

# Probability-Based Survey Research on the Internet

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## 1. The Basic Problem

We start with the assumption that survey research samples are used to draw inferences about the total population of households in the United States. However, if the mode to be used is the Internet, there are serious problems of coverage which need to be addressed (Couper). For example, recent statistics indicate that only 42% of U.S. households are connected to the Internet. Any serious attempt to conduct national household surveys on the Internet needs to take into account this undercoverage. This paper describes the solution adopted by Knowledge Networks (KN).

## 2. The Adopted Solution

The KN solution, implemented now for almost two years, involves a rotating research panel (i.e., the panel is refreshed with new members continuously). Panel recruitment is a multi-stage process starting with a Random Digit Dialing (RDD) sample of households, followed by a reverse address match, and the mailing of an introductory letter and incentive to as many households as possible. The households are then recruited by telephone, resulting in a cooperation rate of approximately 56%. Once a household agrees to participate, KN delivers an Internet appliance (currently a WebTV unit), which essentially transforms the television in the household into a web-enabled monitor. All household members are recruited and all adults are given an initial profile survey to collect basic demographic information. The cost of the Internet appliance and monthly connection fees are borne by KN. In return, the household members agree to complete one survey a week.

The surveys are usually 5 to 15 minutes in length.

The novel challenge posed by this new approach is the coverage of households by WebTV, the Internet Service Provider (ISP) used by KN. Unfortunately, coverage is not universal; about 6-8% of households do not have local call access to one of the WebTV's dial-in telephone numbers, primarily in hard-to-reach rural areas. This percentage is diminishing steadily since in July 2001 KN began including a small sample in the panel from outside the WebTV ISP network.

Panelists are expected to participate for 23 years. Research on panel conditioning has not found any significant effects of panel tenure and survey activity on survey response. Panel attrition, which averages about 1-2% of the panel each month, is not substantially related to demographics, although younger persons and low-income households do attrite at slightly higher rates (Dennis, Marketing Research).

### **3. Response Rates**

This potentially represents one of the most challenging aspects of this new approach. Panel-based survey research tends to have lower overall response rates than cross-sectional survey research because there are multiple stages where nonresponse is introduced. The cumulative response rates obtained by KN (factoring in all stages of response) vary between 25% and 50%, depending upon design parameters specific to each survey. Surveys that include telephone-based nonresponse follow-up of a sample of panel recruitment nonresponders have had weighted overall response rates exceeding 50% (Wiebe). Other surveys conducted at lower costs and with shorter field periods have had unweighted overall response rates of 25-30%. The response rate for final stage of response, participation in the web-enabled survey, has an interquartile range of 70% to 85%. Final stage response rates by demographic groups are fairly constant, with no differences based on gender and education level, and with whites, older persons, and those without home Internet access (at time of panel recruitment) having slightly higher response rates (Dennis, AAPOR). In one key study of nonresponse, the inclusion of data from nonresponse followup of panel recruitment nonresponders did not affect the statistical estimates, suggesting that nonresponse bias is operating at a low level (Wiebe).

Under consideration is a new panel recruited by professional field staff by traditional in-person methods and based on an area probability sample frame. This approach is likely to make possible a cumulative response rate in excess of 70% and eliminate noncoverage of U.S households.

### **4. Panel Quality**

The KN panel closely tracks the U.S. Government's population estimates for gender (female: KN 51%; U.S. 51%), race (black: KN 11%, U.S. 12%), and Hispanic ethnicity (Hispanic: KN 9%, U.S. 11%). The KN panel does underrepresent slightly the elderly (55 and over: KN 19%; U.S. 28%) and low-income households (<\$25,000 annual income: KN 16%; U.S. 28%). The sample selection system, described next, does assure that survey samples correspond to U.S. population

estimates for key demographics variables.

## **5. Sample Selection from the Panel**

Drawing random samples from the panel is an important part of the process. If all surveys were based on national samples, the process would be much simpler. However, most KN surveys target subpopulations; once such samples are drawn, the remaining panel suffers an underrepresentation of those subpopulations. The implemented solution is to maintain and constantly update panel poststratification weights such that the weighted panel distributions match the most recent benchmarks from the most recent U.S. Government statistics. KN uses a 42-stratum cell weighting approach where the strata are defined by age, gender, region, race, ethnicity, and education. Samples are drawn with probabilities proportional to the panel weights using a systematic sample applied to the sorted panel members. The distributions for the panel samples resemble the national population distributions for the above-mentioned variables.

## **6. Weighting and Sampling Errors**

Sampling weights are calculated at the recruitment stage to account for variable number of telephone lines per household. These are used as inputs to the panel weights. Once the samples are drawn, assigned, and the data returned, we subject the final respondent data to a poststratification and nonresponse adjustment process. The final weights for most surveys are typically in the range of 5-8 (maximum/minimum). Sampling errors are due almost exclusively to the weights giving very low design effects, almost always less than 1.5.

## **7. Future Challenges**

This initiative launched by Knowledge Networks has been underway for almost two years during which time we have learned a great deal about its strengths as well as its weaknesses. Survey researchers should consider this as one more tool in the kit available for survey research. As methodological work progresses, we will be in a better position to judge precisely the conditions under which this new approach is most suitable.

## REFERENCE

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## SUMMARY

This paper describes the statistical approach adopted by Knowledge Networks for conducting probability-based surveys on the Internet in the U.S. Knowledge Networks has created a research panel recruited by Random Digit Dialing methodology, and equipped panel households with an Internet appliance for research participation. In addition, there is discussion of various dimensions of the approach: response rates, panel quality, survey sampling, and weighting.