

Identifying and Mitigating Nonresponse Bias in School Surveys During COVID-19: --The 2021 Adolescent Behaviors and Experiences Survey (ABES) Case

Ronaldo Iachan, [Xiaoyi Deng](#), Lee Harding, Alice Roberts
ICF



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Objectives

- Identify potential nonresponse bias in ABES
- Mitigate potential nonresponse bias to provide valid survey estimates



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Adolescent Behaviors and Experiences Survey (ABES)



The ABES was a CDC-sponsored national student survey that assessed risk behaviors and experiences during the COVID-19 pandemic. It was administered online in the spring of 2021.



- Tobacco, alcohol, and drug use
- Risky sexual behavior
- Behaviors that result in unintentional injuries and violence
- Unhealthy dietary behaviors
- Physical inactivity

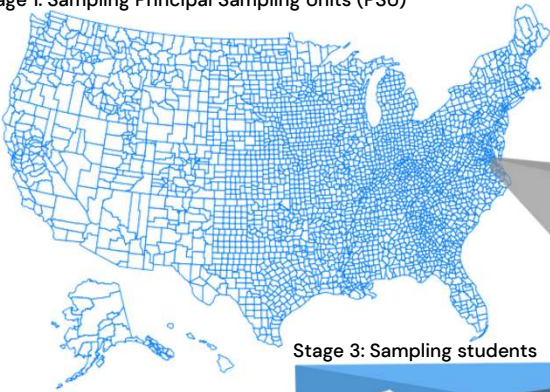


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Selecting a national representative sample of high school students

Stage 1: Sampling Principal Sampling Units (PSU)

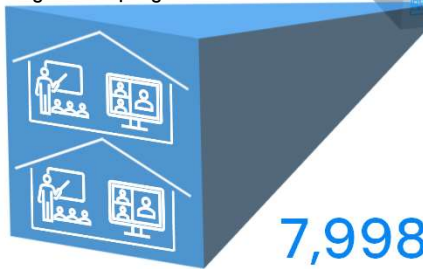


Stage 2: Sampling schools



128/339

Stage 3: Sampling students



7,998/16,037



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Low school level and student level response rate in ABES

School response rate : 38%

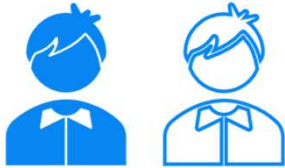


Student response rate : 50%



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Low response rate could indicate potential nonresponse bias



$$\text{Bias}(\bar{y}_r) = \left(\frac{M}{N}\right)(\bar{Y}_r - \bar{Y}_m)$$

Nonresponse bias is a function of the amount of nonresponse and differences between the nonrespondent and respondent subgroups with respect to characteristics estimated by the survey.



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Our Research

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Methods

- Identify potential nonresponse bias in ABES
 - Comparison of participating vs nonparticipating school characteristics
 - Multivariate adjusted logistic regression model on school participation

- Mitigate potential nonresponse bias to provide valid survey estimates
 - Nonresponse adjustments
 - Post-stratification weighting adjustments



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Comparison of participating vs nonparticipating school characteristics



- Geography: census region, urban status, collapsed NCES locale
- Socioeconomic: poverty level, title 1 dollar allocation, AIM Per Pupil Expenditure, Affluence
- Demographics: percent Black, percent Hispanic
- Others: school type, school size, instructional model



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Geography: Midwest, rural, and non-city schools have higher response rates



- **Census region:** **Midwest** schools responded at a higher rate (56.9%) compared to schools in the Northeast (27.5%), South (38.0%), and West (28.2%) census regions.
- **Rural vs Urban:** Schools in **rural areas** have a higher response rate (44.2%) compared to schools in urban areas (31.1%).
- **Collapsed NCES Locale:** Schools in **non-city areas** have a higher response rate (41.7%) compared to schools in city areas (29.4%).



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Socioeconomic: schools with lower socioeconomic status responded at a higher rate



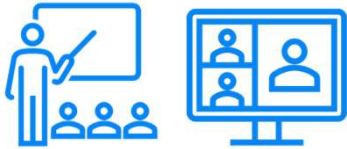
- **Title 1 Dollar Allocation per student:** Schools with **Title 1 dollar allocation per student equal to or greater than 150 dollars** responded at a higher rate (41.7%) compared to schools with less than 150 dollars Title 1 dollar allocation per student (25.9%).
- **Poverty Level:** Schools with **higher percentage of students below poverty level** responded at a higher rate (45.7%) compared to schools with lower percentage of students below poverty level (28.4%).
- **AIM Per Pupil Expenditure:** below vs. above median
- **Affluence:** Low/Below Avg vs. Avg vs. Above Avg/High



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Demographics and other characteristics: schools using virtual instruction responded have a higher response rate



- School % Black: below vs. above median
- School % Hispanic: below vs. above median
- School type: public vs non-public
- School size: large vs small
- **Instructional Model:** Schools using 100% **virtual** instruction responding at a higher rate (65.1%) compared to schools with traditional in-person (7.7%) or hybrid (42.9%) instructional models.



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Comparison of participating vs nonparticipating school characteristics



- Geography: **census region, urban status, collapsed NCES locale**
- Socioeconomic: **poverty level, title 1 dollar allocation**, AIM Per Pupil Expenditure, affluence
- Demographics: percent Black, percent Hispanic
- Others: school type, school size, **instructional model**



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Logistic regression model on school participation: predictors

- Census Region
 - Urban Status
 - Collapsed NCES Locale
 - Title 1 Dollar Allocation
 - Poverty Level Indicator
 - Instructional Model
 - School type
- **Census region:**
 - Midwest vs West,
 - Northeast vs West,
 - South vs West
 - **Collapsed NCES locale:**
City vs Non-City
 - **Poverty level:**
Above median vs Below median
 - **School type:**
Public vs Non-public



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Logistic regression model on school participation: results

Effect	Comparison	Odds Ratio	(95% CI)
Census Region	Midwest vs West	3.51	(1.65,7.46)
	Northeast vs West	1.21	(0.49,2.98)
	South vs West	1.26	(0.69,2.40)
School Type	Non-Public vs Public	0.36	(0.14,0.96)
Collapsed NCES Locale	City vs Non-City	0.48	(0.28,0.83)
Poverty Level	Above Median vs Below Median	2.74	(1.66,4.53)



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Mitigating potential nonresponse bias in weighting adjustment

- Nonresponse adjustment to sampling weights to account for nonparticipating schools. Variables used to adjust the sample weights are **census region**, **school type**, **collapsed NCES locale**, and **poverty level**.
- Post-stratification to national student estimates by Grade



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Conclusions

- Differences in geography and socioeconomic characteristics observed between participating and nonparticipating schools are significant, suggesting potential nonresponse bias.
- However, with nonresponse adjustment developed with school level data from participating and nonparticipating schools, nonresponse bias potential could be minimized.



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Get in touch with us:

Xiaoyi.Deng@icf.com
Ronaldo.lachan@icf.com
Richard.L.Harding@icf.com
Alice.Roberts@icf.com

icf.com

- [linkedin.com/company/icf-international/](https://www.linkedin.com/company/icf-international/)
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