The Design and Use of an Event History Calendar in the Los Angeles Family and Neighborhood Survey: Results and Lessons

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Introduction

An important task of social and economic surveys is to collect retrospective information about events in each respondent's past. Collection of retrospective data reduces respondent burden and survey costs, because it allows researchers to capture time sequences of events either in a single interview or in a smaller number of more widely-spaced interview rounds. However, successful retrospective data collection depends on the accuracy and completeness of respondent recall, which has been an important concern of researchers for many years.

Retrospective histories are a type of retrospective data collection which requires an even higher accuracy of recall than other retrospective questions. Respondents are asked to report on their status and all changes in status during a significant period of time. For example, a respondent may be asked to report on when all marriages and cohabitations in their life began and ended. The standard survey approach to the collection of retrospective histories has been the "question list," in which questions start from the beginning of the first episode (e.g., date of first cohabitation or marriage) and work forward or from the present and work backward, question by question, until the respondent's status at each moment in the time period is covered. Question lists require considerable care in construction to avoid logic and skip errors. It can also be difficult for even the most diligent interviewers to determine whether they have covered all events in the time period based on a question list.

An alternative approach, using a visual calendar in which all events or spells are recorded, has been developed since the 1980s. Calendar methods have been shown to improve respondent recall and the quality of date reporting compared with standard question-list methods (Freedman et al., 1988; Becker and Sosa, 1992; Hamill et al., 1990; Goldman et al., 1989; Belli, 1998; Belli et al., 2001). Calendars have several potential advantages. First, they may help interviewers (and respondents, if they are shown the calendar) to determine quickly whether all periods in the calendar have been covered and whether events are misplaced in time relative to each other. Second, reporting on multiple types of events in respondents' lives (e.g., marriages, residential moves, birth of children) may make it easier for respondents to recall the timing of events.

The Los Angeles Family and Neighborhood Survey (L.A.FANS) includes a computerized event history calendar that was adapted from an application developed for the Panel Study on Income Dynamics (PSID) by Belli, Shay, and Stafford (2001). The computerized EHC is an interactive Windows-based application written in Visual Basic, and was programmed by the

computing staff at the University of Michigan's Institute for Social Research (ISR). ISR's computing staff, led by William E. Connett, modified the PSID EHC program for use in L.A.FANS.[1]

In this paper, we report on our experience using the EHC in Wave 1 of L.A.FANS and provide preliminary results from Wave 2. We focus on the L.A.FANS experience with designing, pretesting, and fielding the EHC, as well as processing the data and analyzing the results. We learned many lessons from administering the EHC in Wave 1 that led to improvements in Wave 2, and we describe these changes and their effects. Our description of the fieldwork experience and results focuses on various data quality issues and considers systematic differences within the L.A.FANS sample according to language of interview, respondent characteristics such as race/ethnicity and education, and interviewer characteristics.

The paper is organized as follows: in the next section, we briefly describe the L.A.FANS sample design. Then we describe the EHC used in L.A.FANS-1 and modifications to the EHC we made for Wave 2. Next, we describe fieldwork-related experiences with the EHC. Finally, we examine several key data quality issues. The paper ends with a discussion of the main lessons learned from the L.A.FANS experience with the EHC and ways in which these lessons might be useful for the Census Bureau's dynamics of economic well-being system (DEWS).

The Los Angeles Family and Neighborhood Survey

The Los Angeles Family and Neighborhood Survey (L.A.FANS) is a household survey conducted in a stratified probability sample of 65 census tracts in Los Angeles County, the second largest metropolitan area in the United States. L.A.FANS was designed to support multilevel studies on a number of topics relating to child and family well-being, with a focus on children's cognitive, behavioral, and social development, anti-social and self-destructive behaviors, schooling, child care, and health. Other topics of major interest include the effects of welfare reform at the neighborhood level and the process of residential mobility and neighborhood change.

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[1] A demonstration version of the event history calendar for the PSID is available for downloading at: http://psidonline.isr.umich.edu/Data/documentation/ehc/ehc-demo.html. Note that there are significant differences between the EHCs for PSID and for L.A.FANS. See below for a description of the L.A.FANS EHC and for additional sources of information about the L.A.FANS EHC.

L.A.FANS is based on a multistage clustered sampling design (Sastry et al., 2006). In the first sampling stage, 1990 Census tracts in Los Angeles County were divided into three strata based on the percent of the tract's population in poverty in 1997: very poor (tracts in the top 10 percent of the poverty distribution), poor (tracts in the next 30 percent of the poverty distribution), and non-poor (tracts in the bottom 60 percent of the distribution). To oversample poor neighborhoods, 20 tracts were sampled in the poor and very poor strata while 25 tracts were sampled in the non-poor stratum. Second, census blocks were sampled within each tract and all dwelling units were listed in sampled blocks. Third, households were sampled within each block and screened. Households with children under 18 years of age were oversampled so that they make up 70 percent of the sample, compared to an average of 35 percent they would otherwise comprise. Households that were unable to complete the interviews in one of the two survey languages—English and Spanish—were excluded from the sample.[2]

Within sampled households, one adult respondent aged 18 years or older was chosen at random and is known the randomly selected adult or RSA. In households with children, one child respondent aged 17 years or younger was also selected at random and is called the randomly selection child or RSA. If the RSC had any siblings, one of these children was also chosen at random and is known as the SIB. The children's primary caregiver, which was usually the mother, was also interviewed and is known as the PCG. Note that, by chance, the RSA and PCG are the same person in some households.

The fieldwork for Wave 1 of L.A.FANS was completed between April 2000 and January 2002. A total of 3,090 households in 65 census tracts were interviewed, with 30 percent of households in tracts in the very poor stratum, 31 percent in tracts in the poor stratum, and 39 percent in tracts in the nonpoor stratum. Screeners to determine eligibility were completed in 92 percent of occupied housing units selected for the sample. Among respondents selected for interview, interviews were completed with 85 percent of RSAs, 89 percent of PCGs, 87 percent of RSCs, and 86 percent of SIBs (for details see Sastry and Pebley, 2003).

In L.A.FANS-2, the goal is to locate and interview all sampled respondents from Wave 1, whether or not they remain in the same location as in Wave 1. In addition, the study includes a

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[2] By chance, none of the L.A.FANS sampled neighborhoods included a large block of Asian or other language speakers. Nevertheless, Asian respondents comprise about 10 percent of the L.A.FANS sample, which is approximately equal to their representation in the population of Los Angeles County.

sample of "new entrants" into sampled neighborhoods—i.e., individuals who did not live in the tract at the time of Wave 1 but moved in (or were born) since then. Fieldwork for L.A.FANS-2 began in the fall of 2006 and is expected to be completed by the spring of 2008.

L.A.FANS-1 Event History Calendar

In both waves of L.A.FANS, the EHC is part of the Adult Module, which is the questionnaire administered to all adult respondents—comprising of RSAs, PCGs, and, at Wave 2, panel RSCs and SIBs who are now age 18 years or older. The L.A.FANS-1 Adult Module is described in detail in Pebley and Sastry (2003a) and interviewer instructions for completing the L.A.FANS-1 questionnaires are provided in Pebley and Sastry (2003b).[3] The EHC was located approximately in the middle of the Adult Module, which allowed the interviewer to establish rapport with the respondent before beginning the EHC and also to collect data in early parts of the questionnaire which are preloaded into the EHC.

L.A.FANS also collected "calendar history" information in other sections of the questionnaires using a conventional question list. In the L.A.FANS-1 Adult Module a marriage and relationship history was collected for respondents that covered the same period as the EHC as well as the summary information for the period preceding the EHC window. The marriage and relationship history was not collected in the EHC because of display limitations on the interviewers' laptop screens and because of the need to cover the pre-EHC period.

The L.A.FANS EHC covered six "domains" or areas of the respondent's life:

1. Landmark events;
2. Residential history;
3. Employment;
4. Unemployment and absences from work;
5. Receipt of public assistance; and
6. Health insurance.

In these domains, the EHC records two types of entries: (a) events, which are occurrences on a specific date, and (b) spells, which are periods of time during which the respondent has a particular status (e.g., a period of employment).

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[3] The L.A.FANS questionnaires are available for downloading at www.lasurvey.rand.org.

Landmark events are events that were particularly memorable to the respondent and could be used as memory aids to help the respondent to recall the occurrence or timing of other events. Changes in marital status and births reported by the respondent in the questionnaire sections preceding the EHC were preloaded into the Landmark Events section of the EHC. The EHC residential history asked for the complete address of all places that the respondent lived for one month or longer. The employment domain was used to determine whether the respondent was employed at any time during the calendar window and, if so, to collect information about each job. The unemployment and absence from work domain verified gaps in employment and collected information on spells in which the respondent was unemployed or was away from work for a period of one month or more due, for example, to disability or illness, a lay-off, a strike, or maternity leave. The public assistance domain recorded spells of receipt for respondents and their children of Food Stamps, Temporary Assistance to Needy Families known in California as CalWORKs, General Relief or General Assistance, and Supplemental Security Income. Finally, the health insurance domain collected information on respondents' and sampled children's (i.e., RSC and SIB) health insurance coverage and reasons for non-coverage.

The L.A.FANS-1 EHC covered the two-year period prior to the interview. Thus, the specific beginning and end dates of the EHC varied from respondent to respondent depending on the date on which they were interviewed. The calendar is organized by thirds of the month, i.e., for each of the 24 months prior to the survey, it includes three segments representing the first, middle, and last one-third of the month. Interviewers could enter dates either as the first, middle or last third of the month or as a specific date (e.g., December 5, 2001).

An overview of the layout of the EHC screen is shown in Figure 1. The EHC screen has five elements. First, there is a summary display window at the top of the screen, which summarizes all of the spell and event information that the interviewer has entered. Second, there is a two-year calendar data entry window in the middle of the screen, in which the interviewer enters the beginning and end dates of spells and the dates of events. Third is a detailed data entry window that appears at the bottom of the screen, which is used to record additional information about the spell. Fourth is a set of pop-up questions that are specific to each domain and appear in a separate window. Finally, the EHC includes a set of data checking procedures to verify that spells have been entered correctly and include completed all required information.

Figure 1. Elements of the EHC Screen
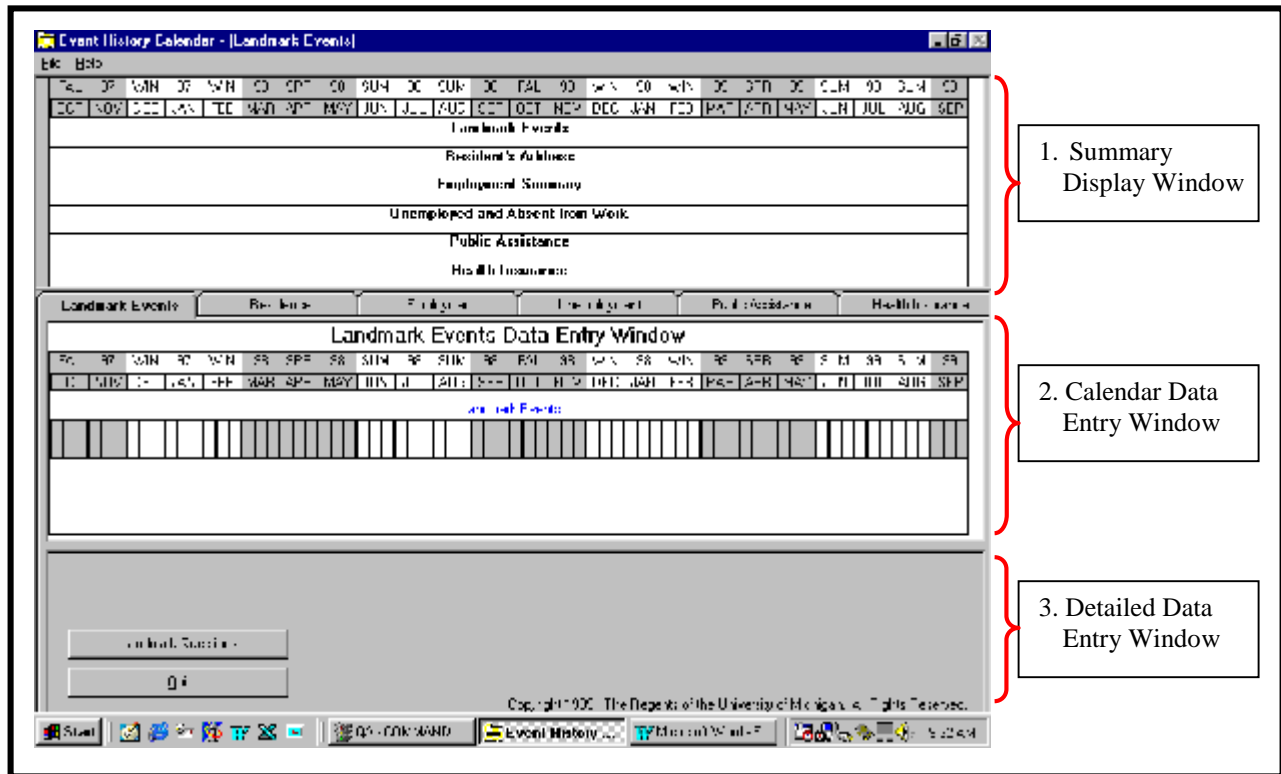
Key Features of the EHC for L.A.FANS-1

The L.A.FANS-1 EHC included several key features. Some of these features were modifications to the original PSID EHC that emerged as part of the development of the EHC for L.A.FANS-1 and based on the results from analyzing the L.A.FANS-1 pretest data, observing interviews, and debriefing interviewers.

First, the L.A.FANS-1 EHC included extensive real-time data checking within the EHC as interviewers were entering the data. One advantage of computerized questionnaires is the ability to conduct data quality and completeness checks virtually instantaneously during the interview. We included two types of data checks in the L.A.FANS EHC. The first were a series of "soft checks," which the interviewers were allowed to override. These soft checks included warnings that appeared when all domains were not visited; when there were gaps in the timeline for residences, employment/unemployment, and health insurance; and when there were overlapping spells within the residence and employment domains and across the employment and unemployment domains and across the employment and program assistance domains (except for Food Stamp receipt). In addition, there was a warning for interviewers to probe for position

changes each time an employment spell was entered. The second type of data checks were "hard checks," which the interviewers were not allowed to override—instead, they had to enter the requested information or otherwise resolve the problem that had been identified. The hard checks included a warning when a landmark event did not include a description, an employment spell did not include the employer's name and address and the job details including the pay rate, an unemployment spell did not indicate whether the person was making money or looking for work and did not include the reason for not working, and a health insurance spell did not include the type of insurance or the reasons for no coverage; the "year" field was omitted for an event in any domain; and the end date for a spell occurred in the future. These hard and soft checks were added to address specific problems that commonly appeared in the completed EHCs.

Second, intensive training was developed to address other issues that could not easily be addressed with software checks. For example, a priority for L.A.FANS-1 was to record the start date of spells which were in progress at the start of the two-year EHC window in order to be able to produce unbiased estimates of duration-specific probabilities of, for example, residential change. Thus, the L.A.FANS-1 EHC required interviewers to ascertain and enter the date (or approximate date) at which all spells occurring during the calendar period started, whether or not the start date was within the two year window covered by the calendar. Results from the pretest indicated that interviewers commonly entered the first month of the two-year calendar window as the start date for spells that had begin prior to the calendar period. We addressed this issue through extensive training of interviewers for the main round fieldwork. A second example concerns the coding of spells that were on-going at the time of the interview. A problem we identified was that there was no clear way to identify a continuing spell in the EHC program and interviewers too frequently recorded the interview date as the ending date for spells. We addressed this issue by modifying the EHC program to allow interviewers to enter the code "CONT" (for continuing)—rather than the interview date itself—for spells that were on-going at interview and conducted intensive interviewer training to have use this code consistently and correctly each time.

Changes to the L.A.FANS EHC for Wave 2

The design and format of the L.A.FANS-2 EHC is very similar to that used in L.A.FANS-1, although there were several important changes that reflected Wave 2 requirements as well as lessons learned from analyzing the EHC data from Wave 1.

The most significant difference in L.A.FANS-2 EHC is that the calendar window was extended to cover a period of seven years, which is the approximate duration between the two waves of the study. All respondents, including new entrants, complete the EHC for the seven-years preceding the interview. Because of laptop screen size limits, the entire seven-year timeline does not appear on the interviewer's screen at once; rather, the timeline extends beyond the right (or left) edge of the screen and interviewers must scroll across the screen to view the entire EHC. Interviewers have been able to understand this new design of the EHC quickly and easily, and we have encountered no known problems with interviewers completing the EHC for the full seven-year period.

Our original plan for the L.A.FANS-2 EHC was to have the calendar precisely cover the period between the two waves, with preloaded information on respondents' Wave 1 status used to anchor the start of spells recorded in the Wave 2 EHC and with the start date for the Wave 2 EHC corresponding exactly to the Wave 1 interview date. However, technical and logistical challenges made it possible only to preload information on respondents' residential address at the time of L.A.FANS-1 and precluded our being able to have a calendar with a window that varied across respondents.

There were several other significant changes in the L.A.FANS EHC for Wave 2. One change was the addition of an address verification module that interviewers use to look up the addresses of respondents' former residences and current and former places of work in an address database. The address look-up function helps to ensure that complete and accurate address information is recorded and any errors or incomplete or inconsistent details are resolved on the spot with the respondent. We expect this approach to yield much better address information and to reduce costs of geocoding addresses.

A second Wave 2 EHC revision was to add a set of flags to each date field that the interviewer uses to record whether each component of the reported start or end date of a spell was accurately recalled by the respondent or whether, instead, the respondent had estimated the date. We had no way of distinguishing between precise and approximate dates in the Wave 1

EHC which may have led to an impression among data users that the dates were more precise than they in fact were.

A third revision was to add several new fields across various domains, but especially in the employment domain where, for instance, information is now collected about health insurance coverage provided by each job.

Fourth, the EHC for Wave 2 included an additional set of soft-checks and hard-checks to improve the quality of the EHC data. Among the soft checks were flags that appeared whenever the interviewer recorded a spell that began at the start of the EHC window or ended in the last month of the EHC. Analysis of the Wave 1 EHC data suggests that a disproportionate number of spells started or finished at the beginning or end of the EHC window, which suggests that interviewers were either not obtaining or recording correct dates. Among the hard-checks added in Wave 2 is an error that appears when the final spell in one of three domains (residence, health insurance, and combined employment and unemployment is not characterized as a continuing spell. In each of these domains, a respondent's status at the time of the interview must be characterized by a continuing spell. This change was implemented based on results from L.A.FANS-1 and from the Wave 2 pretest that showed some interviewers continued to have problems correctly recording continuing spells.

Finally, we revised interviewer training in Wave 2 to emphasize the importance of correctly asking about and recording all position and salary changes in the employment domain as well as similar changes of status in other domains. Our analysis of the Wave 1 EHC data and observations of interviews revealed that interviewers were not eliciting all position and salary changes on a consistent basis.

L.A.FANS-1 EHC Fieldwork Results

In this section, we present an analysis of L.A.FANS-1 fieldwork results that focuses on the time it took to complete the EHC. We begin, however, by briefly summarizing the characteristics of L.A.FANS-1 respondents.

The EHC was completed in L.A.FANS-1 by all adult respondents, which includes randomly selected adults (RSAs) as well as sampled children's primary caregivers (PCGs). Because virtually all of the PCGs in L.A.FANS-1 were female, the overall sample is 69 percent female and 31percent male (see Table 1). Respondents are also concentrated in the younger

adult years, with about one-third of adult respondents aged between 30 and 39 years. The demographic composition of Los Angeles together with the L.A.FANS oversample of poorer neighborhoods resulted in almost 60 percent of respondents being Latino. A quarter of L.A.FANS-1 respondents were white, 8 percent were black, and 7 percent were Asian. Over half of the respondents completed at least one year of post-secondary education. The large immigrant concentration in Los Angeles County is reflected in the fact that a majority of respondents were non-native born, with 32 percent naturalized citizens or permanent residents, 44 percent native born, and 24 percent in a residual category that included residents on visas and undocumented immigrants. L.A.FANS interviews were completed in Spanish by 41 percent of adult respondent. Finally, Table 1 shows that just under half of respondents (44 percent) were RSAs who were not PCGs of any children in the sample, while the other remaining 56 percent of adult respondents included those selected as both an RSA and a PCG as well as PCG-only respondents.

The median time taken to complete the L.A.FANS-1 EHC was 9 minutes (see Table 2). Figure 1 shows the distribution of EHC completion times with the distribution censored at 20 minutes. The start and end times for administering the EHC are in general accurately recorded. However, there are a number of issues that led to large elapsed times, such as the interview being completed over several visits or a break occurring before the EHC was completed. We address this problem by censoring EHC durations at 20 minutes, which affects less than 20 percent of cases. Figure 1 shows that 25 percent of cases in L.A.FANS-1 completed the EHC in less than 5–6 minutes, while 25 percent of cases took longer than 15 minutes.

We next examine the bivariate association between EHC completion times and several demographic and socioeconomic characteristics of respondents (see Table 2). The table shows the median time for completing the EHC within each subgroup and whether the group differences in completion times are statistically significant. Several results are worth noting. First, EHC completion times decrease systematically with the respondent's age, which reflects the fact that older people generally have more established circumstances with fewer job or residence changes in the past two years. The results by race show that blacks take the longest time to complete the EHC (with a median of 11 minutes) while Asians take the least time (a median of 7 minutes). The difference in completion times by respondent race/ethnicity over the entire distribution of completion times for the EHC is shown in Figure 2A, which reveals the similarities over the entire distribution of completion times between whites and Latinos and

between blacks and others while also showing that EHC completion times for Asians are substantially lower over the full distribution. There are no differences by education in median EHC completion times or in the overall distribution of completion times (see Figure 2B) when comparing respondents with a high school education or less with respondents who have had some higher education. However, respondents in the poorest quartile of the income distribution take longer to complete the EHC. Finally, there are statistically significant differences by immigration status, with native-born respondents taking the longest time to complete the EHC.

These findings are primarily of descriptive interest. They do not allow us to distinguish between respondents who took a longer time to complete the EHC because they had more events to report and those who took a longer time because they had difficulty recalling events and responding to the interviewers' questions. To gain a better understanding of the association between the various background factors and EHC completion times we estimate a multivariate survival model with these data. The results, presented in Table 3, show that respondents who are female, younger, less educated, poorer, and native born all have higher hazard rates—which are, in turn, associated with shorter times for completing the EHC. At the bottom of Table 3 we present an estimate of the effect of unmeasured interviewer characteristics on the hazard rate— based on an interviewer-specific random effect or frailty term—which reveals that there are statistically significant differences in EHC completion times by interviewer even after we control for all of the individual covariates listed in the table. This suggests that characteristics of the interviewers themselves are related to completion times for the L.A.FANS-1 EHC because interviewers were assigned cases geographically and the variance of the tract-specific random effects is substantially smaller than the interviewer-specific random effects. These findings are useful for assessing the types of respondent characteristics that are related to EHC completion times and the potential benefits of assigning interviewers who are more effective at completing the EHC to the cases that tend to take longer to complete.

L.A.FANS-1 EHC Data Quality Evaluation

An extensive literature suggests several common problems in retrospective reporting of events and spells. First, the further back in time a history goes, the less likely it is that events will be reported. For example, a number of studies show that frequency of reported illness episodes declines the further back in time the interview question goes, even when there is no

reason to between that the actual prevalence of illness has changed overtime (Goldman, Vaughan, and Pebley, 1998). Second, because respondents may not recall dates accurately, it is common to find "heaping" of events on major time points, such as six month or one year before interview—a situation the EHC is designed to minimize by improving recall of events relative to each other. Third, because the EHC seeks to help respondents recall the dating of events relative to other events in their recent histories, respondents may heap events around another more salient event in the past. A fourth and related problem is that respondents may collapse events into a relatively short time prior to an event or to the beginning or end of the calendar window. Or they may move an event that was close to the beginning of the two year window into the past in order to avoid having to answer questions about this event. Finally, the EHC is designed to collect a complete history without any gaps for several domains and to collect detailed information on a number of characteristics of each spell. The burden of recalling a continuous history and providing complete details of past spells may be particularly challenging for certain types of respondents—such as those with less education and with a larger number of transitions—and for less skilled, experienced or well-trained interviewers. However, recall errors or omissions that are systematically related to respondent characteristics may affect the results of analyses based on the L.A.FANS EHC data.

In this section, we investigate decay, heaping, and displacement of events in the L.A.FANS-1 EHC and also investigate the effects of respondent and interviewer characteristics on the completeness of EHC timelines in several key domains.

Decay, Heaping, and other Shifts in Timing of Events

To look for evidence in the L.A.FANS-1 EHC of decay over time in events, heaping, and other shifting in the timing of events, we begin by plotting the monthly rates of occurrence for each type of event over the two-year calendar window. The monthly rate is calculated as the number of events in that month divided by the number of person-months lived by the sample in that month. We examined several types of events or transitions: (1) landmark events, (2) residential moves, (3) the beginning and end of employment spells, (4) the beginning and end of unemployment spells, (5) the beginning and end of program participation spells (in TANF and Food Stamps), and (6) the beginning and end of health insurance spells. We also examined

months spent in spells, such as the number of person-months covered by health insurance, during a particular EHC month.

Figures 3A and 3B show the monthly rates of events in the two-year EHC from L.A.FANS-1. Because landmark events are far more frequent than other types of events, Figure 3B excludes landmark events, so that the pattern for other types of events can be seen more clearly. The figures exclude the most recent month—i.e., the month in which the interview occurs—because it is not a complete month. If reporting were entirely accurate, we would expect the reporting of these events to be roughly the same from month to month except for random noise. However, the first month of the calendar, labeled in the graph as Month 24, generally shows a large number of events primarily because interviewers sometimes mistakenly started spells that began before the calendar window at the date that the calendar period began, despite extensive training to the contrary.

As Figure 3A shows, landmark events are much more frequent than other types of events, reflecting in part the preloading of births and marriages that were reported earlier in the interview and the recording of Christmas Day and Independence Day as landmark events for all respondents. From our interviewer observations, it appeared that interviewers spent considerable time during the EHC eliciting landmark events from respondents, in part because this was the first domain covered in the EHC and because it allowed respondents to provide open-ended answers. In fact, during fieldwork, we instructed the interviewers to reduce the amount of time spent on eliciting landmark events and explained that they only needed to elicit a few events during the two-year period. Nonetheless, because the training emphasized the importance of landmark events for "anchoring" the calendar, the interviewers appear to have spent more time eliciting and recording landmark events than they should have.

Figure 3B shows some potential evidence of heaping around the twelve month make for some types of events and also possibly at the six-month mark, but the heaping is modest. There also appear to be some decay in reporting completeness, because the event rates reported in the earlier year of the calendar is lower for some types of events than the more recent year of the calendar—as in the case of job change, job loss, and loss of health insurance. But here again, the difference between the two years is not dramatic.

We examined these monthly event rates by educational attainment and language of interview, to determine whether decay and heaping vary by these two factors. In Figures 4A and

4B and 5A and 5B, we show only events where there appear to be some differences in heaping and decay by these variables. In Figures 4A and 4B, we examine residential moves. There appears to be more decay in residential move reporting for the low education group but little if any decay for the high education group. Moreover, there is evidence of heaping of events for the low-education group at 12 months and 3 months before the interview. [Note Figures 4A and 4B are on different scales and need to be put in the same scale.] Figure 4B shows some evidence of greater heaping for Spanish speakers than English speakers, consistent with the lower average educational attainment of the Spanish speaking L.A.FANS respondents. Similarly, Figures 5A and 5B show some evidence of heaping of reported job changes for less-educated and Spanish-speaking respondents—particularly for the former group. The highest peak for the low education group in this case is 13 months before the interview.

In Tables 4 and 5, we examine clustering or "heaping" of reported transitions around landmark events. This clustering is a measure of the degree to which respondents relied on the landmark events to anchor their recollection of events in the past.

In addition to births and marriages reported by respondents in earlier sections of the Adult Module, the CAPI program also automatically preloaded Christmas Day and Independence Day as landmark events. In Table 4, we include these two dates as landmark events, despite the fact that they are the same for all respondents. In Table 5, we exclude these two dates and classify as landmark events only those events reported by respondents themselves.

The first column of figures in each table shows the average number of each type of event in all possible three-month periods in the EHC. In other words, it represents the average number of transitions (e.g., residential moves) which were reported in any given three-month period in the EHC. The next two columns represent the number of events reported in the three months before and after landmark events. When Christmas Day and Independence Day are included as landmark events, the results show that respondents are far more likely to report all types of events in the three months before and the three months after landmark events than they are in an average three month period. When we omit Christmas Day and Independence Day, respondents continue to be more likely to report events in the three months before and the three months after a landmark event, except in the case of starting health insurance where respondents are actually less likely to report starting health insurance in the three months before landmark events than in an average three-month period.

These results suggest that the dating of events within the EHC is sensitive to recording of landmark events. One interpretation is that these results demonstrate the importance of the strategy to collect landmark event as part of a retrospective history data because respondents rely heavily on these landmarks for recalling the dates of other events in their lives. A more pessimistic interpretation is that respondent recall of the dates of events is poor and they, therefore, choose the expedient solution of providing a date close to a landmark event rather than having to think through when an event actually occurred.

Completeness of L.A.FANS-1 EHC Timelines

There are a number of possible indicators of data quality that can be constructed for the L.A.FANS-1 EHC to examine reporting errors, omissions, and timeline gaps. For example, we can examine the rate of missing data for specific questions associated with each spell and various measures of the accuracy and completeness of respondent reports to these questions. We focus, however, on a key requirement of the data collected in several key domains of the L.A.FANS EHC—namely that the timelines are continuous and complete. A timeline gap is an indicator of data quality problems in virtually all cases for three L.A.FANS domains: the residential history, the combined employment / unemployment history, and the health insurance history. For each of these domains, the respondent must be residing somewhere at all times, must either be employed, unemployed, or out of the labor market, and must either be covered by health insurance or provide a reason for not having health insurance. In all cases, transitions and the duration of spells are of key interest to researchers using these data; gaps in these timelines thus undermine researchers' ability to study these topics.

In this analysis, we examine whether a respondent had *any* timeline gap in any of these three domains and examine the individual-level characteristics associated with a respondent having a timeline gap. The results are useful for assessing the scope of this data problem and systemic patterns of incomplete reporting that could be addressed in the field.

We begin by presenting summary statistics for timeline gaps in Table 6. The overall rate of having a timeline among the 3,408 individual respondents in L.A.FANS-1 is 5.4 percent. This rate is modest and does not suggest that there is a major problem with timeline gaps in L.A.FANS-1. This situation is likely the result of a considerable amount of emphasis to interviewers during training and fieldwork to to check and probe carefully for timeline gaps and

to keep these to a minimum. Nevertheless, in some situations timeline gaps may be unavoidable. For example, L.A.FANS guidelines required the residential timeline to only record residences that the respondent stayed at for one month or more. If respondents had one or more periods when they had a very short stay at a residence—or were in transition between residences—then there could be legitimate timeline gaps. However, the interviewers were trained to write a note to explain all timeline gaps, so some information should have been available in the data about all periods.

Table 6 shows that there are statistically differences in timeline gaps by sex, age, education, and respondent type. Respondents who are female, younger in age, have a high school education or less, or who are PCG respondents have a higher rate of time gaps. There was no association of timeline gaps with race/ethnicity, family income, immigration status, or language. The characteristics associated with timeline gaps appear to form a cluster of respondents with similar traits. We next examine whether there are independent effects of any of these factors after controlling for all of the other characteristics by estimating a linear probability model of the likelihood of having a timeline gap. The model includes all of the covariates as well as interviewer and tract random effects to capture the influence of any unmeasured variables at each of these levels. We use a linear probability model for ease of computation, which is an important consideration when estimating multilevel cross-classified random effects models such as this.

The results in Table 6 reveal a number of changes to the bivariate results. In particular, in the multivariate model, females are now less likely to have a timeline gap, as are blacks and respondents with a high school education or less. PCG respondents continue to have a significantly higher rate of timeline gaps, as do younger respondents compared to middle-aged respondents. There are strong effects of interviewers on timeline gaps, as reflected by the statistically significant variation in the interviewer random effects. We can calculate an interclass correlation coefficient from the variances of the random effects which indicate that interviewers account for 7 percent of the unexplained variance in the outcome while tract-level factors account for less than 1 percent. Overall, these findings indicate the existence of systematic patterns in timeline gaps that researchers and field staff should address.

Discussion

In this final section, we summarize some potentially useful lessons that have emerged from the L.A.FANS EHC experience which may be useful for the Census Bureau as they plan DEWS and for other researchers interested in using calendar methods in the field.

- The L.A.FANS EHC experience reveals the critical importance of thorough and comprehensive training, assessment, and retraining of interviewers. For example, if interviewers consistently record the beginning of the calendar as the start date for spells, there is no programming solution—such as a hard-check—that can be used to avoid this problem (because spells could legitimately begin at that time). In addition to initial training, testing, observation, and recurrent training is essential. Correctly recording continuing spells is another crucial issue.

- One specific topic that training needs to focus on is resolving timeline inconsistencies—for example, making sure that there are no gaps or invalid periods of overlap. A related issue is that all the calendar information entered on the screen is available for interviewers to use— but they must in fact choose to use it and know how to use it effectively.

- The concepts are well-developed for maximizing the value of the calendar—for example, using narrowing techniques to help respondents remember dates as precisely as possible—but effectiveness depends on interviewer skills and training.

- Another important training issue is having interviewers use the appropriate amount of time on each section of the calendar and on verifying and cross-checking entries, reviewing entries, and probing for omitted spells. In L.A.FANS, interviewers appeared to spend *too much* time collecting and reviewing landmark events. Interviewers need to use judgment to know when a sufficient number have been collected (3-4 landmark events for a 2-year calendar, one every six months) and to not overemphasize this domain which is challenging in part because it is the first one in the calendar

- The L.A.FANS calendar focused on changes in status and spell durations. The calendar is not well structured to collect information about the relative ordering of events in time given the thirds-of-the-month resolution that is generally used. Certain changes or enhancements to the L.A.FANS EHC would be appropriate for a survey seeking to use the same module but emphasizing other aspects of respondents' retrospective histories.

- A major challenge in collecting spell data is capturing intermediate-level changes—for instance, changes in pay-rates or position changes for respondents who continued to work for the same employer. The mechanics of splitting a single employer-based spell into components reflecting different pay rates and positions is challenging. But having respondents correctly report these types of intermediate-level status changes is much more difficult. Sometimes even when employment changes were recorded as landmark events, the interviewers neglected to collect appropriate information in the employment domain. Similar difficulties occur in other domains—for instance, distinguishing between periods of unemployment during which the respondent was and was not looking for work or an absent-from-work spell that is divided between two or more distinct sub-spells (such as sick followed by disabled), or changes in type of health insurance coverage or different reasons for non-coverage as separate spells.

- It is awkward and difficult to handle "don't knows" or "refusals" in the EHC, particularly for starting and ending dates of spells.

- In designing and implementing the L.A.FANS EHC, we faced a challenge in balancing, on one hand, the use of pop-up questions for standardization of question wording with, on the other hand, the awkwardness of using pop-up questions on a laptop with a small screen and the underlying need for interviewers to have the flexibility to complete the EHC.

- Another challenge in completing certain timelines is how best to record information when a respondent never experienced an event—e.g., was never covered by health insurance. We suspect that some interviewers simply left the domain blank, which made it impossible to distinguish a "never" outcome from missing information.

- It was extremely important in developing the EHC for both the EHC program and the CAPI program to work flawlessly on their own and together. In particular, it was very important to avoid errors in passing variables to the EHC program from the CAPI program and vice-versa, immediately diagnose and correct problems that resulted in crashes (particularly for the EHC program, which could be unstable), and to preload events correctly.

- Collecting detailed information is difficult, especially in the employment domain--such as profit/loss from own business in the employment history. This is in part because pop-up questions are often awkward to use and don't have sufficient detail and specificity, and

interviewers generally develop their own approach to administering the calendar without using the questions.

- It is challenging to collect information on periods in which respondent is working irregularly or at temporary or odd jobs, which may lead to timeline gaps or incomplete information. Irregular work over a long period and multiple short-term unemployment spells are similarly difficult to capture.

- We found it worthwhile to incorporate program checks to verify that timelines were complete. Our impression is that these and other built-in program checks for common problems is an effective way of reducing error rates and improving the quality of data.

- We recommend keeping the period covered by the EHC to a minimum and only using it to collect information on domains and topics that are difficult to collect using standard question-list approaches.

Lastly, we note that there are a number of opportunities to examine EHC results and data quality issues in the L.A.FANS as new data become available from Wave 2 over the coming year. The L.A.FANS-2 experience of fielding an EHC that covers a seven-year period should provide some useful new insights. In addition, overlapping data from Waves 1 and 2 covering respondents' circumstances at and immediately prior to Wave 1 should also provide some valuable insights.

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Table 1. Summary Statistics for L.A.FANS-1 EHC Respondents

Variable	Percent	Observations
Sex		
Male	31%	1,054
Female	69	2,369
Age		
< 29 years	25%	871
30–39 years	34	1,147
40–49 years	23	788
> 50 years	18	613
Race		
Latino	59%	1,982
White	25	859
Black	8	292
Asian	7	243
Other	1	47
Education		
High school or less	43%	1,964
More than HS	57	1,456
Family income quartile		
< $13,500	25%	856
$13,500 – $27,200	25	854
$27,200 – $55,000	25	859
> $55,000	25	848
Immigration status		
Native-born	44%	1,503
Naturalized/PR	32	1,091
Other	24	829
Language		
English	59%	2,031
Spanish	41	1,392
Respondent type		
RSA-only	44%	1,503
Other	56	1,920
Total observations	100%	3,408

Table 2. Median Time Spent Completing L.A.FANS-1 EHC

Variable	Median	Chi-squared statistic (p-value)
All respondents	9 mins.	
Sex		
Male	10 mins.	0.70
Female	9	(0.40)
Age		
< 29 years	12 mins.	160.21***
30–39 years	10	(0.00)
40–49 years	9	
> 50 years	6	
Race		
Latino	9 mins.	26.80***
White	9	(0.00)
Black	11	
Asian	7	
Other	11	
Education		
High school or less	9 mins.	1.43
More than HS	9	(0.23)
Family income quartile		
< $13,500	10 mins.	8.42**
$13,500 – $27,200	9	(0.04)
$27,200 – $55,000	9	
> $55,000	9	
Immigration status		
Native-born	10 mins.	25.97***
Naturalized/PR	8	(0.00)
Other	9	
Language		
English	9 mins.	3.70*
Spanish	9	(0.05)
Respondent type		
RSA-only	9 mins.	2.23
Other	9	(0.14)

Note: Chi-squared statistic reported is of log-rank test for equality of
survivor functions by group.

Table 3. Survival model of time to complete L.A.FANS-1 EHC

Variable	Estimate	Std. err.
Sex		
Male†	.	.
Female	0.85***	(0.05)
Age		
< 29 years	0.82***	(0.04)
30–39 years†	.	.
40–49 years	1.10**	(0.05)
> 50 years	1.57***	(0.09)
Race		
Latino†	.	.
White	1.08	(0.07)
Black	0.90	(0.07)
Asian	1.21**	(0.11)
Other	0.72**	(0.12)
Education		
High school or less	0.91**	(0.04)
More than HS†	.	.
Family income quartile		
< $13,500	0.92*	(0.05)
$13,500 – $27,200	0.94	(0.05)
$27,200 – $55,000†	.	.
> $55,000	1.02	(0.06)
Immigration status		
Native-born†	.	.
Naturalized/PR	1.14**	(0.07)
Other	1.27***	(0.09)
Language		
English†	.	.
Spanish	1.10	(0.08)
Respondent type		
RSA-only	1.09*	(0.06)
Other†	.	.
Random effect std. dev.		
Interviewer	0.17***	(0.03)
Model Chi-squared	201.24*** (16)	
Observations	3,398	

Note: † omitted category; *p<.10; **p<.05; ***p<.01.

Table 4. Clustering of Events Reported in L.A.FANS-1 EHC Around Landmark Event Dates, Including Christmas and July 4th as Landmark Events

Event type	Mean events per 3-month period	Events in 3 months prior to landmark	Events in 3 months after landmark	Total number of events in EHC
Residence change	187	535	615	1,552
Job change	161	485	471	1,351
Work position change	126	384	367	1,032
Loss of job	89	259	362	800
Start TANF	12	52	37	100
Start Food Stamps	22	75	82	183
Start health insurance	118	169	185	1,002
End health insurance	52	134	113	412
Health insurance change	31	71	66	242

Table 5. Clustering of Events Reported in L.A.FANS-1 EHC Around Landmark Event Dates, Excluding Christmas and July 4ᵗʰ as Landmark Events

Event type	Mean events per 3-month period	Events in 3 months prior to landmark	Events in 3 months after landmark	Total number of events in EHC
Residence change	187	353	433	1,552
Job change	161	304	293	1,351
Work position change	126	247	249	1,032
Loss of job	89	170	246	800
Start TANF	12	33	24	100
Start Food Stamps	22	48	45	183
Start health insurance	118	99	126	1,002
End health insurance	52	109	84	412
Health insurance change	31	50	53	242

Table 6. Summary Statistics for Gaps in L.A.FANS-1 EHC Timelines

Variable	Percent	Chi-squared statistic (p-value)
Any timeline gap	5.4%	
Sex		
Male	2.5%	26.09***
Female	6.8%	(0.00)
Age		
< 29 years	7.8%	17.11***
30–39 years	5.5	(0.00)
40–49 years	3.3	
> 50 years	4.7	
Race/ethnicity		
Latino	5.8%	3.93
White	5.4	(0.42)
Black	3.1	
Asian	6.2	
Other	4.3	
Education		
High school or less	6.3%	7.37**
More than HS	4.2	(0.01)
Family income quartile		
< $13,500	6.1%	1.52
$13,500 – $27,200	5.7	(0.68)
$27,200 – $55,000	5.0	
> $55,000	5.0	
Immigration status		
Native-born	5.9%	1.49
Naturalized/PR	4.8	(0.48)
Other	5.6	
Language		
English	5.7%	0.75
Spanish	5.0	(0.39)
Respondent type		
RSA-only	3.3%	24.64***
Other	7.1	(0.00)

Note: Timeline gaps can occur in any of the EHC domains for which a complete timeline for the full calendar period is required.

Table 7. Linear Probability Regression of Gaps in L.A.FANS-1 EHC Timelines

Variable	Estimate	Std. err.
Sex		
Male†	.	.
Female	–0.020*	(0.012)
Age		
< 29 years	0.025**	(0.010)
30–39 years†	.	.
40–49 years	–0.021**	(0.010)
> 50 years	–0.002	(0.012)
Race		
Latino†	.	.
White	–0.002	(0.014)
Black	–0.041**	(0.017)
Asian	0.012	(0.019)
Other	–0.028	(0.034)
Education		
High school or less	–0.029***	(0.009)
More than HS†	.	.
Family income quartile		
< $13,500	0.016	(0.011)
$13,500 – $27,200	0.012	(0.011)
$27,200 – $55,000†	.	.
> $55,000	0.002	(0.012)
Immigration status		
Native-born†	.	.
Naturalized/PR	–0.017	(0.012)
Other	–0.022	(0.015)
Language		
English†	.	.
Spanish	–0.012	(0.015)
Respondent type		
RSA-only	–0.031***	(0.011)
Other†	.	.
Random effect std. dev.		
Interviewer	0.060***	(0.008)
Tract	0.020***	(0.007)
Model Chi-squared (d.f.)	75.14*** (16)	
Observations	3,408	

Note: Timeline gaps can occur in any of the EHC domains for which a
    complete timeline for the full calendar period is required.
    † omitted category; *p<.10; **p<.05; ***p<.01.

Figure 1. Time to complete EHC in L.A.FANS-1

Time to complete EHC (minutes)
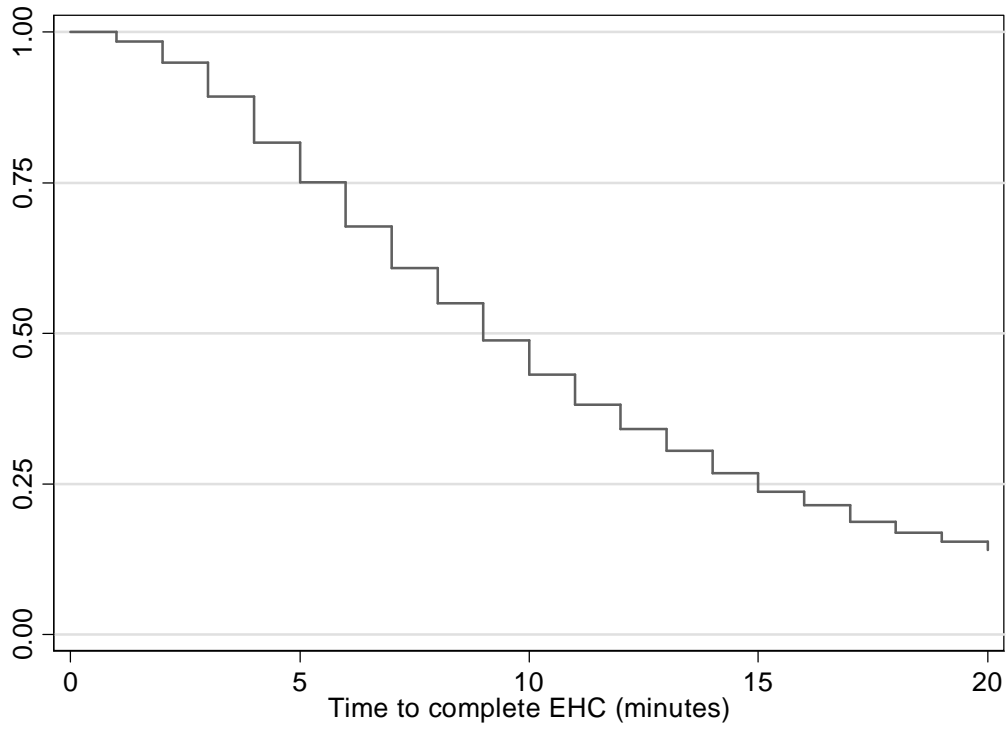
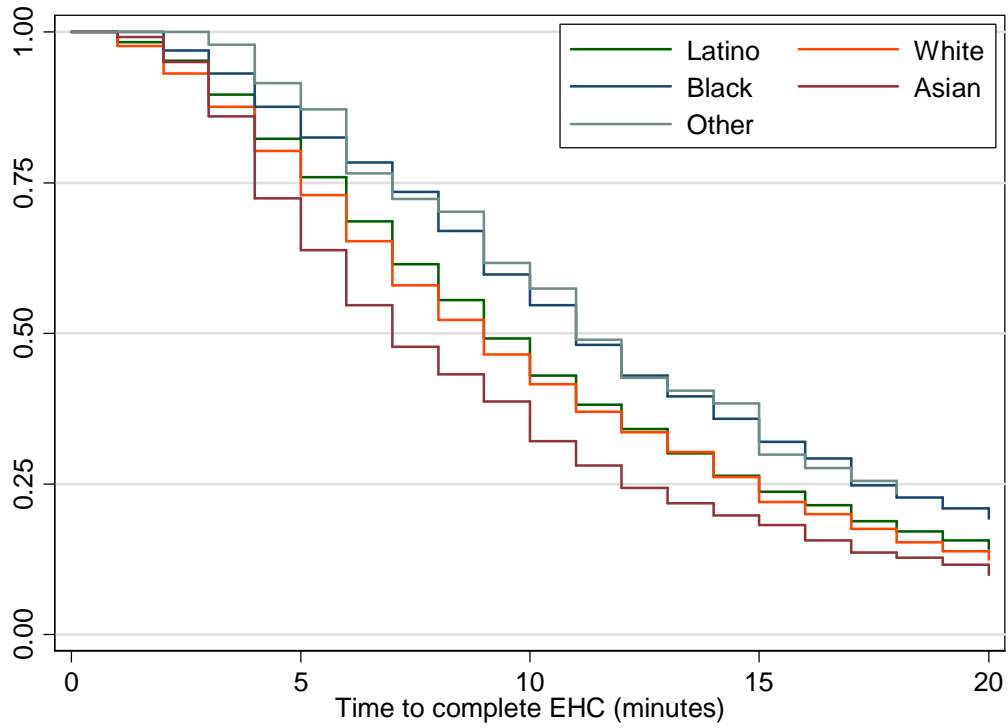**Figure 2A. Time to complete EHC in L.A.FANS by race/ethnicity**

Figure 2B. Time to complete EHC in L.A.FANS by education
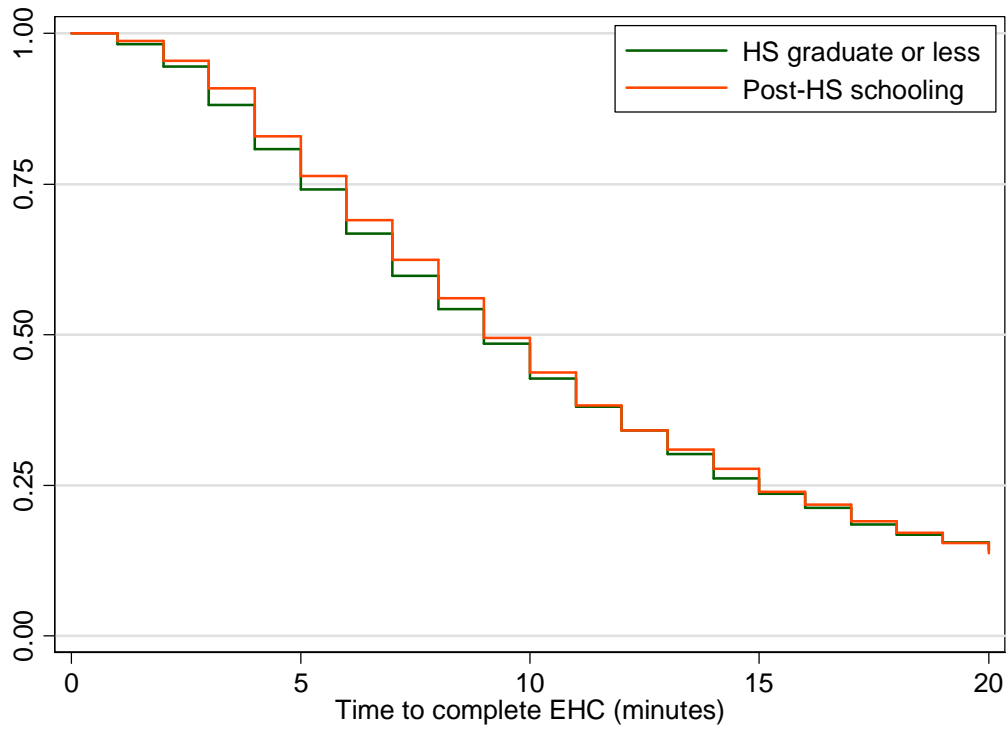
Figure 3A.
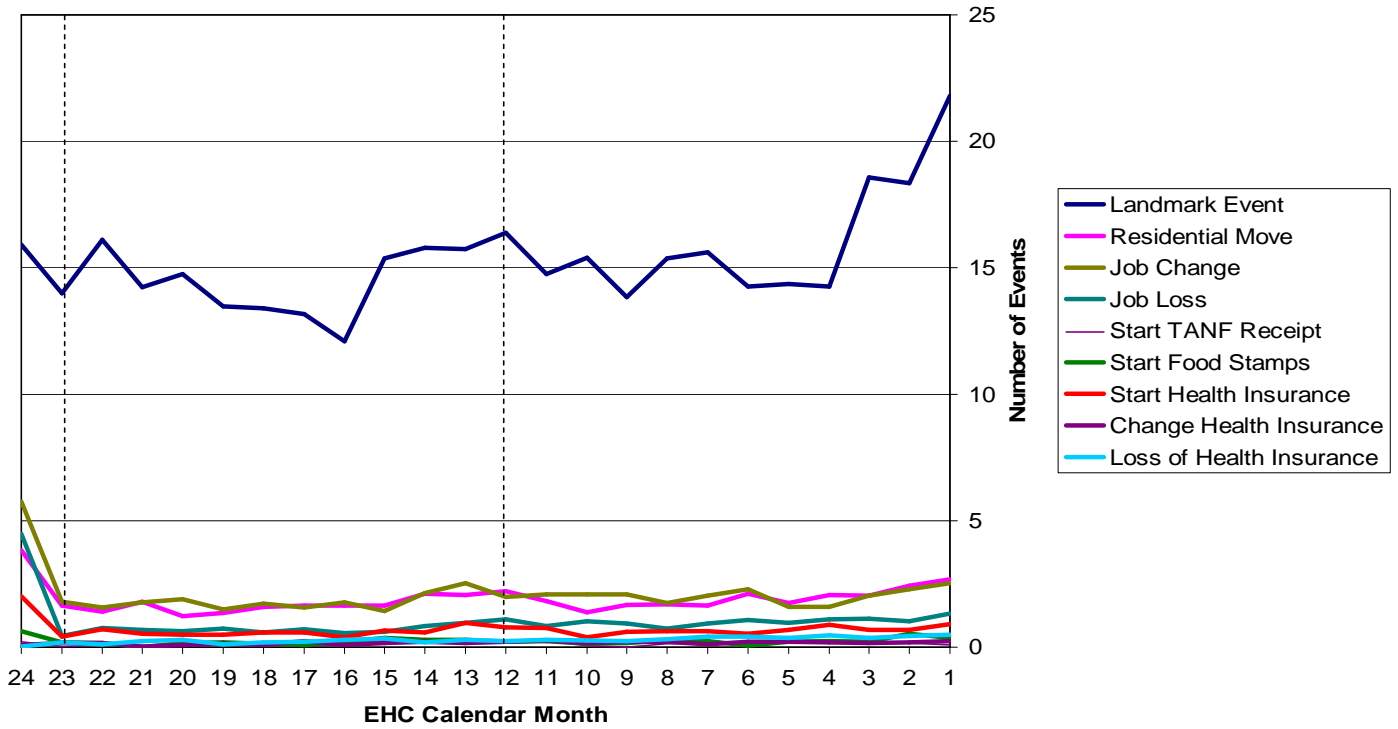
Timing of Events Across Two Year EHC

Figure 3B.
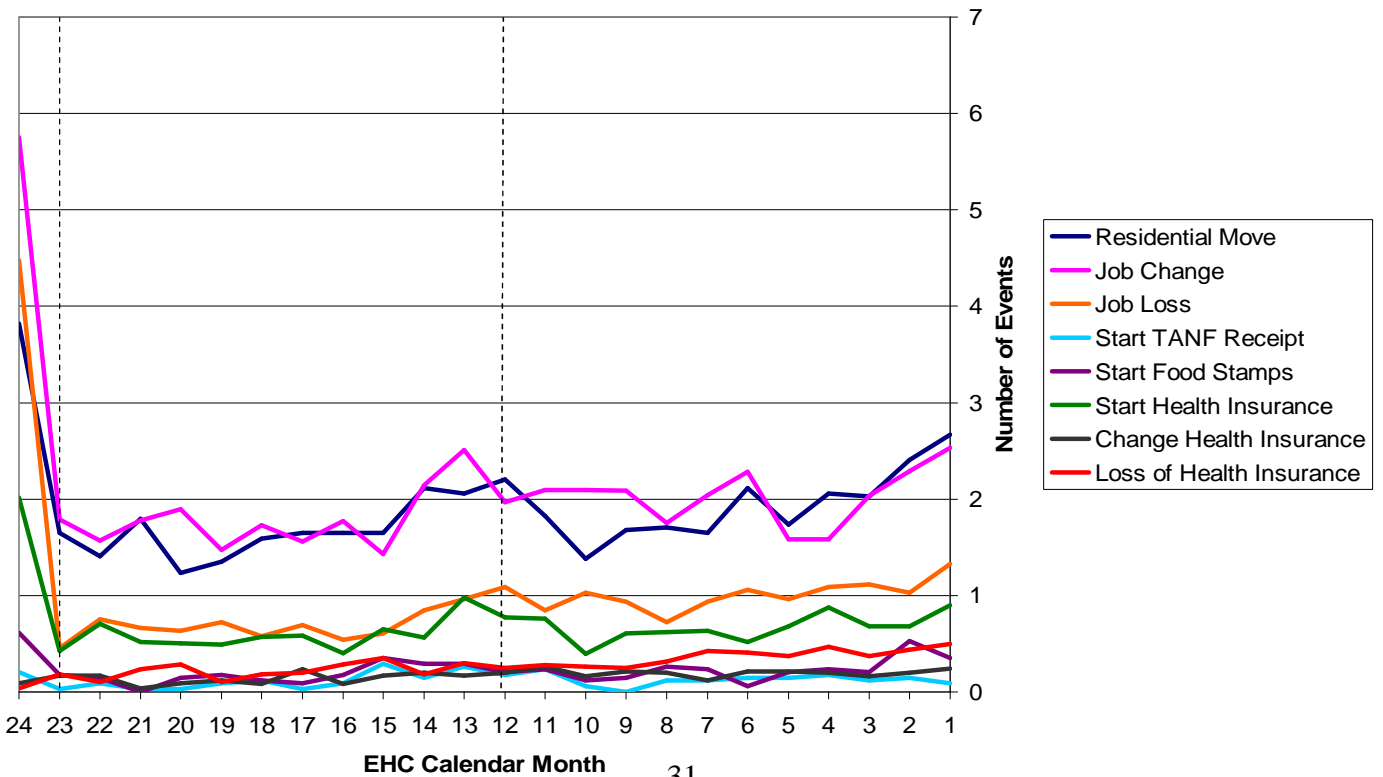**Events (Other than Landmarks) by EHC Calendar Month**

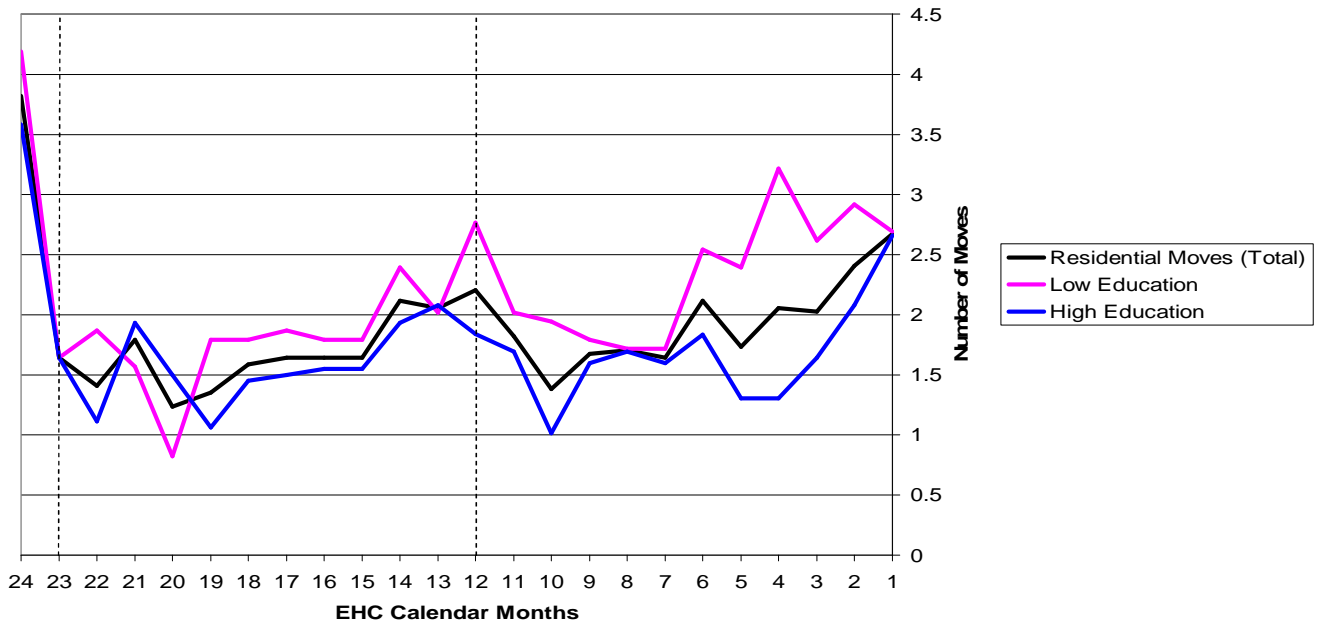**Figure 4A.**

Residential Moves by Educational Attainment
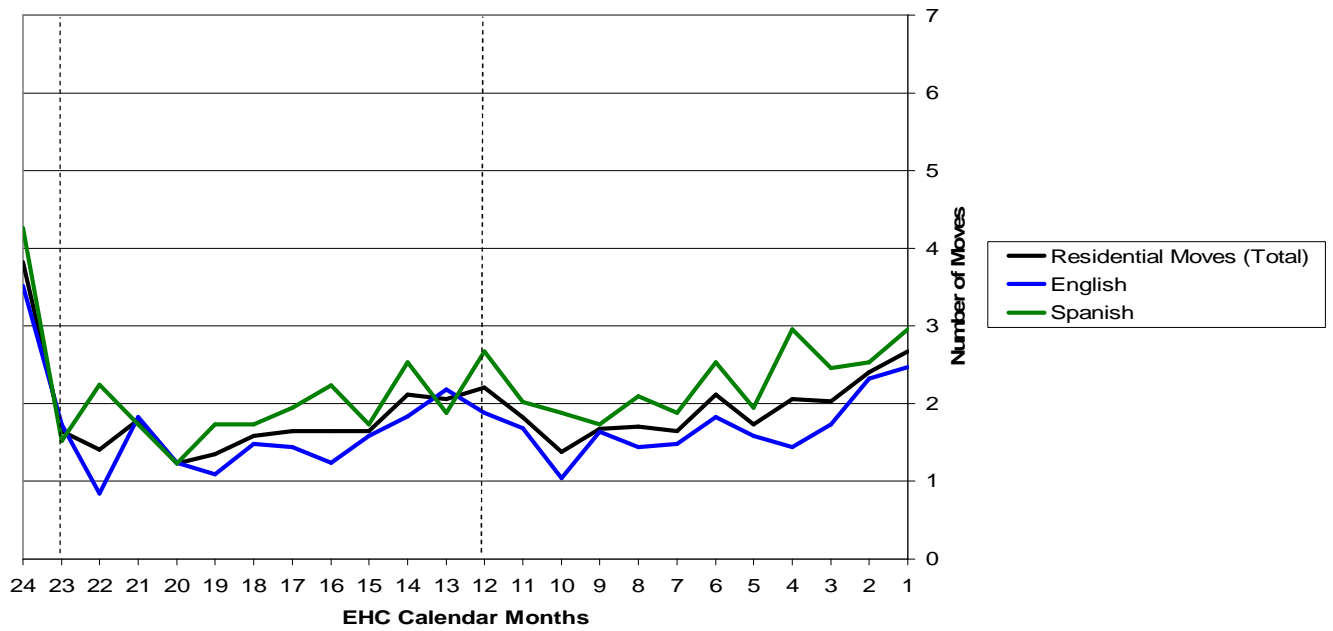

Figure 4B

Residential Moves by Language of Interview
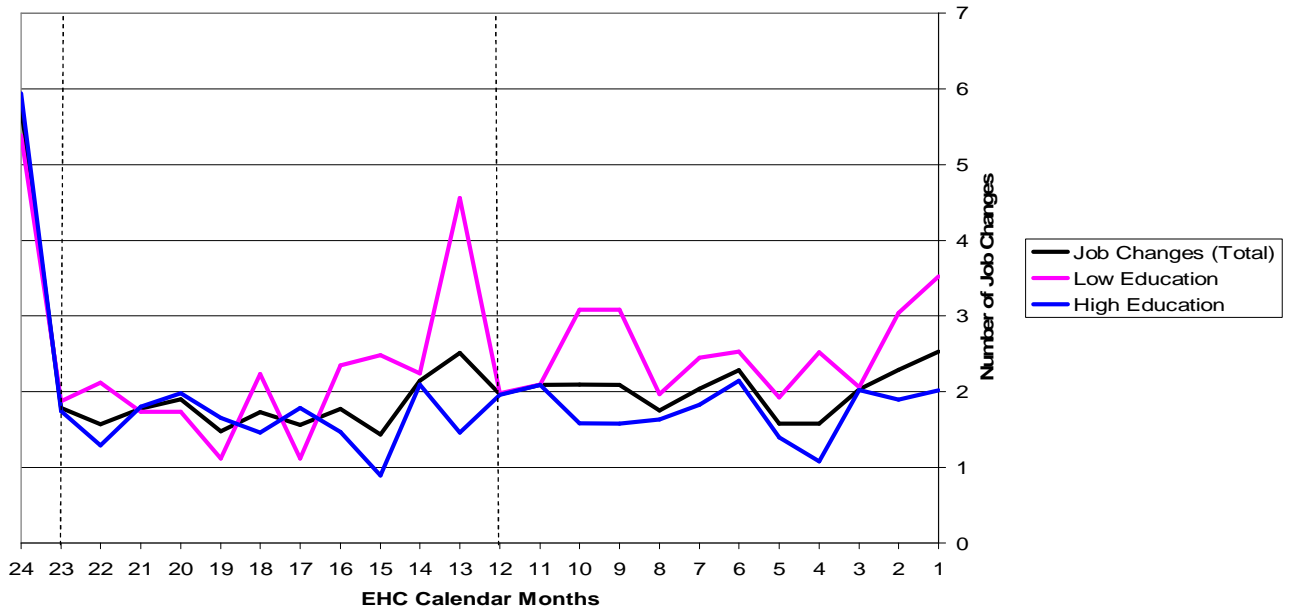
Figure 5A.

Job Changes by Educational Attainment

Figure 5B.
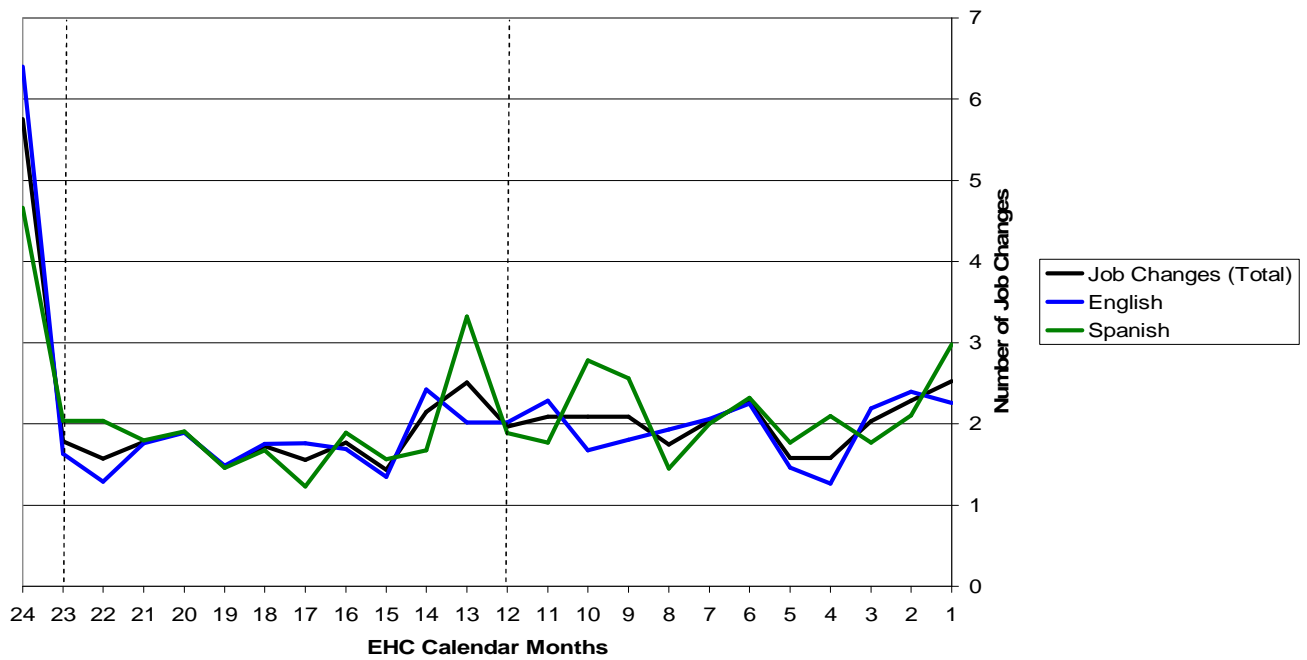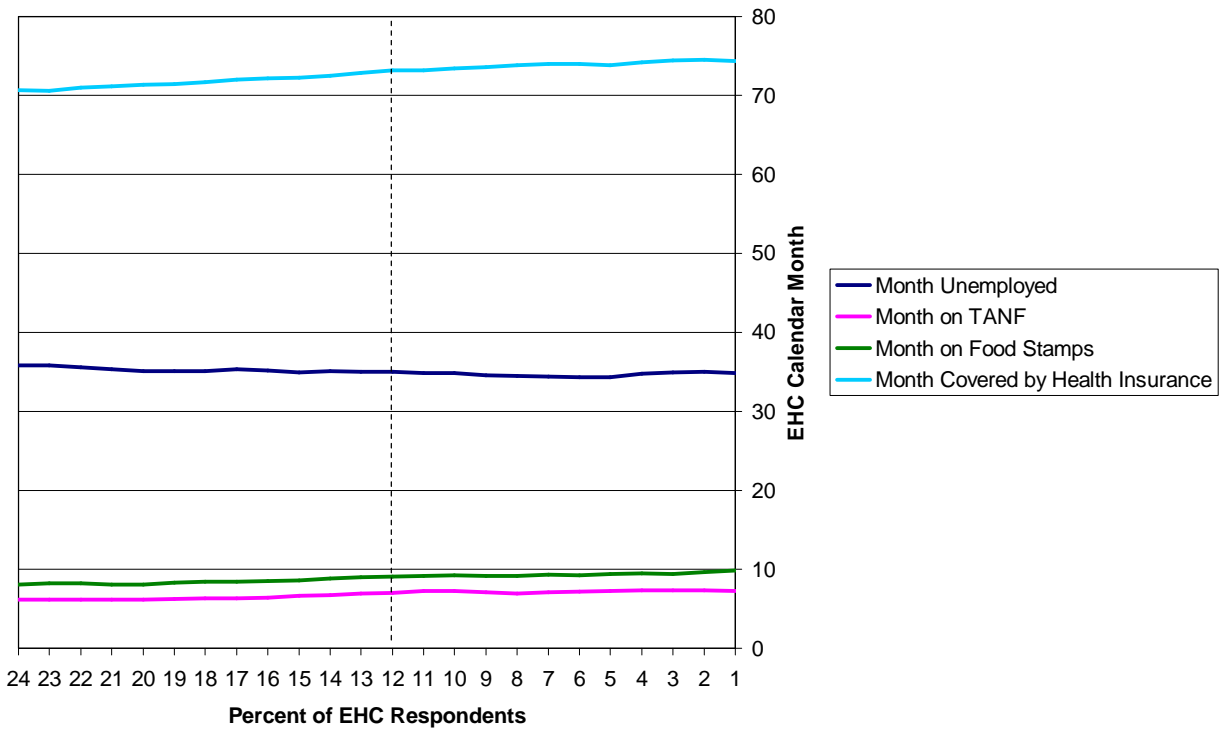**Job Changes by Language of Interview**

Figure 5.
Percent of Respondents In Specific States by EHC Month

Note: "Unemployed" is used here to mean anyone out of the (paid) workforce whether or not they are looking for work.