

Catalogue no. 12-001-X
ISSN 1492-0921

Survey Methodology

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Release date: June 30, 2025



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Comments on “Progress in survey science and practice: yesterday-today-tomorrow”

Constance F. Citro¹

Abstract

Carl-Erik Särndal’s essay on the challenges to the probability sample survey paradigm (or research tradition) quotes my 2014 article in this journal, which “impatiently” called for a move to a mixed data (or blended data) sources paradigm. I explain my intent not to downgrade probability surveys but to blend them with administrative records and other sources to improve data quality and relevance. The United States has made strides toward blended data since I wrote my article.

Key Words: Administrative records; Blended data; Sensitivity analyses.

I am honored to comment on Carl-Erik Särndal’s illuminating and thought-provoking reflections on the history of probability sample surveys for official statistics and other uses. His “conceptual and exploratory” essay places the science of probability surveys in a larger picture of the evolution of science. The essay gives comfort to survey theorists and practitioners that the challenges to the probability survey paradigm – or research tradition, to use Särndal’s preferred term – are not unique in the history of science. The essay may cause disquiet, nonetheless, because it illustrates that science does move on – paradigms that are universally accepted must evolve or die when their foundations are undermined, as has arguably happened with probability surveys given low response rates and high costs.

Särndal cites my article in this journal (Citro, 2014), which called on national statistical offices to move from the probability sample survey paradigm to a mixed data source paradigm for the future. He says my statement leaves much up to the reader to interpret and suggests a “frustration or impatience with the incumbent way of thinking”. I plead guilty on both counts and am glad to have this opportunity to further explain my thinking.

By urging movement to a mixed data source paradigm, more typically termed a “blended data” paradigm, I did not intend to exclude or even downgrade probability sample surveys, which remain critically important inputs to many of the estimates that users need from national statistical offices. There is no substitute for asking people their opinions, attitudes, and characteristics, such as their self-reported race or ethnicity or health status or what tasks they are doing concurrently (e.g., childcare and exercise via running/walking with a stroller). Moreover, despite the challenges to probability designs, nonprobability samples in my view have not demonstrated the ability to generate sufficiently robust estimates for official statistics. The theoretical and still often practical advantages of probability surveys for estimation are why I included “probability” as a modifier in the term “probability sample survey paradigm”.

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In the mixed or blended data paradigm that I support, sample surveys, designed to be as robust as possible given limitations of resources and the difficulties of obtaining adequate response, are often the “spine”, if you will, for blended datasets. The blended data paradigm also, importantly, includes other data sources, such as government and business administrative records or data scraped from the internet, to deal with the growing problem that respondents to surveys often fail to answer key questions or provide answers that are inaccurate. Years of research and experimentation have identified critical items that have intractable and, often, increasing levels of error – these items include elements of income, wealth, expenditures, and medical conditions, among others. What made me impatient with “the incumbent way of thinking” is the disproportionate effort that had been devoted, in my view, to issues of survey weighting and estimation to adjust for unit nonresponse bias and variability as compared to the effort devoted to incorporating data sources that would be more accurate than survey responses for key items.

Again, I did not intend to argue against effort on weighting and estimation but to argue *for* commensurate methodological effort by national statistical offices to appropriately integrate other data sources that could address severe reporting problems for key survey statistics. Effort is needed in such areas as: documenting and evaluating other data sources to deeply understand their uses and limitations; adapting processing systems to smoothly integrate other sources with survey responses, including projecting sources that are only available on a lagged basis forward in time; and developing measures of error for other sources that contribute to a total error measure in addition to the traditional measures of sampling and nonresponse error.

I wrote the article that Särndal quotes in 2014 from a U.S. context. At that time, U.S. official statistical series based on surveys, as many were and are, presented weighted survey results as if they were the desired outputs, even with serious reporting errors and often serious coverage errors (e.g., inability to capture the highest stratum of wealthy people in the sample). Statistical agencies did not typically determine first what outputs users needed and then what combination of data sources could best provide those outputs. An exception to publishing survey estimates despite serious errors are estimates of gross domestic product, personal income, personal consumption, and the like, produced within the conceptual framework of the National Income and Product Accounts. The goal for these estimates has always been completeness, which necessarily entails drawing on multiple survey and administrative records sources to obtain the best estimate for each component (see [NIPA Handbook: Concepts and Methods of the U.S. National Income and Product Accounts | U.S. Bureau of Economic Analysis \(BEA\)](#)).

I am happy to report that, in the 10 years since I wrote about a blended data paradigm, the U.S. statistical system has made important strides in that direction. Progress has been slowed by the legal barriers that impede ready access to needed federal, state, and local administrative records sources by agencies in the decentralized U.S. system. Development of blended datasets by U.S. statistical agencies is also often experimental at this point, which means that changes in priorities or budgets could snuff out promising developments. Nonetheless, the shift in viewpoints (see, e.g., National Academies of Sciences, Engineering,

and Medicine, 2017a,b; 2023a,b) and the multiplicity of proofs of concept are real and heartening. Box 1 summarizes an example of progress that parallels one of the examples in my 2014 paper of problems – namely, household income. Other examples include the planned use of administrative records to replace selected housing questions in the American Community Survey (see [Federal Register: Agency Information Collection Activities; Submission to the Office of Management and Budget \(OMB\) for Review and Approval; Comment Request; American Community Survey and Puerto Rico Community Survey](#)) and regular linkages of administrative records (e.g., Medicare and Medicaid) with the National Center for Health Statistics' health surveys (see [NCHS Linked Data Table \(cdc.gov\)](#)).

BOX 1 – Blended Data for Improved Income Estimates

The U.S. Census Bureau's flagship survey of income and poverty, the Current Population Survey Annual Social and Economic Supplement (CPS ASEC), is known to have high levels of missing and misreported (largely underreported) income for many sources. At present, nearly 40 percent of total household income is imputed in the CPS ASEC, and yet, for property, retirement, and transfer income, there remains substantial net underreporting. The Census Bureau has conducted extensive research documenting these phenomena but until recently had not committed to using administrative data to address the situation. In February 2023, building on years of research, the Census Bureau launched the National Experimental Well-being Statistics (NEWS) program to improve income estimates by blending administrative and survey data. This first set of statistics estimated income from the CPS for 2018 by using a wide variety of administrative sources to improve weighting and imputations and to adjust for underreporting. The effect was dramatic – median household pre-tax money income increased by over 6 percent and official poverty decreased by 1.1 percentage points compared to the published statistics; median household pre-tax money income for householders aged 65 and over increased by over 27 percent and their poverty rate declined by 3.3 percentage points. Next steps include bringing the series up to date and addressing sources of income, particularly self-employment, that are not well measured in either surveys or administrative records.

Reference: [sehsd-wp2023-02.pdf \(census.gov\)](#).

Särndal's essay focuses on the challenges to probability sample design and estimation, given the costs to achieve a decent response rate and the fact that bias and variance often remain higher than users would like. I support the probability framework but have no ready answer to these challenges. I do suggest, for both probability and nonprobability designs, that the statistical and survey methods profession develop standards to help users understand the weight to give to one or another set of estimates. For example,

standards could specify the minimum amount and types of sensitivity analyses (such as varying assumptions about reporting accuracy for a key item or adequacy of coverage of a population group) that data producers should perform and document for users to have reasonable confidence in the data. Standards could also call for publishing estimates, when response rates are very low and representativeness is suspect, in the form of “10-15 percent [or even 10-20 percent] of the population says this or that”. Such formulations would account not only for traditional sampling error, but also for the results of sensitivity analyses or other ways of calculating total error. (See Box 2 for an example of the kind of data series that could benefit from such standards.)

BOX 2 – The U.S. Household Pulse Survey

Multiple federal agencies, led by the U.S. Census Bureau, conceived, designed, and implemented in record time the Household “Pulse” Survey (HPS) to provide timely information on the effects of the COVID-19 pandemic on mental health, employment, child care arrangements, and many other topics. (There is also a Small Business Pulse Survey and, more recently, a School Pulse Panel.) In its first phase, the HPS was administered weekly beginning April 23, 2020, through July 21, 2020, using an internet questionnaire. Subsequent phases have two weeks of data collection followed by two weeks “off”. Data are released within 10-14 days of data collection. The samples of about 1 million households for each collection period are drawn from addresses on the Census Bureau’s Master Address File that have email and/or telephone contact information (about 86% of the total). Response rates are low – 5-10 percent – and representativeness cannot be guaranteed, as the Census Bureau acknowledges on its website, even with nonresponse and coverage weighting adjustments. The estimates are labeled as “experimental”. While not feasible initially, given the overriding goal of fast implementation and release of estimates, the Household Pulse Survey could benefit from sensitivity analyses to capture the wider variability and greater bias inevitable with the design used.

Reference: [Household Pulse Survey \(COVID-19\) \(census.gov\)](https://www.census.gov/hhes/survey/2020/hps.html).

In conclusion, Särndal has written a thoughtful and thought-provoking essay. I look forward to the next steps in the evolution of probability sample surveys – for use as stand-alone datasets and as part of a blended data approach to producing more complete and accurate estimates of key quantities by national statistical offices.

Acknowledgements

The viewpoints expressed in these comments are solely the author’s and should not be attributed to the National Academies.

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