

## **HUMAN BEHAVIOR IN FIRE STUDY**

Supporting Statement for OMB Review

Part B

Prepared by:

Battelle Centers for Health Research and Evaluation  
2971 Flowers Road South, Suite 233  
Atlanta, GA 30341-3724

Submitted by:

Shane Thomas Diekman, M.P.H., Ph.D.  
Behavioral Scientist  
Home and Recreation Injury Prevention Team  
Division of Unintentional Injury Prevention  
National Center for Injury Prevention and Control  
Centers for Disease Control and Prevention  
4770 Buford Highway, NE, Mailstop K-63  
Atlanta, GA 30341  
Work: 770-488-4901, Fax: 770-488-1317  
Email: [sdiekman@cdc.gov](mailto:sdiekman@cdc.gov)

September 29, 2006

## **B. Collections of Information Employing Statistical Methods**

### **B.1. Respondent Universe and Sampling Methods**

The sample size for this study is 1,300 residential fire incidents over a 3 year period. Interviews will be conducted with 650 cases and 650 controls. Cases will be defined as individuals who were injured in a residential fire and controls will be individuals who were involved in a residential fire, but were not injured. Case subjects will be matched with control subjects on both geographic region and number of household residents home at time of fire (alone/not alone). A total of 300 persons (150 cases and 150 controls) will be conducted in homes that have elderly and homes with children occupants.

Potential participants will be identified from fire incident reports submitted by local fire departments in selected regions. Actual site selection and recruitment of fire departments will be guided by (1) the number of fire incidents that occur annually in that catchment area; (2) an established systematic reporting and documentation of local fires, such as participation in the National Fire Incident Reporting System (NFIR); and (3) willingness to forward these reports to study personnel on a regular basis. Participating fire departments will be spread across the continental United States and will include urban, rural, and suburban catchments areas.

#### *Inclusion criteria:*

We propose interviewing injured and non-injured individuals who were in an unintentional, uncontrolled residential fire incident in a single-family detached or low-rise multifamily residence in which a fire department and/or emergency medical service (EMS) is dispatched in response to notification by telephone, radio report or in-person report. The fire department must take some action against the fire. In addition, no fatal injuries should have occurred as a consequence of the fire incident. Interviewed individuals must be aged at least 18 years or older, have been in the home when the fire started, be a permanent resident of the home, speak English, and provide written consent. Controls (non-injured) will be matched to cases (injured) on geographic region and number of household residents.

#### *Exclusion criteria:*

Characteristics that would exclude a residential fire incident include fires that (1) did not result in a fire department being dispatched, (2) did not require the responding fire department to take some action to extinguish it, (3) were restricted to an area not attached to the main home structure (e.g. backyard, detached garage), (4) resulted in a civilian death, or (5) involved arson (i.e., were intentionally set) or suspected arson. Individuals to be excluded from study participation include those who are (A) less than 18 years of age, (B) do not speak English, (C) have any physical or mental condition that would make it impossible to conduct the interview, (D) refuse to give consent, (E) were not present in the home when the fire started, (F) are not able to be interviewed within 90 days of the fire incident, and (G) for controls, those that do not have an appropriately matched case. In addition, during the initial eligibility screening phone call, potential subjects will be asked to indicate whether or not they are able to participate in this study; this will exclude potential subjects who perceive their mental and/or physical conditions as too severe to participate in the study.

In order to locate the study participants, Battelle, will obtain information on fire incidents that meet study criteria from fire departments in selected communities in approximately 17 states.

We plan on collaborating with fire departments in the following urban and surrounding rural areas:

- Atlanta, GA
- Baltimore, MD/District of Columbia (DC)
- Philadelphia, PA
- Chicago, IL
- Denver, CO
- Delaware
- Detroit, MI
- Durham/Raleigh/Winston Salem, NC
- Fairfax, VA
- Gainesville, FL
- Greenville, SC
- Los Angeles, CA
- Portland, OR/Seattle, WA
- St. Louis, MO
- Texas
- West Virginia
- West Palm Beach/Broward County, FL

Because injuries from residential fires are relatively rare events, the case-control design will allow us to ascertain the necessary number of participants needed for analytic purposes in a reasonable amount of time. The locations were selected based partly on the high incidence of fires in a specific geographic area and partly on established relationships with local fire departments in the specified areas. Another consideration for selecting sites was to achieve a good representation of fire incidents in rural locations. Participating fire departments will be sent weekly reminder cards and receive weekly updates on the progress of the study.

## **B.2. Procedures for the Collection of Information**

Potential participants will be identified from local fire departments in selected regions. Participating fire departments will be spread across the continental United States and will include urban, rural, and suburban catchments areas. In order to initiate participation by local fire departments in selected geographic areas, Dr. Milke, the project subcontractor with the University of Maryland Department of Fire Protection Engineering, will contact local fire departments by email or phone. He or a project-affiliated graduate student will introduce themselves, provide a description of the study, and ask them if they are interested in being a fire department partner for the study.

When the project begins, participating fire departments will notify Battelle about residential fires that meet study inclusion criteria for the study. They will provide the Battelle study manager with the fire incident report, which will include the contact information of the individuals present

at the fire. When the Battelle study manager obtains incident reports, she will examine these forms to verify potential study participants' eligibility and will abstract pertinent information such as date and time of the incident, contact information, location of fire, type of structure, number of people present, and number of people hurt (when reported) into an electronic database. Trained Battelle interviewers will then conduct a brief, computer-assisted telephone interview (CATI) (see Appendix 2) to screen out incidents that do not meet the study's inclusion criteria and to screen out individuals who do not want to participate. The interview will require initial verbal consent from the respondent and will limit the burden on individuals not eligible or not interested in participating in the study. In-depth, face-to-face computer-assisted interviews will be scheduled for eligible cases and controls at the time of enrollment.

The face-to-face interviews will be conducted by Battelle's trained interviewers. At the time of the interview, written informed consent to participate in the study will first be secured (Appendix 6). Next, the interviewer will explain the project and describe exact participant expectations (Appendix 3). The interviewer will answer any questions and address any concerns, then obtain the participant's signature on the informed consent document and provide them with a copy. The interview data will be collected using the Computer Assisted Personal Interview (CAPI) process. The survey instrument (Appendix 3) will be programmed onto laptop computers using Blaise® software (Netherlands' Central Bureau of Statistics for Windows). The interview survey consists of two main sections. The first is a narrative section comprised of the Behavioral Sequence Interview Technique (BSIT), which is designed to facilitate the documentation and recording of people's open-ended narrative accounts of their behaviors following discovery of the fire. This section will provide information about the study's main independent variables: behaviors during the resident fire. The second section is the semi-structured part of the survey, which contains questions about important factors related to residential fire behaviors and outcomes.

This sophisticated system can handle complex questionnaires and incorporate the type of information handling required by the BSIT. The interviewer will enter responses from the study subject directly into laptop computers. In addition to these data, an audio recording will be made of the study participants' recounting of the sequence of events that occurred after fire recognition. The audio recording is handled through the Blaise® program, with a built-in microphone.

To ensure that interviewers conduct interviews in a consistent manner, they will undergo a training session that will involve the following areas:

- Basic interviewing skills
- Conducting interviews by using a sequence from general with tape recording to specific close-ended questions, with direct laptop computer entry.
- The Behavioral Sequence Interview Technique (BSIT)
- Sensitivity interviewing, including reactions to normal and abnormal interviewee behaviors

A tracking Management Information System (MIS) will be also developed and implemented using Microsoft Visual Basic and MS Access. All confidential, identifying data will be stored in

an SQL database. All analyses will conduct using either Epi Info or SAS System for Windows Version 8 (Cary, NC).

In the analytic component of this study, the primary purpose is to determine the differences in behaviors between injured and uninjured individuals. Sample size calculations are presented in Appendix 9, Sample Size Calculation—Number of Cases Needed, which indicates the number of cases needed for 80% power to detect differences in behaviors between the case and control groups, at varying frequencies (%) of behavior in the control group. We anticipate interviewing approximately 650 cases, which would give us 80% power to detect differences in the frequency of behaviors between the cases and controls at a minimum of 5-8%. We are confident that the study sample size is large enough to allow for the detection of meaningful statistical differences between matches and controls in the variables of interest.

### **B.3. Methods to Maximize Response Rates and Deal with Nonresponse**

The Battelle study manager will maintain weekly contact with participating fire departments to ensure that contact information of potential study participants is provided in a timely manner.

- Potential participants will be called up to 4 times to complete the computer assisted telephone screening interview (CATI). These phone calls will occur at different times of day to maximize likelihood of reaching them when they are home.
- Contacts listed on fire department forms, local shelters, the Red Cross, and church organizations will all be considered potential avenues for tracking potential participants who have not been reached after 4 phone calls.
- We propose to pay respondents \$25 for their participation in this survey.(Section A.9).

### **B.4. Tests of Procedures or Methods to be Undertaken**

Battelle will employ procedures throughout the project lifecycle to ensure a high quality product. Quality control will begin at the interview instrument development phase, where the instrument is pre-tested (piloted) on nine or fewer participants for wording comprehension, question order, and other factors that determine that the instrument is appropriately capturing the information it is intended to elicit. The CAPI program will be tested and checked for accuracy, first in the development environment, then by potential users. Interviewers are trained on all procedures and must pass a certification exam prior to being given actual cases to interview. In addition, random sections of interview audio recordings will be examined to gain information on interview authenticity, probing, coding, and other interview characteristics. Data entry of tracking information will be reviewed by a supervisor and accuracy verified through at least a 10% check. Editing and coding will be monitored through random 5-10% double edits by supervisory staff. A reconciliation process at the end of the study will match the survey tracking data file with the interview file to ensure that there is one-to-one match of cases that are completed.

## **B.5. Individuals Consulted on Statistical Aspects and Individuals Collecting and/or Analyzing Data**

The Technical Advisory Group (TAG) provided expert input into the conceptualization, design, implementation and evaluation of the study.

### **Table B-1: Members on Technical Advisory Group (TAG) for the Human Behavior in Fire Study**

Please refer to Table A-1 for the list of TAG members.

Dr. Michael Ballesteros performed sample size calculations and number of cases needed (Appendix 9) and will be the lead agency representative responsible for receiving and approving contract deliverables.

Battelle Centers for Research and Evaluation will oversee data collection and perform both the descriptive and analytic steps of the analysis plan.

## **References**

Ahrens M. *U.S. experience with smoke alarms and other fire alarms*. Quincy, MA: National Fire Protection Association; 2001.

Brennan P. Response of occupants close to fire. *Fire Code Reform Research Program Technical Report*. 1998; FCRC-TR 98-03.

Bryan JL. Smoke as a Determinant of Human Behavior in Fire Situations (Project People): Final Report. NBS GCR 77-94, Gaithersburg, MD, National Bureau of Standards; 1977.

Bryan JL. Behavioral response to fire and smoke. *SFPE Handbook*. New York: NY: National Fire Protection Association; 2002: 315-341.

Bryan JL, Milke JA. Determination of Behavior Response Patterns in Fire Situations, Project People II. Final Report. Health Care, NBS GCR 81-343, Gaithersburg, MD, National Bureau of Standards.

Canter D. *Studies of Human Behavior in Fire: Empirical Results and Their Implications for Education and Design*. Borehamwood, Fire Research Station; 1985.

Dillman DA. *Mail and Telephone Surveys*. New York, NY: John Wiley & Sons; 1978.

Hall HJR. *Burns, toxic gases, and other hazards associated with fires: Deaths and injuries in fire and non-fire situations*. Quincy, MA: National Fire Protection Association, Fire Analysis and Research Division; 2001.

Hopkins KD, Gullickson AR. Response rates in survey research: a meta-analysis of the effects of monetary gratuities. *J Experimental Education*. 1992; 61:52-62.

Karter MJ. *Fire loss in the United States in 2003*. Quincy, MA: National Fire Protection Association; 2004.

Kasprzyk D, Montano DE, St Lawrence JS, Phillips WR. *Eval Health Prof* 2001; 24:3-17

Keating JP, Loftus EL. *Post Fire Interviews: Development and Field Validation of the Behavioral Sequence Interview Technique*. Final Report. NBS GCR 84-477, National Bureau of Standards, Washington, DC; 1984.

National Fire Protection Association (NFPA). *NFPA National Fire Escape Survey*. 2004. Available at: <http://www.nfpa.org>. Accessed April 27, 2005.

Sudman S. Mail surveys of reluctant professionals. *Evaluation Review*, 1985; 9:349-360.

Warda L, Tenenbein M, Moffatt MEK. House fire injury prevention update. Part I. A review of risk factors for fatal and non-fatal hour fire injury. *Injury Prevention*, 1999; 5:145-150.

Wood PG. *The Behavior of People in Fires* Fire Research Note 953. Borehamwood, Fire Research Station; 1972.

## **List of Appendices**

Appendix 1: Legislative Authority (Section 301)

Appendix 2: Computer Assisted Telephone Interview (CATI) Screener Script

Appendix 3: Computer Assisted Personal Interview (CAPI) Survey Instrument

Appendix 4: Federal Register Notice

Appendix 5: Fire Incident Report Form (Example)

Appendix 6: Informed Consent

Appendix 7: CDC IRB Approval Notice

Appendix 8: Battelle and University of Maryland IRB Approval Notices

Appendix 9: Sample Size Calculation Table