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The Influence of Nonresponse Bias in Juvenile Court Case Estimates Produced by the National Juvenile Court Data Archive

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Nonresponse Bias in Juvenile Court Case Estimates

Bias is the difference between an estimate and the actual population value. Nonresponse bias associated with an estimate consists of two components—the amount of nonresponse and the difference in the estimate between the respondents and nonrespondents. The best way to avoid bias for traditional surveys is to improve response rates by using methods such as intensive refusal conversion techniques, incentives, multiple modes of data collection, flexible scheduling, and interviewer training. The National Juvenile Court Data Archive (Archive) cannot reasonably employ all these strategies, but nevertheless has managed to improve its data coverage. However, despite best efforts, nonresponse does occur. While it may not be possible to get an exact measure of the bias, nonresponse bias analyses form an integral part of the overall assessment of data quality.

Some of the Archive's nonresponse is caused when a state does not have a data system that captures case-level data on its delinquency and status offense cases. Several states do not have statewide systems that capture detailed case-level data. On occasion, a state may have a data system, but does not have the capability to extract data to submit to the Archive either because of a lack of staff resources or a technical inability. In some states, the Archive has identified one or more counties that are able to contribute data. The strategy is used sparingly, since data processing costs are the same whether the file is for an entire state or a single county.

The Archive's estimates are not based on a probability sample, thus its weight adjustments are not probability-based but are based on the population characteristics of nonresponding jurisdictions. In weighting case records to produce estimates, an assumption is made that the responding counties are similar to the nonresponding counties. The procedure used is similar to that used by the FBI and BJS to produce arrest estimates (described in the Methods tab of the Arrest Data Analysis Tool <http://www.bjs.gov/index.cfm?ty=datool&surl=/arrests/index.cfm>). The Archive's estimation procedure is described in detail in the methods section of *Juvenile Court Statistics*.

Evaluation of the bias in the Archive's estimates is difficult because the true value of the population parameter is unknown. A nonresponse bias analysis can quantify the estimated nonresponse bias and identify potential sources of nonresponse bias on estimates. Nonresponse bias analyses serve as an indicator of the quality of the data collected and can help reassure data users, as well as the agency collecting and releasing data, of the quality of the data available.

Methods for Analyzing Nonresponse Bias

Several accepted methods for analyzing nonresponse bias are appropriate for the Archive's national estimates released through the *Juvenile Court Statistics* reports and Easy Access to Juvenile Court Statistics.

Analysis Method	Description and Feasibility	Question Answered
Examination of response rates	<p>The NCES standard is that any overall response rate less than 70% requires a nonresponse bias analysis.</p> <p>The Archive's response rate can be viewed in several ways</p> <ul style="list-style-type: none"> - population coverage, - proportion of counties reporting data included in the analysis, - item nonresponse (missing data). 	Is there enough nonresponse to cause concern?
Comparison of survey estimates to external estimates	<p>Estimates from a survey are compared to estimates from other sources.</p> <p>Historically, the Archive has compared estimates of "cases referred by law enforcement" with FBI data on "arrests referred by law enforcement to juvenile court." However, those data are no longer well reported in the FBI's UCR sample.</p>	Are the estimates reasonable?
Comparison of respondents to nonrespondents on other factors	<p>Another way to identify those responders who are most 'like' the nonresponders is to compare them on variables thought to be related to the variables being estimated.</p> <p>The Archive can compare counties on any number of variables included in Census data collections or perhaps FBI arrest rates (there are also nonresponding counties).</p>	Are responders similar to nonresponders on factors related to the estimates?
Comparison of 'early' responders to 'late' responders	<p>One way to identify those responders who are most 'like' the nonresponders is to compare early to late responders. The key assumption in such an approach is that later responders to a survey are more similar to nonresponders than are earlier respondents.</p> <p>The Archive could instead compare better vs. weaker information systems. We can also look at the impact of fewer responders on the estimates.</p>	Are early responders similar to late responders (and presumably nonresponders)?
Follow-back surveys	<p>Follow-back surveys are designed to collect at least some key or critical variables either from all or a randomly selected sample of nonrespondents.</p> <p>The Archive does seek out aggregate case counts from jurisdictions unable to provide detailed data. These aggregate case counts are incorporated into the estimates, but could be analyzed separately</p>	Are responders different than nonresponders?
Comparison of estimates using base and nonresponse adjusted weights	<p>Examine estimates using both the base and nonresponse adjusted weights. If there are large differences, it is possible that the adjustment did indeed reduce the bias in estimates. If there are no differences, it is possible that the original respondent sample was not very different from the nonrespondents, and so there was not much bias at the start.</p> <p>The Archive can conduct such analyses, but doing so will have an impact on the production schedule.</p>	What is the effect of nonresponse adjustments?

Methods Currently Used by the Archive

Examination of response rates—overall response rate/data coverage. The National Center for Education Statistics (NCES) requires a nonresponse bias analysis for any collection

with an overall response rate below 70%. Applying this threshold to the Archive shows that the Archive achieves above 70% across most measures of response rate or coverage.

The Archive’s estimation procedure uses both case-level and county aggregate data. Delinquency case data are reported by jurisdictions representing more than 80% of the population of youth ages 10 through upper age and status offense data are reported by jurisdictions representing 77% of the population ages 10 through upper age. As a percentage of counties, the figures are a bit lower, but exceed the 70% threshold except when considering the “case-level data only” for status offense cases (67%). The proportions are similar when considering states as the reporting unit (76% for delinquency cases and 73% for status offense cases).

2014 Delinquency Data							
Stratum	County 10-17 pop	Counties	Reporting counties				
			Case level	Percent of counties	Case level + aggregate	Percent of counties	Percent of population
Total		3,142	2,256	72%	2,415	77%	84%
1	<13,531	2,664	1,889	71	2,033	76	77
2	13,531--48,800	334	247	74	259	78	79
3	48,801--121,000	109	86	79	89	82	82
4	>121,000	35	34	97	34	97	98
2014 Status Offense Data							
Stratum	County 10-17 pop	Counties	Reporting counties				
			Case level	Percent of counties	Case level + aggregate	Percent of counties	Percent of population
Total		3,142	2,108	67%	2,267	72%	77%
1	<13,531	2,664	1,778	67	1,922	72	72
2	13,531--48,800	334	225	67	237	71	72
3	48,801--121,000	109	73	67	76	70	71
4	>121,000	35	32	91	32	91	94

The Archive’s estimation procedure groups counties by population quartiles. Whether one considers the response percentage as either the percentage of counties reporting or the percent of the population covered by reporting jurisdictions the Archive achieves 70% reporting or better. Applying the National Center for Education Statistics standard that requires nonresponse bias analysis whenever an overall response rate is less than 70% would mean that no nonresponse bias analysis is required.

Examination of response rates—item nonresponse. Gross item response proportions across the sample of jurisdictions contributing data used in the estimations are shown in the table below, which is included as part of table A-3 in the Methods appendix of the *Juvenile Court Statistics* report.

Percentage of reporting sample providing variables used in <i>Juvenile Court Statistics</i>									
Data Year	Age at referral	Gender	Race	Referral source	Referral reason	Secure detention	Manner of handling	Adjudication	Disposition
2014	98%	98%	94%	68%	97%	37%	100%	97%	86%
2013	97%	98%	93%	69%	97%	41%	100%	93%	84%

The most missing variable is secure detention, followed by referral source, followed by disposition. These higher item missing variables suffer from what we refer to as “format missing” meaning that the data format submitted to the Archive simply does not contain the variable. For example, some of the Archive’s data providers do not have detention information that is tied to a specific case if the youth is involved in multiple cases or the data provider may only be able to provide detention admissions. Others do not have dates of detention that allow us to determine whether the detention was between referral to court and disposition. And others simply do not have detention information in their information systems at all. For this reason, Archive staff have targeted specific jurisdictions to include detention information with their submission, which will reduce the item missing for detention substantially. Table A-3 in the Methods appendix of the *Juvenile Court Statistics* report indicates which states are format missing for which variables (they are indicated by “-” cell entries).

Comparison of survey estimates to external estimates. In the past the Archive routinely made comparisons between its estimates of delinquency cases referred by law enforcement and the FBI’s reported data on disposition of juvenile arrests, specifically arrests referred to juvenile court. The FBI, unfortunately, no longer distinguishes arrests referred to juvenile court. Instead they distinguish arrests handled within the department from other dispositions which include all of the following lumped into one group: turned over to juvenile court, probation department, welfare agency, other police agency, and criminal adult court. Thus, comparison to the FBI’s disposition of juvenile arrests is no longer feasible.

Comparing Archive data on delinquency cases in which the youth was ordered to residential placement following adjudication to estimates from the CJRP on youth committed to residential placement following adjudication may also shed some light. The comparisons can’t be made directly because the Archive estimates are annual and the CJRP estimates are 1-day counts. Looking at demographic characteristics for selected offenses categories shows that the profiles are remarkably similar (table below). Broader offense categories (e.g., delinquency, aggravated assault) have somewhat less similar profiles than the more narrow categories, but even so all are within 5 percentage points.

Similarly, comparing Archive data on delinquency cases in which the youth was securely detained between referral to court and disposition to estimates from the Census of Juveniles in Residential Placement (CJRP) on youth detained in a locked facility awaiting adjudication or disposition may shed some light on bias in two of the variables with higher item missing percentages. Again, the comparisons can’t be made directly because the Archive estimates are

annual and the CJRP estimates are 1-day counts. Although the detention variable is arguably the weakest variable for the Archive’s estimates, here too, the data show that the two data sources produce estimates with similar characteristics.

2013 Data	CJRP 1-Day Count Committed Youth	Archive Annual Count Cases Placed	CJRP 1-Day Count Detained Youth	Archive Annual Count Cases Detained
Delinquency				
Percent male	87%	83%	83%	79%
Percent black	38	40	38	42
Percent 16-years-old	25	28	27	28
Robbery				
Percent male	95	94	94	90
Percent black	66	69	69	72
Percent 16-years-old	24	29	31	30
Aggravated assault				
Percent male	86	82	81	76
Percent black	47	47	42	45
Percent 16-years-old	23	26	27	25
Burglary				
Percent male	95	94	90	93
Percent black	44	44	49	48
Percent 16-years-old	25	28	29	28
Motor vehicle theft				
Percent male	85	85	86	81
Percent black	39	40	46	**
Percent 16-years-old	30	30	27	**
Drugs				
Percent male	84	85	85	84
Percent black	25	26	33	30
Percent 16-years-old	26	31	30	30

If the Archive’s estimates suffered from substantial bias caused by nonresponse, one would expect a significantly greater difference between the profiles stemming from the Archive and those from CJRP data.

Possible Additional Methods

Compare respondents to nonrespondents on other factors. Another means of assessing bias would be to compare jurisdictions on variables that are available for both respondents and nonrespondents from other data sources and are associated with the estimates being assessed. Archive data used as part of the estimation procedure are collected at the county level. The project does not receive data from all possible counties; in 2013, we received some type of delinquency data from 77% (more than 2,400 counties) of all counties in the U.S. We can evaluate bias in the sample by comparing the characteristics of counties in our reporting sample

on factors associated with delinquency to those not in the sample. For example, we can evaluate the racial composition of the reporting sample with non-participating jurisdictions to determine if our sample over (or under) represents particular subgroups, such as African-American youth. Such a comparison could be expanded to include other factors associated with delinquency, such as poverty (which is available at the county level), and arrest estimates (county level data is not available for all counties).

The analysis would provide a better understanding of the ways in which the responding counties are similar and different from the nonresponding counties. This information might be able to be used to make adjustments to the estimation procedures and nonresponse weighting.

Comparing ‘early’ respondents to ‘late’ respondents. An analysis that compares responses of early responders to those of late responders is intended to determine whether substantial differences exist between the two that would hint at substantial differences between responders and nonresponders. The basic assumption is that late responders are similar to nonresponders. The Archive can make such a comparison but for the Archive a more meaningful analysis might be to compare submissions from “better” versus “weaker” information systems. It would also be possible to test the impact of fewer submissions on the estimates to determine whether there is a coverage/response rate threshold that must be achieved (below which the estimates are unstable or obviously biased).

Follow-back surveys. The Archive routinely gathers critical case counts from nonresponding jurisdictions. County-level aggregate counts of petitioned and nonpetitioned delinquency and status offense cases are pulled from state or county annual statistical reports or websites. The Archive incorporates these aggregate case counts into the estimation procedures, but they could also be analyzed separately to compare case rates with fully responding counties and national estimates. Conducting additional analyses using these aggregate data that are part of the Archive’s routine data collection would not require a great deal of additional work. Additional efforts could be taken to obtain critical counts from a sample of nonresponding jurisdictions, but this would involve substantial effort and thus cost.

Comparison of estimates using base and nonresponse adjusted weights. This type of analysis is intended to determine the effects of nonresponse adjustments. For the Archive this would require writing a substantial amount of new code to create estimates that do not adjust for nonresponse. Not only would a substantial amount of effort/cost be involved, but it would delay the production schedule as it would involve a substantial amount of programmer time. Taking this course of action would need to be weighed against what additional information would be learned from doing so.

Next Steps

The relative priority of the possible additional analyses must be weighed against the priority of improvements to timeliness in the development of annual estimates. The additional cost factors associated with the additional analyses for a grant with limited funding must also be considered. Funds diverted for additional analyses to occur would harm the core tasks associated with data collection, processing and distribution. Therefore, at this time no additional analyses beyond those currently employed are planned.