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PARTNERING WITH LOCAL EXPERTS TO RECRUIT A PROBABILITY SAMPLE OF A CAMBODIAN COMMUNITY

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ABSTRACT

RAND Corporation, a non-profit research organization, is conducting a study of the mental health needs of Cambodian refugees residing in the U.S. who lived through the Khmer Rouge "Killing Fields". The research requires in person interviews with a representative sample of 500 refugees residing in Long Beach, California; the largest Cambodian refugee community in the United States. Although the community is comparatively large, it comprises only about 4% of the total population of Long Beach. In this paper, we discuss novel methodology for efficiently listing, screening, and identifying households to ultimately yield a random sample of eligible participants.

KEYWORDS: Local Experts; Sampling; Screening

1. INTRODUCTION

About thirty years ago, in Cambodia, Pol Pot and his bands of Khmer Rouge, known by their red headbands, committed many brutal atrocities. Of an estimated population of 7.1 million in 1975 (Food and Agriculture et al., 2004), as many as 2 million Cambodians were killed during the 4 years of Khmer Rouge control. Approximately 1 million more were killed in the civil wars before and after this period (Rummel, 1994). The remains of the richest, the students, and the most educated were tossed and left in the Killing Fields.

Some Cambodians stayed in Cambodia, posing as farmers and laborers, and some escaped into Thailand, suffering hardships and often death as a result of their trek. Some were successful in reaching Thailand, only to undergo countless hardships in refugee camps.

After the war, many of these refugees eventually settled in the United States; in particular, in Long Beach California. Given the trauma exposure that befell many Cambodian refugees, we expected that large numbers would have experienced significant psychological distress at some point in their lives. There have been few, if any, systematic efforts to determine the current mental health status of Cambodian refugees residing in the United States.

Our goal was to assess the mental health needs of Cambodian refugees aged 35-75 who lived and survived under the Pol Pot regime (1975-1979) and who now lived in a to-be-determined geographic area within Long Beach. To obtain this information, we planned to conduct in-person interviews with 500 eligible men and women who live in Long Beach California, USA, to collect data on the extent of trauma, the prevalence of Posttraumatic Stress Disorder (PTSD) and depression, among other topics.

This paper will discuss the cultural aspects that prompted us to think creatively to develop novel sampling procedures to achieve our goals, and a statistical analysis of the impact of those procedures.

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2. SCOPE OF THE STUDY

Long Beach, California has more than 450,000 residents, of whom approximately 17,000 are Cambodians. As such, it is the largest Cambodian community in the United States. Over 99% of these Cambodians came as refugees following the civil war. Our major operational goals were: (1) to define and refine our sample area to determine precisely where would we find the population within the boundaries of this large geographic area, (2) to determine the total number of households in our sampling area through the process of "listing" or enumerating to develop our sampling and interviewing framework, (3) to assess how to screen households for eligibility, (4) and then to conduct interviews with a member of an eligible household. These activities are quite labor and cost intensive, involving the listing of all households, the screening of large numbers of residences (many of which are unlikely to house an eligible person), repeated visits to households to find someone home, the asking of screening questions, and documenting each of these steps. As can be seen, the challenge we faced was to achieve these objectives while making optimal use of a fixed budget.

3. OPERATIONAL GOALS

3.1 Defining the population area

To define the population area, we used the 1990 census to identify census tracts with the highest concentration of households who spoke Khmer as their primary language. This strategy resulted in an initial selection of five contiguous census tracts. Following release of relevant information from the 2000 Census, we were able to assess whether updated information required us to modify our basic strategy. Although some changes had taken place, none affected our basic approach. To further refine our population area, we worked with a non-Cambodian colleague who assisted us in identifying Cambodian informants who had a living and working knowledge of the community. Three of these local experts reviewed maps on which the five census tracts were superimposed. Using these maps, the experts provided estimates of the density of eligible persons (high, medium, or low) by blocks. There was consensus among the experts that about half of one of the tracts contained few eligible persons. As a result, this low-density region was dropped, leaving a still contiguous area of 4.5 census tracts that consisted of 217 blocks and approximately 15,000 households. For field purposes, we split some of the larger blocks, yielding 264 field blocks. These field blocks served as the basic unit for the task of listing or household enumeration. It is notable that during the development of our sampling frame, we assessed the feasibility of other strategies. For example, we tried to use a commercial vendor who had compilations of Khmer surnames to refine the geographical area. We determined that this strategy was not likely to increase our accuracy or result in significant cost savings as the list contained many false positives (i.e., Chinese surnames).

3.2 Listing the sample area and sampling blocks

Our experience with previous listing assignments using paper and pencil to list households led us to decide to use hand held computers to assist in listing. Compaq IPAQs, which used the Microsoft Pocket PC operating system, programmed using VB questionnaire design software were programmed to accept listing information. The hand held computers were efficient, reducing opportunity for errors, permitting daily reports regarding progress, and enabling us to validate and supervise quickly and efficiently. Listing resulted in enumeration of approximately 15,000 Dwelling Units (DU's).

We randomly assigned the 264 field blocks into 3 replicates with 20% allotted to the first replicate, and 40% assigned to the second and third replicates. From the practical vantage point of management of the field tasks, the use of replicates enabled us control the numbers of households we approached as a function of our response rate. We intentionally made the first replicate smaller than the other two replicates, reasoning that this strategy would allow us to assess progress and problems and make adjustments in subsequent replicates as needed.

3.3 Screening and interviewing

Our original estimate was that we would have to approach and screen 30 DU's to obtain one complete interview. This estimate was predicated on the assumption that we would have no additional information to refine our search for eligible households. We were also working with several considerations that imposed constraints on options for screening households. First, we learned that it would be inappropriate to have a young person approach or ask questions of an older person. Therefore, we had to incorporate age restrictions into our screening and interviewing plans. Moreover, because most refugees had little formal education and were often illiterate in their native language, it proved difficult to identify and recruit screeners and interviewers of appropriate age who could read and speak Khmer (the Cambodian language). Because the professional survey staff did not speak Khmer, the training was conducted in English necessitating that only bilingual persons were hired. Thus, we faced the challenge of screening large numbers of households with few available Cambodian-speaking staff for screening and interviewing.

4. OPERATIONALIZING SAMPLING, SCREENING, AND INTERVIEWING OF HOUSEHOLDS

4.1 Household sampling considerations and alternatives

Even within the boundaries of our defined "high density" area, we estimated that only about 12% of households would contain an eligible individual. Any strategy that increased the probability that eligible households would be approached relative to households that did not contain eligible persons would be potentially very cost-effective because of reduced screening. Two methods that might normally have been used are adaptive sampling using blocks or network sampling with networks using neighbors within a specified distance from the dwelling.

Adaptive sampling (Kalsbeek, 2003 and Kalton, 1993b) refers to probability sampling methods in which sampling probabilities and allocations are, in part, determined recursively or interactively on the basis of eligibility information. Since we believed that there was substantial block-by-block heterogeneity in the density of eligible persons within our defined region, we might have first sampled blocks, taking a small initial systematic random sample of households (perhaps three households per block). For the current objectives, we might then have continued with the rest of the block only if at least one of those houses contained an eligible person. This approach requires weighting, but can produce efficiency gains if the geographic heterogeneity of eligibility is great (i.e., there exist many blocks with no eligible persons, and some with very high proportions of eligible persons). One disadvantage is that this approach might involve revisiting blocks. More sophisticated versions of this approach could use spatial modeling to borrow information from adjacent blocks, thus resulting in more efficient screening rules or even adaptive selection of blocks themselves. This approach might require challenging amounts of rapid feedback between field and analysis, however.

A second standard strategy, i.e., network sampling (Kalton, 1993a; Sirken, 1975; Sirken, 1978; Sudman, 1986 and Sudman, 1988), is a probability sampling method that begins with a traditional probability sample of "nodes." For example, one might start with a systematic random sample of every fifth household on selected blocks. Eligible nodes would then be asked to supply a list of all eligible members with a defined network of known size (other applications have used siblings, members of a military platoon, or other groups where the network size for a given node is unambiguous). For the current purposes, the networks might be all households on the block between the eligible node and the next eligible node in the counterclockwise direction. All members of the network would then be approached for sampling. Unlike snowball sampling, network members would not be asked to nominate others in subsequent rounds. The success of this approach depends upon various factors including the cultural comfort of respondents with nominating neighbors for a research study, the response rate effects of being approached on the basis of a referral, and the accuracy of network responses. Failure to identify members of the network may result in biased estimation. Deriving weights may be complex, and design effects may be substantial. Because the seriousness of many of these threats to validity and efficiency cannot be resolved *a priori*, there has been some caution about implementing network sampling on a large scale (Massey, 1993 and Waksberg, 2000).

As we were weighing these alternatives and thinking about efficient use of bilingual staff, a third strategy became apparent: stratified random sampling of household by expert rating**.** Considering the large area of our population,

we asked our primary community expert to indicate the blocks that were most densely populated with Cambodians so we could effectively utilize our bi-lingual staff by assigning them those dense blocks rather than visiting blocks with many ineligibles. Using this strategy, we could assign our least dense blocks to our monolingual English speaking screeners. We asked our primary community expert to drive or walk each block. As our expert was reporting progress, we realized that we could utilize his knowledge even more effectively. Specifically, rather than merely assess whether blocks were densely populated with our target group, we wondered whether our expert could assess the likelihood that individual dwelling units housed persons eligible for the study. In fact, our expert believed that he could differentially rate individual dwelling units with respect to the likelihood that a given unit contained potentially eligible persons. Using his knowledge of cultural practices as well as the neighborhoods, he believed that he was able to identify Cambodian households by visual observation of markers of cultural characteristics. Illustrative markers include sandals or shoes outside the house, lemon grass, bamboo or banana trees in the front yard, or a visible Buddhist altar on the front porch. He also believed that he could make determinations by talking to neighbors or landlords and by knocking on doors to speak with some people. We decided that this strategy was likely to be the most cost effective. So, for the second stage of our three-stage approach, we selected stratified random sampling of households by expert rating. For each dwelling unit, the expert was asked to indicate whether it had a high or low probability of housing an eligible participant.

4.2 Classification of households

The use of the hand held computers had additional benefits. By re-loading the computers with the previously enumerated addresses, we could systematically guide our expert to each household. In addition, by programming a data entry screen to accept an entry for each household, our expert was able to classify dwelling units into one of two strata: 1) high probability DU's (18% of all DU's) and 2) low probability DU's (82%).

4.3 Sampling rates by stratum

To continue to strive toward efficient application of staff, and in the interest of cost efficiency, our new strategy called for under sampling low probability DU's for efficiency and to correct for under sampling with weights in the final analysis. We chose to approach all high probability DU's, and to approach a subsample of low probability DU's. All eligible persons found in low probability households would need to receive weights inversely proportionate to their under sampling rate (unless they were found to be exchangeable with eligible persons in high probability households in subsequent modeling). So, the rate of under sampling could not be too extreme without resulting in large design effects, especially if a non-trivial proportion of eligible persons lived in low probability households. Initial estimates ultimately led to a sampling rate of 1 in 4 for low probability DU's.

Reliance on expert judgments requires, of course, that the expert be able to discriminate well. Degree of accuracy would guide our sampling of high and low probability households. For example, if we had believed that estimates would be perfect, we could have sampled 100% of the high probability designated DU's and 1% of low probability DU's as a check on that assumption. Lower rates of sampling low probability units produce greater cost savings in screening, but at a risk of larger design effects. We expected that our rater would be relatively good at making these determinations but we would not know the degree of accuracy without an initial trial period. We undertook this approach realizing that initial assumptions about accuracy could be tested in the first replicate and that any required adjustments could be made in later replicates. As discussed below, the strategy of using expert judgments for stratification purposes proved quite successful.

4.4 Performance of the expert ratings

By the end of the first replicate, it became apparent that the response rate was so high and the stratification of households by expert rating so successful that we ended up using only the first replicate and a random 42.5% sub sample of the second replicate. This strategy had the effect of making the first stage in what was ultimately a three-stage random sample equivalent to a 37% simple random sample of blocks.

Over 99% of selected households were successfully screened for eligibility. As it turns out, 58% of high probability DU's contained eligible persons, whereas only 2% of low-probability DU's contained eligible Cambodians. Thus, about 86% of eligible persons lived in the high probability households. False positives probably were attributable

primarily to the difficulty in distinguishing eligible and ineligible Cambodian households by external appearances. It would be difficult, for example, for the expert rater to determine age eligibility from external appearances of the DU. A secondary source of misclassification might be mobility between the timing of the expert rating and the actual household screening. Supporting this interpretation, well over half of the high probability households without eligible Cambodians contained ineligible Cambodians. False negatives were probably attributable primarily to mobility with difficulty in identifying less culturally typical eligible persons being a secondary source.

4.5 Sampling within households and response rates

In the third stage, an eligible individual was selected at random within households. Eighty-eight percent of selected individuals participated in the survey, for an overall response rate of 99% x 88% = 87%.

5. SUMMARY AND CONCLUSIONS

After defining individual and geographic eligibility criteria, we conducted a three-stage random sample of a Cambodian population in Long Beach, CA. The first stage was a simple random sample of blocks; the second stage was a stratified random sample of households (stratifying by expert classification of the likelihood of containing eligible individuals). The third stage involved a simple random sampling of one eligible individual within each household. This approach requires adjusting for clustering of households within blocks and design weighting for under sampling of eligible persons from low-probability households and households with more than one eligible, unless these characteristics are found to be exchangeable in modeling.

The innovative elements of this approach include the integration of census and expert data to define the area of interest, the use of hand-held computers for listing and recording expert ratings of household eligibility, and the use of these expert ratings as a basis for cost-effective stratified sampling of households. The use of expert ratings reduced the field time for screening and interviewing by at least 6 months, reduced field labor by more than 33% and allowed the few Cambodian-speaking staff to be used to approach mostly Cambodian DU's for screening and interviewing. The latter benefit, in all likelihood, boosted response rates, thus further reducing cost. Even after adjusting for design effects, substantial savings in cost per effective sample size are anticipated.

REFERENCES

Food and Agriculture Organization of the United Nations (2004), Available at http://faostat.fao.org/faostat/, Accessed February 22, 2005.

Kalsbeek, W. D. (2003), "Sampling Minority Groups in Health Surveys", *Stat Med*, 22(9), pp. 1527-49.

Kalton, G. (1993a), "Sampling Considerations in Research on HIV Risk and Illness", in D.G. Ostrow et al. (eds.) *Methodological Issues in AIDS Behavioral Research*, New York: Plenum Press.

Kalton (1993b), *United Nations Department for Economic and Social Information and Policy Analysis. National Household Survey Capability Programme: Sampling Rare and Elusive Populations. INT-92-P80-16E,* New York, NY: United Nations.

Massey, J. T., Judkins, D. and Waksberg, J. (1993), "Collecting Health Data on Minority Populations in a National Survey (Disc: P85-87)", *Am Stat Assoc Proc Sect Surv Res Methods*, pp. 75-84.

Rummel (1994), *Death by Government*, New Brunswick, NJ: Transaction Publishers.

Sirken, M. G., Inderfurth, G. P., Burnham, C. E. and Danchik, K. M. (1975), "Household Sample Surveys of Diabetes: Design Effects of Counting Rules", *Am Stat Assoc Proc Soc Stat Sect*, pp. 659-63.

Sirken, M. G., Graubard, B. I. and McDaniel, M. J. (1978), "National Network Surveys of Diabetes", *Am Stat Assoc Proc Sect Surv Res Methods*, pp. 631-35.

Sudman, S. and Kalton, G. (1986), "New Developments in the Sampling of Special Populations", *Ann Rev Social*, 12, pp. 401-29.

Sudman, S., Sirken, M. G. and Cowan, C. D. (1988), "Sampling Rare and Elusive Populations", *Science*, 240(4855), pp. 991-96.

Waksberg, J., Levine, D. and Marker, D. (2000), "Assessment of Major Federal Data Sets for Analyses of Hispanic and Asian or Pacific Islander Subgroups and Native Americans. Inventory of Selected Existed Federal Databases", Washington, DC: US Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation.