

Misclassification of Fourth-Grade Children's Participation in School-Provided Meals Based on Parental Responses Relative to Administrative Daily Records

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ABSTRACT

Although many studies have relied on parental responses concerning children's school-meal participation, few studies have evaluated parental response accuracy. We investigated misclassification of fourth-grade children's participation in school-meal programs based on parental responses relative to administrative daily records using cross-sectional study data collected for 3 school years (2004-05, 2005-06, and 2006-07) for 1,100 fourth-grade children (87% black; 52% girls) from 18 schools total in one district. Parents reported children's usual school-meal participation on paper consent forms. The district provided administrative daily records of individual children's school-meal participation. Researchers measured children's weight and height. "Usual participation" in breakfast/lunch was defined as $\geq 50\%$ of days. Parental responses misclassified 16.3%, 12.8%, 19.8%, and 4.7% of children for participation in breakfast, classroom breakfast, cafeteria breakfast, and lunch, respectively. Parental responses misclassified more children for participation in cafeteria than classroom breakfast ($P=0.0008$); usual-participant misclassification probabilities were less than nonusual-participant misclassification probabilities for classroom breakfast, cafeteria breakfast, and lunch ($P<0.0001$ for each) (two-proportion z tests). Parental responses concerning children's participation were more accurate for lunch than breakfast; parents overstated breakfast participation (both classroom and cafeteria) and lunch participation. Breakfast participation misclassification was not related to body mass index ($P=0.41$), sex ($P=0.40$), age ($P=0.63$), or socioeconomic status ($P=0.21$) (multicategory logistic regression controlling for school year, breakfast location, and school). Relying on parental responses concerning children's school-meal participation may hamper researchers' abilities to detect relationships that have policy implications for the child nutrition community. The use of administrative daily records of children's school-meal participation is recommended.

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PARENTAL RESPONSES CAN EFFICIENTLY MEASURE children's participation in the School Breakfast Program (SBP) and National School Lunch Program (NSLP). National surveys and other studies have relied on parental responses to investigate various relationships with school-meal participation, including children's body mass index (BMI) and food insecurity.¹⁻⁹

Although research has relied on parental responses concerning children's school-meal participation, few studies have evaluated parental response accuracy. Those studies raise questions about parents' accuracy. In one study,¹⁰ 24% of parents gave incorrect responses for children's SBP participation compared with study records consisting of nametag records of SBP participation compiled by researchers for direct meal observations. In another study, parental responses concerning children's school-meal participation

were more accurate for 1-day or 1-week's participation than for annual participation, and more accurate for NSLP than SBP participation relative to school-district administrative records.¹¹ In one study, parental response accuracy was 74% for SBP participation and 92% for NSLP participation compared with study records consisting of nametag records of school-meal participation compiled by researchers for direct meal observations.¹² In another study,¹³ when asked to report the number of days per week that children usually ate school lunch, parents reported higher levels of NSLP participation than administrative data.

Because parents may inaccurately report children's school-meal participation, studies relying on parental responses may provide erroneous or conflicting results. For example, there is concern that childhood obesity may be related to school-meal participation.¹⁴⁻¹⁹ Several studies investigating this

relationship in children attending elementary school have used parental responses for school-meal participation^{3,4,6,12} and have provided conflicting results. Specifically, they found a positive association between NSLP participation and BMI³; no association between NSLP participation and overweight status⁴; an inverse association between SBP participation and BMI, but no association between NSLP participation and BMI⁶; and a positive association between SBP participation and BMI, but an inverse association between NSLP participation and BMI.¹² In contrast, two studies^{20,21} that based participation on more objective measures (ie, administrative records and study records, respectively) found no association between fourth-grade children's BMI and participation in SBP and/or NSLP.

We used data from a dietary-reporting validation study²² to investigate misclassification of children's participation in school-meal programs based on parental responses relative to administrative daily records. A basic premise is that administrative data on children's school-meal participation are accurate. This is reasonable, although schools and districts do make errors as found in published studies.^{5,23}

METHODS

The University of South Carolina's institutional review board approved this project. Written parental consent and child assent were obtained. Because data collection methods for the dietary-reporting validation study are described in detail elsewhere,²² we provide only a summary.

Cross-sectional data were collected over 3 consecutive school years (2004-05, 2005-06, and 2006-07) with fourth-grade children from 18 public elementary schools total in one district in Columbia, South Carolina. The district provided school meals using a nutrient-based menu planning approach that complied with national standards.²⁴ Menus followed 4-week cycles and included choices (eg, entrée and milk flavor); à la carte items were sold. The district had implemented the offer-vs-serve provision, so children could refuse some meal items.²⁴ Data were collected during school year 2004-05 in 17 schools, school year 2005-06 in 16 of the same schools plus an additional school, and school year 2006-07 in eight schools involved during the previous 2 school years. (School year 2006-07 had fewer schools because data collection needs were less.) Researchers identified schools based on high average daily participation in SBP and NSLP; each school principal provided permission for data collection, renewing it each subsequent school year. For the 3 respective school years, 74%, 76%, and 72% of children invited to be in the study agreed.

Each school year, each school's principal determined the SBP breakfast location as classroom or cafeteria. The location was unchanged for a school year. For school years 2004-05 and 2005-06, the location was classroom for six schools and cafeteria for 11 schools. For school year 2006-07, the location was classroom for seven schools and cafeteria for one school. One school changed its breakfast location from cafeteria for the first 2 school years to classroom for the third. Breakfast was scheduled before the school day began irrespective of location.

Parents answered questions on paper consent forms about children's usual participation in school-provided meals. The [Figure](#) provides questions and response options. Instead of contacting parents directly, researchers distributed consent

and assent forms in classes, read the assent form aloud, and asked children to take forms home for parents to complete and return signed forms to class several days later.

Parents granted permission on consent forms for the district to release information to researchers about children's daily participation in school-provided meals. Administrative records from the district provided information about individual children's daily participation (ie, receipt of a reimbursable school meal) in breakfast and lunch on 180 possible school days during children's fourth-grade school year.

On a morning during the spring of children's fourth-grade school year, researchers measured children's weight and height using standardized procedures^{25,26} with digital scales (LifeSource Precision Health Scale UC-321, A&D Medical) and portable stadiometers (PE-AIM-102 Portable Adult/Infant Measuring Unit with Knitting Needle Technology, Perspective Enterprises, Inc). Intermeasurer reliability was assessed daily for pairs of researchers on a random sample of 10% of children; intraclass correlation reliability was >0.99 for weight and height each school year.²⁰ Children's age was calculated by subtracting birth date (from school records) from measurement date. After calculating BMI, for descriptive purposes, BMI percentile was determined using age/sex BMI charts,²⁷ and children were categorized as defined in [Table 1](#).²⁸

Data were analyzed using SAS/STAT software (version 9.2, 2002-2008, SAS Institute Inc). Parental responses concerning children's participation in school-provided breakfast and lunch were categorical and coded "1" for "usual participant" or "0" for "nonusual participant" (see the [Figure](#)). For breakfast, parents had to select "at school" for responses to be coded "usual participant." For lunch, parents had to select "from the cafeteria" for school year 2004-05 or 2005-06, or "from school" for school year 2006-07, for responses to be coded "usual participant." One breakfast response option ("at home and school") for each school year, and one lunch response option ("from school and home") for school year 2006-07 were excluded from analyses (440 children) because the meaning of these options was unclear. Administrative records were categorized for each child to parallel these two categories. Specifically, using administrative records of daily participation, each child's breakfast participation was coded "1" for "usual participant" if the child participated in breakfast on $\geq 50\%$ of days; otherwise, breakfast participation was coded "0" for "nonusual participant." Each child's lunch participation from administrative records was categorized and coded analogously. When analyzing breakfast participation misclassification, location (ie, classroom or cafeteria) was also considered. Parental responses could misclassify children by indicating nonusual participant when administrative records indicated usual participant, or vice versa. To measure misclassification, percentages (across schools and school years) of children who were misclassified by parental responses were calculated separately for breakfast and lunch (and by breakfast location), keeping track of misclassification direction.

To measure sensitivity against the "usual participant" definition, misclassification percentages using alternative cutoffs of 55%, 60%, and 65% of days were investigated.

Usual participants and nonusual participants (as defined using administrative records) were treated as independent samples. Two-proportion z tests compared probabilities of usual-participant misclassification to nonusual-participant

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