

Development and Reliability Testing of a Tool to Assess Default Beverage Offerings with Kids' Meals in Fast-food Restaurants

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Key Findings

- **The Food Policy Program Fast-food Restaurant Kids' Meal (FPP-FFKM) audit tool provides reliable measures of kids' meal default beverage offerings and characteristics of those beverage offerings for kids' meals ordered either at fast-food restaurants or through online platforms.**
- **The average percent agreement across all measures was 0.98 for interior menu boards and 0.99 for online platforms.**
- **The average kappa statistic was 0.89 for interior menu boards and 0.96 for online platforms, both indicating "almost perfect" agreement.**

Introduction

Children aged 2-19 years are frequent consumers of fast food, with just over one third (36.3%) consuming fast food on a given day and 11.4% obtaining more than 45% of their daily calories from fast food.¹ While adolescents are heavier fast-food consumers (obtaining 16.7% of their calories from fast food, on average), children aged 2-11 still consume a substantial amount of fast food, obtaining 11.4% of their calories from this source.¹ This is of concern because fast-food consumption among children is associated with an increased intake of saturated fat, sodium, sugars, and calories, along with higher consumption of sugar-sweetened beverages (SSBs).² Relatedly, SSBs are the leading source of added sugars in the US diet^{3,4} and are associated with obesity, type 2 diabetes, cardiovascular disease, and poor dental health.^{5,6}

Given that children frequently consume food and beverages from fast-food restaurants, this setting has been a focus for public health advocates and policymakers aiming to improve the nutritional quality of restaurant offerings and make the healthy choice the default choice. In this regard, a number of

voluntary initiatives (e.g., Kids LiveWell⁷ and Choose Health LA Restaurants⁸) and government policies (e.g., in several states and cities)⁹ have been implemented to encourage healthier beverage offerings with restaurant kids' meals. Evaluations of the impact of these initiatives on consumer behaviors and restaurant practices are limited and results are mixed.¹⁰⁻¹⁶

Most recently, effective January 1, 2022, Illinois implemented a healthy beverage default (HBD) act restricting default beverages in children's meals to: (1) water with no added natural or artificial sweeteners, but which may be sparkling or flavored; (2) 100% juice, which may be diluted with plain or carbonated water, in a serving size of ≤8 ounces; (3) non-fat or 1% dairy milk with ≤130 calories per serving; and, (4) non-dairy milk with ≤130 calories per serving, which must further contain no added natural or artificial sweeteners and meet the standards for the National School Lunch Program.¹⁷

A photo- and screen shot-based audit tool of fast-food restaurant kids' meal default beverage offerings was developed as part of a University of Illinois Chicago Food Policy Program (FPP) evaluation of the impact of the Illinois HBD Act on changes in default beverage offerings with kids' meals ordered from the premises of fast-food restaurants and from online platforms (i.e., restaurant websites and mobile applications, Grubhub, DoorDash, and Uber Eats). To determine the reliability of the FPP Fast-food Restaurant Kids' Meal (FPP-FFKM) audit tool, we conducted an inter-rater reliability (IRR) study in the spring of 2022. For the IRR study, photos of restaurant menu boards and screen shots of online ordering platforms from 50 fast-food restaurants were examined, and coding of measures was compared across raters. The purpose of this brief is to describe the measures related to kids' meal default beverage offerings in the FPP-FFKM tool and report on the IRR results.

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Methods

Instrument and Measures

The FPP-FFKM is designed to assess default beverages offered with kids' meals from fast-food restaurants. Information on default beverage offerings is recorded from four sources at each restaurant: (1) interior menu boards; (2) interior kiosks; (3) drive-thru menu boards; and, (4) the interior cashier's verbal offering. Information is also recorded on default beverages offered via four online platforms: (1) restaurant website or mobile application; (2) Grubhub; (3) Uber Eats; and, (4) DoorDash. Information about potential substitutes for kids' meals is also collected, including general beverages available on the main menu and availability of family and "mini" (smaller meal packages not labeled as "kids") meals. Data are collected in the field (i.e., at restaurants) using a Research Electronic Data Capture (REDCap) mobile application,^{18,19} which includes questions with photo prompts for the data collectors to take and upload pictures. The protocol for data collection in the interior and drive-thru of the fast-food restaurant requires that data are captured through both wide-angled and close-up photos. In addition to photos of menus, the protocol requires that all fountain machines and other sources of beverages (e.g., fridges) be captured for coding. To obtain data on default beverage offerings from the cashier, data collectors ask scripted questions specified in the protocol.

The online data collection protocol details the process for capturing screen shots of kids' meals, default beverage offerings, and secondary beverage offerings. Default offerings are defined as beverages immediately shown to the consumer when selecting a kids' meal; secondary offerings are defined as beverages not visible until the consumer actively requests to see additional beverages offered with the kids' meal. Additional screen shots are obtained for detailed information about each beverage, including serving size and calories for both milk and juice, percent fat and flavor for milk, and 100% juice and no added sugars for juice. Further, screen shots of nutrition facts panels or other nutrition labels are obtained from the menu pages of the fast-food restaurant website for use in coding compliance with particular kids' meal default policies.

Photos and screen shots are coded using a data entry protocol that allows assessment of compliance with healthy beverage default policies. Beverage options offered with kids' meals are coded based on 18 mutually exclusive beverage categories, including milk, juice, lemonade, bottled water, poured/fountain water, other, and either regular, diet or "any" soda, sports drink, energy drink, or iced tea. Juice is further coded into 7 subcategories based on whether it is 100% juice with no added sugars or not (with up to three juices for each) or if type is indeterminable. Milk is

further coded into 11 subcategories based on fat content, whether it is flavored or not, whether it is non-dairy or not, and if milk type is indeterminable. For milk and juice, we also record size (e.g., fluid ounces) and calories. For each kids' meal beverage offering, we record whether the beverage required paying an additional charge ("upcharge") and, if it did, the amount of the upcharge is recorded. For beverages offered as a fountain drink, all available options are recorded. Similarly, for beverages such as iced tea offered from other dispensers, all available options (e.g., diet, regular, any) are recorded. Outside of the kids' meals, all regular menu beverage offerings and associated prices, as well as the presence (yes/no) of family meals or mini meals are recorded.

Reliability Study Design and Data Analysis

To assess IRR of the FPP-FFKM, we randomly selected 50 restaurants from our larger study of the IL HBD Act for which both the interior menu board and at least one online platform could be coded. In restaurants where more than one online platform was coded, we randomly selected from the restaurant website/application, Grubhub, Uber Eats, and DoorDash. Thus, our sample included photos from 50 interior menu boards and screen shots from 50 online menu listings. For some measures, the analytic sample was smaller because observations were excluded from the analysis if: (1) the measure was not applicable for one or both coders based on responses to previous questions (e.g., milk type was not coded if milk was not selected) or (2) one or both coders marked the given measure as "not shown" (e.g., juice size). IRR was assessed for beverage category, milk and juice type, size, calories, and upcharges.

Percent agreement, the proportion of responses for a given measure where both data collectors agreed, was reported for all variables with at least 10 observations. Kappa statistics were also computed where possible. The kappa statistic is a robust measure of IRR for dichotomous or categorical variables and is a chance-adjusted measure of agreement.²⁰ Kappa statistics in the range of 0.81–1.00 are considered "almost perfect" agreement, 0.61–0.80 are considered "substantial" agreement, 0.41–0.60 are considered "moderate" agreement, 0.21–0.40 are considered "fair" agreement, 0.00–0.20 are considered "slight" agreement, and anything less than 0.00 is considered "poor" agreement.²¹ One limitation of using kappa statistics is that if the distribution of a variable is highly skewed, the kappa statistic may be low because the chance level of agreement expected is very high.²² Thus, we did not compute kappa statistics for dichotomous and categorical variables with a highly skewed prevalence of one response category (i.e., >0.8) and only reported kappa statistics for variables that did not have an average prevalence of any response category across the two coders exceeding 0.8.

To assess IRR for continuous measures (i.e., upcharge amount), we would have used two-way random intraclass correlation coefficients; however, there were only 6 instances where upcharge amounts were captured by both coders for a given restaurant offering. Given that, we were not able to conduct a reliability analysis on coding of

upcharge amounts and could only report on the reliability of coding for presence of an upcharge.

Two coders, trained on the interior and online protocols, coded the photos and screen shots independently. All analyses were performed using Stata/SE 13.1.

Results

The IRR results for the FPP-FFKM for both the interior menu board and online platforms were very high (Tables 1 and 2). Table 1 shows that, on average, across all measures for the interior menu board and the online platforms, respectively, the percent agreement was 0.98 and 0.99 and the kappa statistics were 0.89 and 0.96, indicating “almost perfect” agreement.²¹ As described above for kappa statistics, outcomes with highly skewed prevalence (i.e., >0.8) were excluded; therefore, Table 1 reports fewer kappa compared to percent agreement statistics.

Table 1 shows that the IRR for the 18-category beverage type classification was “almost perfect” with average percent agreement and kappa, respectively, of 0.99 and 0.94 for the interior menu board and 0.99 and 0.95 for the online platforms. For juice type, the outcomes were highly skewed and thus kappa was not computed, but average percent agreement was 1 for the interior menu board and 0.98 for

the online platforms. Across the 11 milk type categories, on average, percent agreement and kappa statistics, respectively, were 0.97 and 0.76 (substantial agreement) for the interior menu board and 0.99 and 0.95 (almost perfect agreement) for the online platforms. Table 1 also shows that IRR for beverage characteristics (i.e., size and calories) and whether beverages were upcharged was high (almost perfect agreement).

Table 2 shows that while agreement was generally very high across all 11 milk categories, it was lowest for classifying 1% milk on the interior menu board with percent agreement and kappa statistics, respectively, of 0.91 and 0.79 for unflavored 1% milk and 0.91 and 0.72 for flavored 1% milk. Table 2 shows that for all other beverage classifications, for either the menu board or online platforms, percent agreement was greater than or equal to 0.93 and the kappa statistics were greater than or equal to 0.92.

TABLE 1 Inter-Rater Reliability Statistics for Coding of Beverages Offered with Kids’ Meals

Variable Category	Interior Menu Board			Online Platforms		
	Number of Variables: Percent Agreement, Kappa	Percent Agreement: Mean (Range)	Kappa: Mean (Range)	Number of Variables: Percent Agreement, Kappa	Percent Agreement: Mean (Range)	Kappa: Mean (Range)
Overall	46, 9	0.98 (0.75-1.00)	0.89 (0.72-1.00)	48, 13	0.99 (0.92-1.00)	0.96 (0.92-1.00)
Default beverages	18, 1	0.99 (0.94-1.00)	0.94 (0.94-0.94)	18, 5	0.99 (0.94-1.00)	0.95 (0.92-1.00)
Upcharges	4, 0	0.94 (0.75-1.00)	N/A	6, 0	0.99 (0.95-1.00)	N/A
Milk type	11, 2	0.97 (0.91-1.00)	0.76 (0.72-0.79)	11, 2	0.99 (0.98-1.00)	0.95 (0.94-0.95)
Milk size	2, 2	0.96 (0.92-1.00)	0.92 (0.85-1.00)	2, 2	1.00 (1.00-1.00)	1.00 (1.00-1.00)
Milk calories	2, 2	0.95 (0.93-0.97)	0.92 (0.89-0.95)	2, 2	0.96 (0.95-0.96)	0.93 (0.93-0.94)
Juice type	7, 0	1.00 (1.00-1.00)	N/A	7, 0	0.98 (0.92-1.00)	N/A
Juice size	1, 1	0.96 (0.96-0.96)	0.92 (0.92-0.92)	1, 1	1.00 (1.00-1.00)	1.00 (1.00-1.00)
Juice calories	1, 1	0.95 (0.95-0.95)	0.92 (0.92-0.92)	1, 1	0.97 (0.97-0.97)	0.95 (0.95-0.95)

N/A: Not available because kappa could not be assessed for any variable in the given category. A total of 50 restaurants were coded for the reliability analysis. Sample sizes were lower for some questions as restaurants for which a question was not applicable for one or both coders based on responses to earlier questions were excluded from the reliability comparison, as were any for which one or both coders indicated the requested information was not shown. Reliability statistics are only presented for variables with data for at least 10 restaurants. Kappa statistics are only presented for variables where the average prevalence of every response option across coders was ≤80%.

Discussion

The coding of default beverage options offered with fast-food restaurant kids' meals, including beverage characteristics and prices, based on the FPP-FFKM audit tool provides highly reliable measures. The IRR results from the coding of restaurant photos and online screen shots showed that the average percent agreement across all measures was 0.98 for the interior menu boards and 0.99 for online platforms. The average kappa statistic was 0.89 for menu boards and 0.96 for online platforms, indicating "almost perfect" agreement.

IRR has been assessed previously for a number of existing fast-food audit tools that have been designed to collect a broad set of measures, including some measures on foods and beverages available with kids' meals. These existing tools have generally relied on "on-the-ground" coding, and, consistent with the findings from our study, reliability has been high.²³⁻²⁵ In particular, one previous study reported on the development and reliability of the Children's Menu Assessment tool, which expanded the children's section of the widely used Nutrition Environment Measures Survey-Restaurant (NEMS-R) tool in order to evaluate food and beverage choices available on children's menus.²⁶ This study found that IRR was high, with mean percent agreement of 0.94 for categorical measures and mean Spearman correlation for ordinal measures of 0.93. While, among the 21 items scored, the tool included coding of five beverage options identified on children's menus (any juice, 100% juice, any milk, 1% or nonfat milk, and soda), it did not report on IRR separately for these measures.²⁶ The NEMS-R tool did report high IRR for presence of two beverages on kids' menus, with percent agreement and kappa, respectively, of 0.96 and 0.92 for 100%

fruit juice and 0.97 and 0.94 for 1% or nonfat milk; however, reliability was lower for whether there were "healthy options available" on the kids' menu, with respective IRR measures of 0.79 and 0.59.²³ Reliability testing of an extensive fast-food audit form developed by the Bridging the Gap program (BTG-FFOF) also reported IRR for specific kids' menu variables, including two beverage measures.²⁴ Kappa and percent agreement, respectively, were 0.85 and 0.93 for whether the kids' meal included a healthy beverage option and 1.00 and 1.00 for whether the healthy option was offered as the default.²⁴ To our knowledge, no previous studies have reported on IRR for foods or beverages available from fast-food restaurants through online ordering platforms, whether for the general menu or

TABLE 2 Inter-Rater Reliability Statistics for Default Beverage Options Offered with Kids' Meals

Beverage Option	Interior Menu Board		Online Platforms	
	Percent Agreement	Kappa	Percent Agreement	Kappa
Milk	1.00	N/A	1.00	N/A
Reduced-fat (2%) unflavored milk	1.00	N/A	1.00	N/A
Low-fat (1%) unflavored milk	0.91	0.79	0.98	0.94
Non-fat (skim) unflavored milk	1.00	N/A	1.00	N/A
Unflavored milk, not shown	1.00	N/A	1.00	N/A
Reduced-fat (2%) flavored milk	1.00	N/A	1.00	N/A
Low-fat (1%) flavored milk	0.91	0.72	0.98	0.95
Non-fat (skim) flavored milk	1.00	N/A	1.00	N/A
Flavored milk, not shown	1.00	N/A	1.00	N/A
Unflavored non-dairy milk	1.00	N/A	1.00	N/A
Other	0.98	N/A	0.98	N/A
Cannot determine	0.93	N/A	1.00	N/A
Juice	0.98	N/A	1.00	1.00
Lemonade	1.00	N/A	0.98	N/A
Bottled Water	0.98	0.94	0.98	0.96
Poured/Fountain Water	0.98	N/A	1.00	N/A
Regular Soda	1.00	N/A	0.96	0.92
Diet Soda	1.00	N/A	0.96	0.92
Any Soda	1.00	N/A	1.00	N/A
Regular Sports Drink	1.00	N/A	1.00	N/A
Diet Sports Drink	1.00	N/A	1.00	N/A
Any Sports Drink	1.00	N/A	1.00	N/A
Regular Energy Drink	1.00	N/A	1.00	N/A
Diet Energy Drink	1.00	N/A	1.00	N/A
Any Energy Drink	1.00	N/A	1.00	N/A
Regular Tea/Iced Tea	1.00	N/A	1.00	N/A
Diet Tea/Iced Tea	1.00	N/A	1.00	N/A
Any Tea/Iced Tea	0.94	N/A	0.94	N/A
Other	0.98	N/A	0.98	0.94

N/A: Not available because kappa could not be assessed. A total of 50 restaurants were coded for the reliability analysis. Because only restaurants for which questions were applicable for both coders were included in reliability comparisons, only 43 and 41 restaurants were included in the reliability analysis for milk type for the interior menu board and online platforms, respectively. Kappa statistics are only presented for variables where the average prevalence of every response option across coders was ≤80%.

specifically related to kids' meals. Additionally, while a number of previous studies have evaluated default beverage offerings with kids' meals,^{11,13-16} this is the first IRR study, to our knowledge, of a fast-food restaurant audit tool used for this purpose.

Overall, the results from this study suggest that the FPP-FFKM photo- and screen shot-based data collection methods for auditing fast-food restaurant premises and online offerings are a particularly reliable means for obtaining data on default beverage options offered with kids' meals, including pertinent nutritional and size information that, in turn, is important for determining whether beverages are healthy or not and whether they comply with particular healthy default policies.

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