table A of the attachment.

The ATUS sample processed through replicate weighting for a given ATUS quarter will consist of CPS records from 6 previous months, beginning 7 months before the last ATUS processing month of the quarter. For example, if the quarter January-March 2006 needs to be weighted, Output Files 2 through 7 would be August 2005 through January 2006. These weights are used as the starting weights for the ATUS replicate weighting. Give these files the following name and place a copy of each in the following directory on the ESPB machine in DSD:

/espb/timeuse/dsmd2006/<mmmyy>atu_pu.sas7bdat

C.   Output File 8: ATUS Replicate Weight Output File

This is a combined file of Input Files 1 through 3 with ATUS replicate weights added for all ATUS weighting stages. Give this file the following name and place a copy in the following directory on the ESPB machine in DSD:

/espb/timeuse/processing/weight/wt_<yyyy>q<b>_2ndmth.sas7bdat

where yyyy is the year and b is the quarter (1, 2, 3, or 4).

D.   Output File 9: ATUS File for BLS Analysis (Public-Use)

This quarterly file contains questionnaire data, BWGT0 through BWGT160 (full-sample and public-use replicate weights reduced to the CPS national sample and adjusted for ATUS stratum subsampling), and FINLWGT0 through FINLWGT160 (full-sample and public-use replicate weights after 3 steps of raking: gender/race-ethnicity/day-of-week, gender/household type/educational attainment/day-of-week, and age/gender/day-of-week).

Note: Due to public disclosure concerns BLS receives a public-use file for analysis that results from performing the replicate weighting detailed in this specification on ATUS sample records that have their original stratum and PSU codes removed. There are pseudo-stratum and

pseudo-cluster codes on this file for a user to create their own replicates if they so desire, but the replicate weights provided are more accurate. These are referred to as the "public-use" weights.

IV.   PROCESS

Note: No rounding should take place during the process. After the process is complete, round all weights (full-sample and replicate weights) to 4 decimal places on the output files. See Section IV.G for a list of variables that should be rounded.

A. Run CPS monthly weighting through the first-stage adjustment using public-use replicate factors

Doc.# ESTWGT2000-13R outlines the steps for running the CPS monthly weighting through the first-stage using replicate factors (see Sections V.A through V.G of [6]). The process for public-use ATUS replicate weighting is similar with the following exceptions:

1. We omit Sections V.A through V.C of [6] which are identical for the ATUS weighting, and just use the weight after these steps (HWWCWGT) from Input Files 4 to 9.

2. Section V.D in [6] works with internal unperturbed data and internal replicate factors. Creating the public-use replicate weights is similar to this step, but we use the public-use replicate factors and a different match key. These changes are described below.

Assign each interviewed or noninterviewed record 161 initial public-use replicate weights. Each initial public-use replicate weight is the full-sample weight after the weighting control factor (HWWCWGT) (in [6] (W_{CF})) adjusted by a replicate factor. There are 161 replicate factors (denoted f_0, f_1, f_2, ..., f_{160}) for each record on the public-use replicate factor file (Input File 10). The 0th replicate sample is the full-sample. Consequently, its associated replicate factor for all sample units has a value of 1.0000. The public-use replicate factor file is a hit-level file and represents the entire universe of segments selected for sample throughout the entire decade.

To obtain the 161 initial public-use replicate weights:

a. Sort each of the CPS internal microdata files (Input Files 4 to 9) by CPS/SCHIP sample flag (GECPSCHP), stratification PSU (GESTRPSU), county (GECO), frame (GEFRAME), and final hit number (GEHITNO).

b. Sort the public-use replicate factor file (Input File 10) by CPS/SCHIP sample flag (GECPSCHP), stratification PSU (GESTRPSU), county (GECO), frame (GEFRAME), and final hit number (GEHITNO).

c. Match the records on each of the CPS internal microdata files (Input Files 4 to 9) to the public-use replicate factor file (Input File 10) by the CPS/SCHIP sample flag (GECPSCHP), stratification PSU (GESTRPSU), county (GECO), frame (GEFRAME), and final hit number (GEHITNO).

d. Calculate the 0th public-use replicate weight (W_0) by multiplying the full-sample weight after the weighting control factor (HWWCWGT) (in [6] (W_{CF})) adjustment by f_0, $W_0 = \text{HWWCWGT} \times f_0 = W_{CF} \times f_0$.

   Note: $f_0 = 1.0000$.

e. Calculate the 1st public-use replicate weight (W_1) by multiplying the full-sample weight after the weighting control factor (HWWCWGT) (in [6] (W_{CF})) adjustment by f_1, $W_1 = \text{HWWCWGT} \times f_1 = W_{CF} \times f_1$.

   f. Repeat in the same manner for the remaining replicate factors (f_2, f_3, ... f_{160}), $W_r = \text{HWWCWGT} \times f_r = W_{CF} \times f_r$, where r = 2, ..., 160.

   This yields an array of 161 initial public-use replicate weights for each record: W_0, W_1, ..., W_{160}.

   Notes:

   • The public-use replicate factor file (Input File 10) is provided for total variance only.

   • All interview and noninterview records should match to a record on the public-use replicate factor file, but the public-use replicate factor file will contain records that do not have a corresponding interview or noninterview record in a particular month.

   • Exclude the Type B and first-month Type C noninterviewed records from the remainder of the processing. These records will contain only the baseweight, the baseweight after the weighting control factor has been applied, and the set of 161 public-use replicate weights.

3. We continue the process by following Sections V.F and V.G in [6]. These two steps are unchanged. These will be Output Files 2 through 7; however, we subset to MIS 8 because the ATUS sample is drawn from the

CPS interviewed cases from the previous month's retiring rotation group. See Reference [2] for the ATUS sampling specifications.

Note: The CPS branch in DSMD will temporarily run these steps until DSD-CPS can take over the processing of the ATUS public-use replicate weights (Output Files 2 through 7). CPSB will run the months for the 2006 weighting until DSD can take over this processing. We assume that will take place before the 2007 ATUS weighting.

B. Determine ATUS Cases Ineligible for Weighting

Working from Input Files 1 to 3, and based on the final outcome codes, identify which ATUS sample cases from the edited files are not eligible for weighting. Examples of an ineligible ATUS case would be:

- a designated person who was institutionalized during the ATUS interviewing period,
- a designated person who died prior to the first designated day of interviewing,
- a designated person who moved from the household,
- a designated person who was in the military during the ATUS interviewing period.

Create a flag for weighting eligibility (WGTELG). Assign a value of '0' for ineligible cases and a value of '1' for eligible cases. Use the following table to assign WGTELG:

ICATI ATUS Final Outcome Code OUTCOME =	Updated (WebCATI) TUFINALCODE	Updated (WebCATI) TUFC_SUB	DESCRIPTION OF OUTCOME	Assign WGTELG =
01	001	--	Fully completed interview	1
02	002	--	Sufficient partial interview	1
03[2]	NA	NA	Sufficient partial interview	1
04[3]	NA	NA	Partial not complete at closeout	1
07-16	020	--	Out of scope cases	0
17	021	001	Household moved since last contact	0
18	021	002	Household absent, ill	1

[2] A final outcome code of '003' was only possible for cases introduced before January 1, 2003; this outcome code no longer exists.

[3] A final outcome of '004' will be converted to the outcome '002'.

ICATI ATUS Final Outcome Code OUTCOME =	Updated (WebCATI) TUFINALCODE	Updated (WebCATI) TUFC_SUB	DESCRIPTION OF OUTCOME	Assign WGTELG =
			or hospitalized for duration of field period	
19	021	003	Household institutionalized for duration of field period	0
21	024	--	Unconvertible language barrier	1
	025	001	Unconvertible hearing barrier	1
22	022	--	Unpublished or unlisted phone number	1
23	022	--	Only phone number incorrect or problem dialing number	1
24	020	--	Household entirely occupied by armed forces	0
25	020	--	Household with all members URE	0
26	020	--	Household vacant	0
29[4]	NA		Other noninterview	1
100	172	001	Case deleted in sample reduction	0
104	172	002	Invalid input	1
106	176	--	Congressional case, deleted at congressional request	1
109 – 112	179 181	--	Hostile break-off codes	1
113	183	--	Closeout due to unproductive call counter	1
114[5]	NA		Other assessor	1

---

[4] There is no WebCATI counterpart for this ICATI outcome. Review of 2004 data indicates that this outcome was never received in production.

[5] There is no WebCATI counterpart for this ICATI outcome. Review of 2004 data indicates that this

ICATI ATUS Final Outcome Code OUTCOME =	Updated (WebCATI) TUFINALCODE	Updated (WebCATI) TUFC_SUB	DESCRIPTION OF OUTCOME	Assign WGTELG =
			noninterview, type 2	
116	186	--	Pre-refusal based on explicit refusal or hostile break-off	1
118	188	001	Uncompleted callbacks; unable to contact on callback	1
119	188	002	Temporarily unavailable – absent, ill, or hospitalized	1
120	188	003	Temporarily unavailable – institutionalized	0
121	191	--	Language barrier	1
NA	192	--	Hearing barrier	1
122	59	--	Other supervisory referral	1
123	193	--	Privacy Detector	1
124	194	--	Never contacted, confirmed number	1
125	195	--	Never contacted, unconfirmed number	1
127	199	--	Never tried	1
	230	--	Less than 5 activities in the core diary.	1
	231	--	More than 3 hours of don't know/refuse time in core diary.	1
	232	--	More than 3 hours of don't know/refuse time in core diary and less than 5 activities in the core diary.	1
	233	--	Diary hit maximum number of activities before reaching 24	1

outcome was never received in production.

ICATI ATUS Final Outcome Code OUTCOME =	Updated (WebCATI) TUFINALCODE	Updated (WebCATI) TUFC_SUB	DESCRIPTION OF OUTCOME	Assign WGTELG =
			hours	

C.   Create Preliminary Public-Use Replicate Weights for Variance Estimation

1.   Match the Edited ATUS Data Files (Input Files 1 to 3) to the Public-Use Replicate Weight Files (Output Files 2 through 7). The match variables will be CPS sample month (HRMONTH), CPS longitudinal identifier (HRLONGID), and line number within housing unit for the correct person sampled (PULINENO). There will be many records on the replicate weight files that are not matched to an ATUS sample record, but each ATUS sample record should match to exactly one record on the replicate weight file. The variables FSWGT0 through FSWGT160 will come from the Public-Use Replicate Weight Files (Output Files 2 through 7). As a result of the matching, you should have 161 first-stage weights for each record on the ATUS data file. These are referred to as public-use replicate weights.

GENERAL NOTE ON REPLICATE WEIGHTING: Subsequent stages of the ATUS weighting will be done 161 times, once for the full-sample (replicate 0) and once for each of the 160 replicates. In the ATUS weighting adjustments described in the next section (Section D.), the weights for each replicate will be adjusted by the same set of factors, since this involves multiplying the initial weights by a series of constants. However, the adjustments in Sections E. and F. will result in different adjustment factors being applied to each replicate.

Note: Perform all following processes as specified for the full-sample and all 160 replicates. In other words, when STSUBWGT is assigned in Process D.2, assign STSUBWGT0,…, STSUBWGT160. Eventually, the following sets of variables should be calculated for each ATUS sample record:

STSUBWGT0-STSUBWGT160
STRTMWGT0-STRTMWGT160
BWGT0-BWGT160
NIWGT0-NIWGT160
FINLWGT0-FINLWGT160

D.   Apply Adjustment Factors to Account for Subsampling from CPS (by Replicate)

These factors adjust the weights of the selected person records to account for the fact that they are a subsample of the CPS interviewed cases from the previous month's retiring rotation group (MIS 8). See Reference [2] for the ATUS sampling specifications.

1. Use all ATUS sample records (eligible interviewed, eligible not interviewed, and not eligible) with a reference day in the calendar month being processed.

2. Multiply the first-stage weight (FSWGT0-FSWGT160) by the ATUS state subsampling factor (TUSI) obtained during the sampling operation. The resulting weight is the ATUS weight after the state subsampling adjustment (STSUBWGT0-STSUBWGT160).

3. Multiply the resulting weight (STSUBWGT0-STSUBWGT160) by the ATUS stratum subsampling factor (HHSI) obtained during the sampling operation. The resulting weight is the ATUS weight after the stratum subsampling adjustment (STRTMWGT0-STRTMWGT160).

4. Multiply the resulting weight (STRTMWGT0-STRTMWGT160) by the ATUS within-household subsampling factor (HHSIZE) obtained during the sampling operation. The resulting weight is the ATUS weight after the household subsampling adjustment. This is also the ATUS baseweight (BWGT0-BWGT160).

So, $BWGT_k = FSWGT_k \times TUSI \times HHSI \times HHSIZE$
where $k = 0, \ldots, 160$.

5. **Do NOT process ineligible sample cases further.**

E. Perform the ATUS Noninterview Adjustment (by Replicate)

The ATUS noninterview adjustment increases the weights of interviewed person records to account for eligible sample persons (WGTELG=1) who were not interviewed in the ATUS. Only interviewed records are carried through the weighting adjustments that follow the ATUS noninterview adjustment. ATUS final outcome codes of '01' and '02' constitute completed interview cases.

1. Classify the ATUS interviewed and eligible noninterviewed records within each replicate into 14 cells, according to their assigned reference day (i.e., REFERDAY= 1, 2, …, 7) and if they received an incentive to respond (i.e., INCNTFLG=0, 1).

2. Compute the ATUS noninterview adjustment factor for each cell:

a.   For each cell, tally:

1)   The weighted count of ATUS interviewed cases (use the ATUS base-weight, BWGT0-BWGT160),

2)   The weighted count of ATUS eligible (both interviewed and noninterviewed) cases (using BWGT0-BWGT160).

b.   Calculate the ATUS noninterview adjustment factor for each cell by dividing the weighted count of ATUS eligible cases by the weighted count of ATUS interviewed cases.

3. Multiply the ATUS replicate baseweight for each interviewed case by the appropriate adjustment factor from Step 2.b. Call the resulting weight the ATUS noninterview weight (NIWGT0-NIWGT160).

Note: Only seven cells were used for the initial ATUS nonresponse adjustment based on the seven categories of the assigned reference day (REFERDAY). However, the response rates for persons receiving incentives to participate were different from those not receiving incentives. To help reduce nonresponse bias we included the incentive flag (INCNTFLG) in defining 14 nonresponse weighting cells instead of the original 7.

F.   Calculate ATUS Controls

1. For these controls, use the CPS internal microdata file (Input File 11), the CPS second-stage replicate weight file for 15 year olds (Input File 12**)**, and the CPS composite replicate weight file (Input File 13) from the middle month of the ATUS quarter being processed. For example, when processing the ATUS for January-March 2006, use the CPS February 2006 files for Input Files 11, 12, and 13, denoted respectively as follows:

    feb06cps.sas7bdat
    ssrp0206.sas7bdat
    cmrp0206.sas7bdat

2. Match the internal microdata file (Input File 11) to the two internal replicate weight files (Input Files 12 and 13) on HRLONGID and PULINENO to add the replicate weights to the microdata file. Use only records from the microdata file where internal PRPERTYP = 1, 2, or 3.

3. Assign a household type

a.   If a household (designated by a unique value for HRLONGID) has any member with PEAGE between (and including) 0 and 17 (any

member meeting the ATUS definition of child), then assign a
household type HTYPE = 1.
- b.   Otherwise, assign HTYPE = 2.
- c.   Make sure that all records with the same value of HRLONGID
receive the same value of HTYPE.
- d.   After assigning HTYPE to every record, keep only records
with PRPERTYP=2.

4. Assign the replicate control weights

Use the CPS composite replicate weights for persons age 16 and older.
The CPS composite replicate weights do not exist for 15-year-olds, so use
the CPS replicate weights after the second-stage adjustment instead for
these records. Each person-record should have 161 replicate control
weights assigned to it, CONWGT0- CONWGT160.

- a.   If PEAGE >= 16 then set CONWGTX = CMWGTX, X = 0 to
160.
- b.   If PEAGE = 15 then set CONWGTX = SSWGTX, X = 0 to
160.

5. Compute controls

a. Assign information for day equalization values as in Table 1. For
example, the initial value cells for January through March 2006 would
contain 65 days for Monday through Friday, and 25 days for Saturday
and Sunday, to make a total of 90 days.

Table 1:   Day adjustment values

Day of the Week	Number of days in the interview quarter
Monday – Friday	
Saturday-Sunday	
Total	

b. For Table 2 controls, sum CONWGT0 for each record assigned to a cell
and multiply by the day adjustment factor from Table 1 to get the
control value for that cell. For example, for the first quarter of 2006,
this is 65 for weekdays (referday=1) and 25 for weekends (referday=2).
Assign each record to one column in Table 2 using the appropriate
identifying variables. Within the column, put each record in two cells:
for referday=1 and for referday=2.

Note: Use the same controls for the full-sample and for each replicate
for Table 2.

c.   Assign each record to a cell in Table 3 for referday=1 using the appropriate identifying variables. Then place a copy of the record in the corresponding cell for referday=2. As on Table 2, each record will be placed in two cells: one for referday=1 and one for referday=2. You will create 161 replicate controls for each Table 3 cell. For the full-sample controls (or replicate 0 controls) sum CONWGT0 for each record assigned to that cell and multiply by the day adjustment factor from Table 1. For example, for the first quarter of 2006, this is 65 for referday=1 and 25 for referday=2. For replicate 1 controls sum CONWGT1 for each record assigned to that cell and multiply by the day adjustment factor. Continue in this manner until you have calculated 161 replicate controls.

Note: Use the 161 replicate controls for Table 3. You will use a different control for each replicate. For example, use the sum of CONWGT0 multiplied by the day adjustment factor as controls for replicate 0, use the sum of CONWGT1 multiplied by the day adjustment factor as controls for replicate 1, … , use the sum of CONWGT160 multiplied by the day adjustment factor as controls for replicate 160.

d.   Assign each record to one cell in Table 4 using the appropriate identifying variables. Place a copy of each record in two cells: one for referday=1 and one for referday=2. As in Tables 2 and 3, each record will be in two cells: one for referday=1 and one for referday=2. For Table 4 controls, sum CONWGT0 for each record assigned to a cell and multiply by the day adjustment factor from Table 1 to get the control value for that cell. For example, for the first quarter of 2006, this is 65 for referday=1 and 25 for referday=2.

Note: Use the same controls for the full-sample and for each replicate for Table 4.

Table 2:   Step 1 Controls

| Reference Day | Hispanic (**PEHSPNON** = 1) | | Non-Hispanic (**PEHSPNON** < > 1) | | | |
| | | | Black (**PRBLNONB**= 1) | | Non-Black (**PRBLNONB**= 2) | |
	Male (**PESEX** =1)	Female (**PESEX** = 2)	Male (**PESEX** =1)	Female (**PESEX** = 2)	Male (**PESEX** =1)	Female (**PESEX** = 2)
Weekday (**REFERDAY**[6] =1)						
Weekend (**REFERDAY** =2)						

Table 3:   Step 2 Controls

| | Day of Week | Male (**PESEX**=1) | | Female (**PESEX**=2) | |
		Educational Attainment HS or less (**PREACAT** =1 or 2)	Educational Attainment More than HS (**PREACAT** = 3, 4, or 5)	Educational Attainment HS or less (**PREACAT** = 1 or 2)	Educational Attainment More than HS (**PREACAT** = 3, 4, or 5)
Household Type, with children (**HTYPE**=1)	Weekday (**REFERDAY** =1)				
	Weekend (**REFERDAY** =2)				
Household Type, without children (**HTYPE**=2)	Weekday (**REFERDAY** =1)				
	Weekend (**REFERDAY** =2)				

---

[6] The variable, Referday is not on the CPS internal microdata file (Input file 11) so we created a dummy variable to randomly assign a 1 or 2, since half of the ATUS sample is assigned to weekdays and half is assigned to weekends. Each record on the control file is duplicated. One copy of the record will have referday=1 and the other will have referday=2.

Table 4:   Step 3 Controls

	Male (PESEX=1)		Female (PESEX=2)	
	Weekday (REFERDAY =1)	Weekend (REFERDAY =2)	Weekday (REFERDAY =1)	Weekend (REFERDAY =2)
AGE (PEAGE)				
15-19				
20-24				
25-29				
30-34				
35-39				
40-44				
45-49				
50-54				
55-59				
60-64				
65-69				
70-74				
75 and older				

6. Perform the raking (by replicate)

The raking is a three-step, iterative procedure which adjusts the weights for the ATUS sample cases so that:

- weighted estimates of persons in various gender/race-ethnicity/day-of-week[7] categories from the ATUS match CPS estimates,

- estimates from the ATUS match composited estimates from the CPS for gender, household composition, educational attainment, and day of the week,[8]

- estimates from the ATUS match composited estimates from the CPS for age, gender, and day of the week.

When finished, the ATUS weights should reflect the distribution of days in the quarter consistent with the civilian noninstitutional population (CNP) age 15 and over.

---

[7] Estimates are adjusted to account for increased number of interviews on the weekends and unequal frequencies of each day of the week in a particular quarter.

[8] Except for 15-year-olds, for whom composite estimates are not calculated. We used CPS second-stage weights for 15-year-olds, as specified in IV.F.4.

The gender/race-ethnicity/day-of-week adjustment will be performed first (this is Step 1). The gender/household type/educational attainment/day-of-week adjustment to CPS estimates will follow (this is Step 2). The age/gender/day-of-week adjustment will be performed third (this is Step 3). Then a second gender/race-ethnicity/day-of-week adjustment will be performed, followed by another gender/household type/educational attainment/day-of-week adjustment to CPS estimates, and a second age/gender/day-of-week adjustment. The cycle will be repeated for 6 iterations. The raking will be at the national level only.

ITERATION 1, STEP 1:

1.   Assign the ATUS interviewed records for the month being processed to the following cells based on gender, race/ethnicity, and day of the week:

Table 5:   Definition of Step 1 Control Cells

| Reference Day | Hispanic (**PEHSPNON** = 1) | | Non-Hispanic (**PEHSPNON** < > 1) | | | |
| | | | Black (**PRBLNONB**= 1) | | Non-Black (**PRBLNONB**= 2) | |
	Male (**PESEX** =1)	Female (**PESEX** = 2)	Male (**PESEX** =1)	Female (**PESEX** = 2)	Male (**PESEX** =1)	Female (**PESEX** = 2)
Weekday (**REFERDAY** =1,2,3,4, or 5)						
Weekend (**REFERDAY** =6 or 7)						

2.   Sum the replicate weights after noninterview adjustment (NIWGT0-NIWGT160) for all of the records assigned to each cell.

3.   Compute the Step 1, Iteration 1 factor by dividing the population control computed for the cell by the sum of the replicate weights of the records assigned to that cell.

4.   Multiply the replicate weight after noninterview adjustment (NIWGT0-NIWGT160) by the appropriate Iteration 1, Step 1 factor computed in 3. The variable containing this value will be named f11. For the replicates, add an underscore to clarify the variable name. In other words, the replicate weights at this point should be named f11_0 through f11_160.

ITERATION 1, STEP 2:

1.   Assign each record to the appropriate cell in the following table:

Table 6:   Definition of Step 2 Control Cells

Based upon ATUS variable	Day of Week	Male (**PESEX**=1)		Female (**PESEX**=2)	
		Educational Attainment HS or less (**PREACAT** =1 or 2)	Educational Attainment More than HS (**PREACAT** = 3, 4, or 5)	Educational Attainment HS or less (**PREACAT** = 1 or 2)	Educational Attainment More than HS (**PREACAT** = 3, 4, or 5)
Household Type, with children	Weekday (**REFERDAY** =1,2,3,4, or 5)				
	Weekend (**REFERDAY** =6 or 7)				
Household Type, without children	Weekday (**REFERDAY** =1,2,3,4, or 5)				
	Weekend (**REFERDAY** =6 or 7)				

2.   Sum the replicate weights after Iteration 1, Step 1 for the records assigned to each cell.

3.   Compute the adjustment factor for Iteration 1, Step 2 by dividing the replicated control total for each cell in Table 6 by the sum of the replicate weights for the records assigned to each cell.

4.   Multiply the replicate weights after Iteration 1, Step 1 by the appropriate Iteration 1, Step 2 factor computed in 3. The variable containing this value will be named f21. For the replicates, add an underscore to clarify the variable name. In other words, the replicate weights at this point should be named f21_0 through f21_160.

ITERATION 1, STEP 3:

1.   Assign each record to the appropriate cells in the following table:

Table 7:   Definition of Step 3 Control Cells

Based upon ATUS Age	Male (**PESEX**=1)		Female (**PESEX**=2)	
	Weekday (**REFERDAY** =1,2,3,4, or 5)	Weekend (**REFERDAY** =6 or 7)	Weekday (**REFERDAY** =1,2,3,4, or 5)	Weekend (**REFERDAY** =6 or 7)
15-19				
20-24				
25-29				
30-34				
35-39				
40-44				
45-49				
50-54				
55-59				
60-64				
65-69				
70-74				
75 and older				

2.   Sum the replicate weights after Iteration 1, Step 2 for the records assigned to each cell.

3. Compute the adjustment factor for Iteration 1, Step 3 by dividing the replicated control total for each cell in Table 7 by the sum of the replicate weights for the records assigned to each cell.

4. Multiply the replicate weights after Iteration 1, Step 2 by the appropriate Iteration 1, Step 3 factor computed in 3. The variable containing this value will be named f31. For the replicates, add an underscore to clarify the variable name. In other words, the replicate weights at this point should be named f31_0 through f31_160.

ITERATIONS 2 –6:

Use the replicate weights computed in 4 above (f31_0 through f31_160) as the initial weights (in place of the NIWGTS) for the Iteration 2, Step 1, raking adjustment for gender/race-ethnicity/day-of-week. Repeat Steps 1, 2, and 3 a total of six times, each time using the replicate weights from the most recent iteration and step. Name the variables f12 through f16, f22 through f26, and f32 through f36. The second character of the variable name is the step number; the third character is the iteration number. Convergence is achieved

when the estimate for the cell equals the control for the cell, or if not equal, is within some specified tolerance.

The ATUS weight after raking (FINLWGT0-FINLWGT160) will be the weight after the noninterview adjustment, multiplied by the product of all 18 factors computed in the six iterations of the raking. There will be one value of FINLWGT for each ATUS interviewed sample case for each replicate: FINLWGT0,…,FINLWGT160.

G. Rounding

Round all weights (full-sample and replicate weights) to 4 decimal places on the output files. The following variables should be rounded:

STSUBWGT0-STSUBWGT160
STRTMWGT0-STRTMWGT160
BWGT0-BWGT160
NIWGT0-NIWGT160
FINLWGT0-FINLWGT160

V. VERIFICATION

Notify the CPS Branch, DSMD when Output Files 1 through 8 and Input Files 1 to 3 and 12 to 13 are available. Once notified, the CPS branch will verify Output File 8 by creating an independent version of this file and comparing their results to Output File 8. The verification programs are located on the PC in the shared directory: M:\ADC-CPHISD\CPSB\ATUS\Repwgting\Prod.

Below is a list of the programs that will be used to verify the public-use ATUS replicate weighting, followed by a brief description:

A. Program 1

Program name: Tus00Wgt0805Pu2006Masterver_01.sas

Description: Remotely connects to the DSD, ESPB, and DSMDE1 machines (you will need an account on all three machines. Log in to each machine separately). Runs the full CPS replicate weighting through the second stage (you will need to change the %let statements to indicate the correct filenames, months, years, and libref. You will need to change the libnames to reflect the months which correspond to the current quarter. Run the libnames even though they are commented out).

B.	Program 2

Program name: Tus00Wgt0107Pu2006Repwgt_01.sas

Description: Selects the correct records for ATUS households and persons.

C.	Program 3

Program name: Tus00Wgt0107Pu2006Controls_01.sas

Description: Creates control cells from the CPS internal microdata file and adjusts for the number of weekdays, Saturdays, and Sundays in a month.

D.	Program 4

Program name: Tus00Wgt0107Pu2006Raking_01.sas

Description: Rakes the ATUS cells to the control cells.

E.	Program 5

Program name: Tus00Wgt0805Pu2006Compare_01.sas

Description: Compares DSD weights to the verification weights we have created and outputs only those records where weights differ by more than 0.000001. Since the weight on the internal microdata file is only carried to 4 decimal places, this difference contains 2 decimal places more than the output weights. The output weights should still match exactly when read with only 4 decimal places. There shouldn't be many records, maybe none.

VI.	TIMING

These weighting programs will be used for weighting of ATUS files from January 2006 through December 2006. See Doc.#ATUS-13 for weighting from January 2005 through December 2005 [3]. See Doc.#ATUS-12-R for weighting from January 2004 through December 2004 [4]. See Doc.#ATUS-06-R for weighting prior to January 2004 [5].

VII.	CONTACT PERSONS

Phawn Letourneau, CPSB/DSMD, x 35942
Andy Zbikowski, CPSB/DSMD, x35939
Carol Gunlicks, CPSB/DSMD, x34241

VIII.   REFERENCES

[1]   Memorandum from A. Tupek to C. Bowie, "American Time Use Survey (ATUS) Specifications for Sampling (ATUS-03)," dated March 7, 2003.

[2]   Memorandum from A. Tupek to C. Bowie, "Changes to the American Time Use Survey (ATUS) Specifications for Sampling due to Sample Redesign (ATUS-11-R)," dated March 30, 2005.

[3]   Memorandum from A. Tupek to C. Landman, "Weighting Specifications for The American Time Use Survey for 2005 (Doc.#ATUS-13)," dated July 21, 2006.

[4]   Memorandum from A. Tupek to C. Bowie, "Weighting Specifications for The American Time Use Survey for 2004 (Doc.#ATUS-12-R)," dated August 26, 2005.

[5]   Memorandum from A. Tupek to C. Bowie, "Revised Weighting Specifications for the American Time Use Survey (ATUS) (ATUS-06-R)," dated October 5, 2004.

[6]   Memorandum from Ruth Ann Killion to Cheryl Landman, "Basic Weighting Specifications for the Current Population Survey Including Replicate Weighting (ESTWGT2000-13R)," dated May 2, 2007.

[7]   Memorandum from A. Tupek to C. Bowie, "Changes to the American Time Use Survey (ATUS) Specifications for Sampling (ATUS-08)," dated December 3, 2003.

Attachment

cc: K. Shelley   (BLS)   K. Creighton
      J. Stewart   H. McGowan
      H. Frazis   X. Guan
      E. Robison   S. Kim
      K. Robertson   J. Posey
      J. Montcalm   (DSD)   P. Flanagan   (DSMD)
      C. Laskey   CPS Branch

M:\ADC\CPHIS\CPSB\MEMOS-C\ATUS\ATUS-16.DOC

Table A: Layout of Public-Use Replicate Weights File

Variable	Description	Household (HH) or Person (P)	Format/Valid Entries
HRLONGID	Housing Unit Identifier	HH	15 characters. Uniquely identifies a case from month to month
HRMONTH	CPS Month of Interview	HH	01-12
HRYEAR	CPS Year of Interview	HH	00-99
PULINENO	Line number within housing unit	P	01-16
FSWGT0	Public-Use First-stage weight (full-sample)	P	9 characters with 4 implied decimals
FSWGT1-FSWGT160	Public-Use First-stage replicate weights	P	9 characters with 4 implied decimals