Research Methodology Group
Department of Social Sciences
University of Duisburg-Essen

Viktimisierungsbefragungen in Deutschland. Band 2: Methodik und Methodologie

Sampling, Nonresponse and Weighting Methods for Victimization Surveys – Abstract –

Rainer Schnell & Marcel Noack

2016

We describe the design, sampling and weighting procedures of national general population samples for cross-sectional victimization surveys. The article starts with the definition of target, frame and inferential population. Due to the lack of complete sampling frames, overcoverage and undercoverage will occur. Despite best efforts, special subpopulations will be excluded either by definition or frame deficiencies. Examples for such subgroups are institutional populations (e.g. prisoners, people living in military installations or asylums) and people living in non-permanent dwellings (e.g. trailers, houseboats). Furthermore, there are clandestine populations which try to withdraw themselves from administrative acts. Most surveys exclude subpopulations suffering from serious health problems. Finally, in many practical cases implementation of victimization surveys members of language minorities will be excluded from almost all surveys. Since for these populations higher victimization probabilities are plausible, their exclusion will lead to different population estimates. Therefore, special attention has to be given to the documentation of the kind and size of the excluded population in victimization studies.

Given a suitable sampling frame, the choice of the actual selection method is the obvious next step. Of course, only probability samples will yield correct statistical inferences. Probability samples are defined by the fact that the selection probability for each element of the population can be calculated. Therefore, neither convenient samples (such as students) nor non-probability samples (such as quota-samples, ad-hoc web-surveys, web panels or snowball samples) can be justified mathematically. Since quota samples are widely misunderstood by non-experts as examples for stratified samples, we explain the correct of stratification at great length. For practical applications very often cluster samples are used (e.g. area samples), therefore we describe application and resulting effects (design effects) of clustered samples in detail. Most face-to-face general population surveys use combinations of stratification and clustering at different stages of selection. Most commonly all these different combinations are denoted as "complex samples".

Traditionally, only the standard error of the estimate is used to assess the precision of a survey result. This is misleading in more than one way. For example, naive calculations of standard errors are based on the assumption of simple random sampling. Since this assumption is rarely given in practice, these kind of calculations underestimate the true sampling variance. We demonstrate that by comparing all German polling results (1957-2013) with election results: Here the empirical coverage probability is 69% instead of the pretended 95%.

Modern assessments of survey error account for sampling and non-sampling error. The "Total-Survey-Error-model" explains the total error as the sum of the squared bias and the variance of an estimate. Usually, the components of the total survey error (specification bias, nonresponse bias, coverage bias, measurement bias, processing bias, sampling variance, measurement variance, data processing variance) are assessed separately.

Every data collection mode for victimization surveys has implications for sampling. The limitations set by available sample frames may seriously impact estimated victimization rates. Therefore, differences in victimization rates due to sampling frames are likely. For example, CATI surveys usually rely on variants of Random Digit Dialling, but – depending on the available information and the technical infrastructure – this sampling method might be inefficient. Under many jurisdictions, special techniques for mobile phones might be required, for example

the use of dual frame surveys. However, their application has to rely on additional information which usually has to be estimated. Face-to-face surveys usually either rely on population registries, address lists or on ad-hoc enumerations. Access to registries or address lists may be difficult in practice. Furthermore, registries and address lists suffer from over- and overcoverage. Ad-hoc enumerations and address lists suffer from various forms of interviewer error or interviewer cheating. The unavailability of population covering frames usually prevent the use of mail surveys for general population surveys. Finally, for web surveys in general no sampling frames are available. Therefore, with the exception of surveys within an organization, no probability sampling is possible and therefore the use of web surveys for victimization surveys has to be avoided. We discuss all these frame problems in considerable detail.

Of course, unit nonresponse is of utmost importance for victimization surveys. The statistical consequences of nonresponse depend on the missing data mechanism. The more recent statistical literature differentiates between missing completely at random (MCAR), missing at random (MAR) and missing not at random (MNAR). MCAR implies just a reduction in sample size without any bias. Despite its misleading name, MAR will cause biased estimates, if the sample is not corrected by the suitable statistical adjustments. These adjustments will work only if the missing data generating mechanism is modelled correctly by the adjustment method. There is ample evidence, that nonresponse in victimization survey is exactly of this type. For example, the response rates of very old and very young people in victimization surveys might be lower than the average; the response rates of victims might be higher that of non-victims. It has to be noted that in case of NMAR, there is no way of correcting for nonresponse which is based on data alone: very strong assumptions on the generating mechanisms have to be made. We are not aware of any study demonstrating a successful correction for MNAR in victimization surveys.

In general, the size of nonresponse bias depends on the amount of nonresponse and the nonresponse mechanism. There is no doubt that the amount of nonresponse has increased during the last 50 years of survey research. However, for unbiased estimates the differences between respondents and non-respondents is crucial. These differences may vary between different variables and different causes for nonresponse. In general, at least nonresponse due to (1) refusal, (2) non-contact and (3) illness should be analysed separately. Refusal can be explained by rational choice theory applied to low-cost decisions. Therefore, minimal cues in an interview situation may cause large differences in response rates. The inability to participate due to health related reasons will cause bias if health is related to the topic of the survey. An example for victimization surveys are persons which are unable to participate due to a victimization. Non-contacts might be the largest problems for victimization surveys. These persons might have higher victimization probabilities. Solutions include call-backs at different daytimes and the change of the interviewer in Face-to-Face surveys, associated with different contact strategies. To summarize, it is necessary to analyse the causes of nonresponse for every victimization survey

We report on a recent nonresponse study covering 49 German victimization surveys conducted in the new millennium. On average, a response rate of about 41% was observed. The cumulative effects of seemingly trivial details like prior notification, length of field period, incentives, conversion attempts etc. resulted in large differences in response rates. However, the response

rate alone is no direct evidence for the presence of absence of nonresponse bias.
Correcting for nonresponse is usually done by different weighting methods. All of them require additional information for auxiliary variables, hopefully related to the nonresponse mechanisms. The current state of the art is the calibration-approach. We explain in detail that weighting decreases nonresponse bias if and only if the weighting variables are highly correlated with the nonresponse mechanism. Demographic variables have to be shown to be sufficient for reducing nonresponse bias, there is no guarantee for this bias reduction. Finally, we mention the often neglected fact that the possible bias reduction might be more than compensated by the increase of variance to the weights.
The future of victimization surveys might be the concentration on very large, but methodological sound surveys. The financial resources required for such surveys will reduce their number.

This abstract refers to:

Schnell, R., Noack, M. (2015): Stichproben, Nonresponse und Gewichtung für Viktimisierungsstudien; in: Guzy, N., Birkel, C. and Mischkowitz, R. (Eds.): Viktimisierungsbefragungen in Deutschland, Band 2: Methodik und Methodologie, Wiesbaden: Bundeskriminalamt, pp. 8-75.

IMPRINT

Publisher

Research Methodology Group
Department of Social Sciences
University of Duisburg-Essen
Lotharstr. 65
47057 Duisburg
Germany

Editor

Prof. Dr. Rainer Schnell

Homepage

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