

The Evaluation of Ordinances to Prevent Workplace Violence in Convenience Stores

Request for Office of Management and Budget Review and Approval for Federally Sponsored Data Collection

Section B

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B. Collections of information Employing Statistical Methods

B1. Respondent Universe and Sampling Methods

A three Phase project is described in Section A of the ICR. However, only Phase I (Study Design I) will be addressed in Section B because this is relevant to the survey of convenience stores proposed and is the only subproject that requires a respondent burden.

Study Design I is a fixed cohort retrospective follow-up study of all convenience stores operating from time of the ordinances in Dallas and Houston to the end of the follow-up period (time of the survey). An 18 month follow-up period is expected. Data on compliance to ordinance conditions at time of ordinance and follow-up will be obtained retrospectively at time of the survey (end of follow-up). Similarly, data on benefits to the stores during the study period will be obtained at time of the survey. The target population will include a) all stores operating continuously from enactment of the ordinance to follow-up and b) stores that closed during the follow-up period. This latter group will be lost to follow-up.

Thus, in Phase I (Study Design I) the respondent universe will be all convenience stores operating in Houston and Dallas, Texas at the time of the survey following OMB approval, approximately 18 months after the effective date of the ordinance in each city. The definition of convenience store is that defined in the city ordinances which is the same for both cities: “Convenience store means a business that is primarily engaged in the retail sale of convenience goods, or both convenience goods and gasoline, and has less than 10,000 square feet of retail floor space. Convenience store does not include any business where there is no retail floor space accessible to the public.” In 2007, based upon police department information, the respondent universe was 950 C-stores in Dallas and 2,380 C-stores in Houston.

A random sample of 600 C-stores (300 in Dallas and 300 in Houston) meeting the convenience store definition will be selected from the respondent universe. The sampling frame of all convenience stores in the respondent universe will be obtained from police department lists and from InfoUSA, a marketing firm. Lists of all convenience stores operating in January, 2010 close to the time of the effective dates of the Dallas and Houston ordinances were obtained from police departments and from InfoUSA. The InfoUSA records were found to be more complete and provided contact and demographic information for all stores. Lists of C-stores operating on June 1, 2011 will be obtained from InfoUSA and PDs to assemble the sampling frame.

Preliminary to the random selection of stores, the proportion of stores located in high and low crime areas will be determined. If the proportion of stores located in a low crime area is less than 20% or greater than 80%, stratification by crime area will be conducted prior to the random selection. Low crime areas will then be either over or under sampled as necessary to ensure that an approximately equal number of stores in each crime area is present in our sample to ensure the maximum amount of power to compare the effect of the ordinance between stores located in low versus high crime areas. Police department crime units have GEO-coded and plotted the location of all C-store robberies during the past 3 years. Based on the police department data, districts will be designated as high or low robbery risk. The address of each C-store in the population sampling frame will be geocoded and assigned a high/low risk code based upon their district location. These data will be evaluated to assess whether a stratified sample selection procedure is necessary. Presently, a simple random sample methodology without stratification will be employed.

The response rate is expected to be close to 100%. In a pilot study of 9 stores, no stores refused to participate. An advance letter (Appendix F) of a survey announcement containing letters of support from industry partners of convenience store companies and ethnic community leaders will contribute to increasing response rates. Additionally, industry partners and ethnic community leaders have offered to call stores and visit stores with the interviewer. Help from ethnic community leaders in the pilot study effectively ensured response rates. Finally, in a 1995 OMB approved study of Virginia convenience stores (Case-Control Study of the Deterrent Effect of Environmental Designs on Robbery in Virginia Convenience Stores OMB# 0920-0352, expiration date September 30, 1995), a similar methodology was employed and site visits were successfully completed in all stores in the sample. See Section B.2 for additional discussion of pilot study and efforts to maximize response rates.

The statistical power and precision based upon the sample size is sufficient to estimate proportions within 6% and provide power of 85-99% to test key hypotheses in each city. See section B.2 below for detailed justification of sample size.

B.2 Procedures for the Collection of Information

Statistical method for stratification and sample selection: As described in B.1, a random sampling method will be employed to select 300 stores from the Dallas convenience store universe and 300 stores from the Houston convenience store universe. A stratified sampling procedure, stratifying on low and high crime rate district will be employed if a disproportionate number of stores are in low and high crime rate districts.

There are no unusual problems requiring specialized sampling procedures. There will be only one interview and site visit per store and thus, there is no need for periodic data collection cycles to reduce burden.

Estimation procedure and degree of accuracy needed: An estimate of the proportion of stores becoming compliant which were not compliant at the time of the ordinance will be estimated. Similarly the difference before and after the effective date of the ordinance in the proportion of stores robbed and in the proportion of robbery-related injuries to employees and customers will be estimated controlling for crime risk factors. Precisions of proportions (i.e., 95% confidence intervals) within 6% are considered adequate for the purposes of this study. Power of at least 85% to test the hypotheses on the change in robbery and robbery-related injury rates before and after the ordinance is also required for the study.

Data collection plan:

Survey Team recruitment: Survey interviewers will be employed under contract to visit each of the 600 stores in the sample approximately 1-1½ years after the effective date of each city's ordinance. It is proposed to employ a survey team of a study manager and 2-3 interviewers' staff on-site in each city to complete the survey. NIOSH will interview and approve all contract survey staff to confirm their competency to conduct interviews.

Survey Protocol

a. Scheduling site visits: NIOSH staff will develop a map of the locations for all stores in the sample using GIS software from the store addresses in the sampling frame. The contract study manager will complete a final schedule from the NIOSH map of store addresses for each interviewer. Each contract interviewer will then be given a list of stores to survey.

Prior to the survey, NIOSH will determine the stores owned by companies with multiple stores and contact the company management, send copies of the store manager questionnaire to them, and obtain approval for visits to their stores. Additionally, NIOSH will mail to all stores in the sample an advance letter (Appendix F) containing copies of letters of support from the co-chairs of the Mayor's Task Forces of Convenience Store Safety (the police department and an industry representative) and from ethnic community leaders (Appendix G).

b. Site visit protocol: The interviewers will visit each store unannounced between 8a.m. and 10a.m. (the best time for managers) and provide the store manager a copy of the Store Manager Questionnaire (Appendix C) to review. The surveyor will then return within two days to review the questionnaire with the manager unless the manager consents to participate at that time.

Consent from the store managers will be obtained verbally by the contract interviewer prior to interview following a text approved by the NIOSH Human Subjects Review Board (Appendix D). A script for oral consent will be read to the manager and after the manager provides consent to participate, a copy of the script will be provided to the manager. The store manager's name will not be collected during the interview. The manager's name will be recorded in cases of discussions with owners and management to obtain their permission for their store manager to participate in the interview, and will be retained until questionnaire data are collected, cleaned and entered into an electronic data base, a period of less than 2-3 months. The manager's name will then be erased from notes collected so there will be no link of a manager name with the questionnaire data to minimize any liability to the manager. Additionally, during the site visit, the interviewer will complete a Store Evaluation Form (Appendix C) which will consist of an observational evaluation of the store environment and will not require a burden or assistance from store employees.

With regard to ethnic stores (Asian, Middle Eastern, and Vietnamese), ethnic community leaders have agreed to contact the stores and recommend participation. The leaders will call the stores prior to the first visit and may accompany the contract interviewer to the store to obtain participation from the manager. NIOSH will identify all ethnic stores working with the community leaders prior to providing the schedule to the study manager and interviewers. The name and contact information of a community leader for the store will be provided on the store list for the interviewer.

Following completion of site visits, the study manager will collect the forms and questionnaires from surveyors each week. The study manager will do quality assurance checks on completion of forms and questionnaires, return documents to the surveyors for correction if necessary, and FedEx documents to NIOSH weekly.

Based upon the pilot study and from NIOSH experience in a 1995 Virginia convenience store study (OMB# 0920-0352), it is estimated that it will require approximately 1 hour of contact time to conduct the first visit and 1-2 hours for the second visits to complete the interviews and store evaluation. Total time of interview of the store manager is approximately 20 minutes.

c. Translation of questionnaires: Consent forms (Appendix D), letters of correspondence (Appendix F), and questionnaires will be translated into Vietnamese for Vietnamese ethnic stores and into Korean for Korean ethnic stores.

d. Contract survey staff training: NIOSH PIs will train contract study managers and interviewers in each city on survey procedures. Training will include procedures for store visits,

texts for introduction to store managers, survey questionnaire administration procedures and instructions for store evaluations. Site visits to approximately 5 stores in each city during the start-up of the survey will be conducted by the project officers and surveyors together to complete training for store evaluations and manager interviews. Training will also be given to study managers on QA procedures, security of records, and submission of forms and questionnaires to NIOSH.

e. Quality control and data editing: A NIOSH study manager will be available to help the survey team throughout the survey. Weekly conference calls will be held with the survey teams in each city to keep a log of problems and solutions. NIOSH data editing staff will receipt forms, and check forms and questionnaires for completeness and errors. Survey staff will be asked to correct all errors or missing fields on the forms, if necessary. Contract study managers will make site visits to approximately 10% of the stores to evaluate the store designs and complete a QA check on the survey staff's store evaluations. Study managers will not be re-interviewed. Additionally, the NIOSH project officers will make a visit to Houston and Dallas within 1 week after start-up and once a month to evaluate a sample of stores to check the validity of the contract survey staff evaluations and ensure adherence to the store evaluation protocol. Any errors in application of the evaluation protocol will be discussed with survey staff to ensure adherence to the survey protocol.

f. Sample size and statistical power: For computation of required samples sizes, assumptions for baseline rates of compliance to the ordinance and crimes were based on data provided by the Houston Police Department. Data from a 2007 Houston convenience store survey indicate the following:

- 31% of the stores had signage up for no loitering
- 39% had height strips
- 41% had surveillance cameras
- 37% displayed signage for cash limit and for drop safes that cannot be opened
- 66% had alarm systems
- 75% had security windows and doors that were clear and within good visibility of the store and register
- 55% had timed-release drop safes
- 79% had a surveillance camera with a view of the register
- 59% conducted 'some' training in robbery prevention

There is no data on the proportion of stores in complete compliance with the ordinance. For planning purposes the proportion in full compliance is estimated by the Houston PD to be 20%-25%.

Crime statistics provided by the Houston Police Department indicate that in 2007 35% of the stores had been robbed and 14% had an aggravated or sexual assault or homicide. These estimates were used for planning purposes as there were no better available data for Houston and Dallas. A 30% reduction in robberies and workplace violence injuries is considered practical for planning purposes because CPTED elements have been shown to be associated with 30-50% reductions in robberies and assaults.

Sample sizes required for power and precision to address 2 design specifications are described below.

Specification 1:

- a) To achieve a precision of at least 6% (95% confidence interval length less than 12%) to estimate the proportion of stores in full compliance in the total population at 1 year after the ordinance assuming the proportion is 50% (20% in compliance at the time of the ordinance plus a 30% increase in the number of stores in compliance).
- b) To achieve a precision of 6% to estimate the proportion of stores in full compliance 1 year after the ordinance among stores which were not in compliance at the effective date of the ordinance assuming the proportion is 30%.

Methodology: The precision for a given sample size is based on the formula $\pm 1.96[p(1-p)/n]^{1/2}$, where p is the percentage being estimated and n is the sample size.

Specification 1a). The sample sized and precision (half the length of a 95% confidence interval) to estimate 50% of stores in full compliance 1 year after the ordinance is estimated as follows:.

<u>Sample Size</u>	<u>Precision</u>
1000	3.1%
750	3.6%
500	4.4%
400	4.9%
300	5.7%
200	6.8%

Specification 1b). The same methodology was used as in Specification 1a. The sample size and precision was estimated assuming a 30% proportion of stores which were not in compliance at the time of the ordinance which become compliant after 1 year. Sample sizes for both the number of original non-compliant stores and the total stores needed in the study assuming 20% in the store population were originally compliant prior to ordinance are shown below:

<u>Non-compliant Sample</u>	<u>Total Sample</u>	<u>Precision</u>
1000	1250	2.8%
750	938	3.3%
500	625	4.0%
400	500	4.5%
300	375	5.2%
200	250	6.4%

Conclusion: A sample size of 300 stores will provide a 6% precision for estimating proportions under conditions of Specification 1a&b.

Specification 2: To achieve at least 80% power to detect a difference of 30% in compliance from the effective date of the ordinance to that 1 year later in the total population of stores assuming the baseline percentage is 20%.

Methodology: 5,000 simulations of the McNemar’s test were run under three sets of conditions. The power was determined as the percentage of times the null hypothesis was rejected.

Condition 1: Change in compliance rate before and after ordinance from 20% to 50%: Power for McNemar’s test for given sample sizes assuming alpha=0.05 was calculated for the following assumptions: a) prior to the ordinance, 20% of stores are compliant, b) after 1 year, the probability of a previous compliant stores change to non-compliant is 0.01., and c) the probability of a non-compliant becoming compliant after 1 year is 0.3875 so that the total

number of all stores after the 1-year period that are compliant is on average 50%. Power for a range of sample sizes is shown below:

<u>Sample Size</u>	<u>Power</u>
50	99.8%
40	99.2%
30	95.7%
20	82.5%

Condition 2: Change in compliance rate before and after ordinance from 20% to 40%:

Power for McNemar's test for given sample sizes assuming $\alpha=0.05$ was calculated for the following assumptions: a) prior to the ordinance, 20% of stores are compliant, b) after 1 year, the probability of a previous compliant stores change to non-compliant is 0.01, and c) the probability of a non-compliant becoming compliant after 1 year is 0.2625 so that the total number of all stores after the 1-year period that are compliant is on average 40%. Power for a range of sample sizes is shown below:

<u>Sample Size</u>	<u>Power</u>
100	99.9%
50	95.2%
30	77.7%

Condition 3: Change in compliance rate before and after ordinance from 20% to 30%:

Power for McNemar's test for given sample sizes assuming $\alpha=0.05$ was calculated for the following assumptions: a) prior to the ordinance, 20% of stores are compliant, b) after 1 year, the probability of a previous compliant stores change to non-compliant is 0.01, and c) the probability of a non-compliant becoming compliant after 1 year is 0.1375 so that the total number of all stores after the 1-year period that are compliant is on average 30%. Power for a range of sample sizes is shown below:

<u>Sample Size</u>	<u>Power</u>
100	89.8%
80	80.9%
60	67.4%

Conclusion: A sample size of 300 stores will provide power of 95% to detect a change in compliance of 10% or more given a baseline rate of 20%.

Based upon the calculation of sample sizes required, a sample of 300 stores in each city is proposed which will provide 6% precision for estimates of proportions in Specification 1a&b and 95% power to detect a 10% or more change in compliance rates before and after ordinance under Specification 2. Thus, a sample of 300 stores in each city and the respective target populations will provide sufficient precision and power to address the research questions separately in each city.

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

Several procedures will be implemented to maximize response rates. First, one advance mailing to all stores (Appendix F) prior to the site visits will be made describing the purpose of the study and support letters of encouragement to participate from the police department, industry trade associations representatives, and community leaders (Appendix G). Second, all companies owning more than 1 store will be contacted by NIOSH and approval from their upper management obtained. Third, community leaders in ethnic communities and industry association representatives will call stores which hesitate to participate to encourage their participation. Fourth, ethnic community leaders will travel with the contract interviewers to ethnic stores in their community to encourage participation. Finally, site visits will be made by the interviewer to all stores and an observation of the premises will capture most of the information on ordinance compliance but will not capture information on benefits to the stores and reasons for non-compliance. Thus, basic compliance information will be obtained on all stores even for stores which refuse to participate.

Compliance rates are expected to be over 90% and close to 100% for three reasons. First, support from community partners will maximize participation. Second, the proposed survey methodology was successful in the past. During 1995, NIOSH conducted a survey of over 1600 convenience stores in Virginia in a study to evaluate the effectiveness of CPTED designs to prevent robbery. A similar protocol of store visits and manager interviews was used as in this proposed information request. Participation rates by store employees were over 90% and primary CPTED environmental store features similar to the ordinance requirements in this study were collected by observation in all stores. Third, a pilot study (See B.4) of 9 ethnic stores in Houston was completed and community leaders provided recommendations for support to the stores, and no store managers refused participation.

B.4 Tests of Procedures of Methods to be Undertaken

As discussed previously, the survey protocol including the Store Evaluation Form and Store Manager Questionnaire were pilot tested in 9 stores. Many questions and checklist items for the Form and Questionnaire were taken from forms previously validated and used in the 1995 NIOSH Virginia Convenience store study (OMB# 0920-0352, approval expired September 30, 1995, Appendix H) and in a current study being done by the University of North Carolina and University of Iowa with the Oxnard California Police Department. In the 1995 NIOSH Virginia study, a store evaluation form, clerk questionnaire, and risk factor information form were used to record similar CPTED evaluation and risk factor information proposed for this study. These forms were reviewed by a criminologist and Richmond, Norfolk, and Fairfax, Virginia police department staff, pilot tested in the NIOSH Virginia C-store study, and employed in that study by contract interviewers. Questions on crime risk factors and CPTED features from the Virginia survey were used in the proposed data collection. Similarly, questions on the Oxnard Police Department forms developed by the university of North Carolina and University of Iowa on training, store compliance, and benefits of compliance to the store have been field tested by the University of North Carolina and University of Iowa and were also used in the proposed information collection.

The draft Store Evaluation Form and Store Manager Questionnaire were pilot tested in 9 Houston ethnic stores (1 Korean, 4 Vietnamese, and 4 Middle Eastern) by one of the NIOSH project officers (Dr. Cammie Menendez). The pilot test identified questionnaire questions which store managers could or would not answer and questions which were unclear. Following completion of the pilot study, the store manager questionnaire was revised.

The pilot test also determined a successful procedure to ensure that store managers would participate. The approach is to visit the store unannounced during the hours 8am-10am which is the least busy time for managers, explain the purpose of the study, leave the questionnaire with the manager to review, return the next day to administer the questionnaire, and to have ethic community leaders call ethic stores and if necessary, visit the store with the interviewer to encourage participation

A NIOSH protocol for the full study was peer-reviewed by a committee of grant proposal reviewers and received NIOSH HSRB review and approval. There are no plans for changing the survey methods or instruments prior to the survey. In the event that any changes need to be made, a change justification will be submitted to OMB.

B.5 Individuals consulted on Statistical Aspects and Individuals Collecting and/or Analyzing Data

Key personnel providing statistical consulting, data collection, and study design are provided below.

Statistician consulting: Completed the power calculations and developed the sampling methodology:

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Data collection: Store manager interviews and store evaluations will be done by contract employees: Contract to be awarded in FY11. OMB will be notified upon contract award.

Study design, data collection, and analysis: The principle investigators (NIOSH project officers) responsible for the study design, management of the data collection, management of the system of records, and analysis of the data:

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