

FOOD SYSTEMS AND SECURITY

Food insecurity and food preparation equipment in US households: exploratory results from a cross-sectional questionnaire

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Introduction

Food insecurity (FI) is regarded as an inability to obtain adequate amounts of nutritious, unadulterated and pathogen-free foods that support normal growth and development to contribute to a healthy life ⁽¹⁾. Approximately 50 million individuals in the USA are FI, which is associated with poor health and morbidity ^(2,3). Food insecurity in adults is tied to poor dietary quality, with

Abstract

Background: Food insecurity (FI) impacted 15.7% (5.9 million) of US households with children in 2017. These households often experience issues within one or more of the food security pillars: access, availability, utilisation or stability. An underexplored area within the pillar of utilisation that may impact FI risk is the availability of kitchen equipment in households. This exploratory project aimed to quantify household food preparation equipment ownership and use by household FI status.

Methods: An online platform (Qualtrics, Provo, UT, USA) was used to administer a questionnaire to a sample of 135 parents of children aged 11–14 years. The instrument queried sociodemographic characteristics, food preparation items owned and frequency of use of 44 items within a 6-month interval. Household FI was measured using the 18-item US Department of Agriculture, Household Food Security Survey Module with a 12-month reference period.

Results: Households experiencing FI ($n = 39$; 28.9%) owned an average of five fewer items than their food secure counterparts ($n = 96$, 71.1%, $P < 0.001$), reporting lower item ownership within each equipment category subgroup (i.e. large appliances, small appliances, food preparation utensils and cooking utensils; all $P < 0.01$). There were no differences between FI and food secure households in frequency of use (all $P > 0.01$).

Conclusions: Compared to food secure households, the number of food preparation items owned was lower, although frequency of use was the same, in US households that were FI. Future projects should investigate how food equipment ownership impacts cooking behaviours, and whether households experiencing FI display behaviours to compensate for a differing set of equipment.

a lower consumption of fruits, vegetables and dairy foods ⁽⁴⁾.

Of particular concern is FI in households with children in that a lack of high-quality foods during key growth and developmental stages has been shown to have adverse consequences ^(2,4–6). Moreover, household FI has been associated with parental–child conflict and a lower family well-being, also contributing to poor health outcomes in children ⁽⁷⁾. In 2017, 5.9 million US households with

children (15.7%) experienced FI during the previous year⁽⁸⁾, identifying a widespread concern.

Formal federal, state and local food assistance programmes and policies are primarily designed to promote access, availability and stability of food, or three of the four pillars of food security^(2,9–11). The pillar of utilisation requires exploration into household practices and individual behaviours⁽¹⁾, amongst other informal factors⁽¹²⁾. For example, parental cooking methods have been associated with children's choices of cooking methods later in life⁽¹³⁾. Home prepared meals are often more healthful than meals prepared away from the home^(14,15), although many barriers to home meal preparation exist, such as lack of time, limited knowledge and poor attitudes toward cooking⁽¹⁶⁾. Unavailability of equipment and cooking utensils, as well as inadequate kitchen space, are also limitations to an individual's ability to prepare a healthful meal^(16,17). Socio-economic characteristics have been related to the number of household food preparation items available among low-income populations, although this has not been widely explored across income ranges^(18,19). Few studies have examined the material resources available to utilise foods in meal preparation in the household with regard to FI.

The aim of this exploratory study was to identify food preparation equipment ownership and use within a sample of US households that included children, aged 11–14 years. The first hypothesis was that a significant difference in ownership of household food preparation equipment between food secure and FI households would be found. The second hypothesis was that the frequency of use of kitchen equipment items would significantly differ between food secure and FI households.

Materials and methods

Participants

In February 2015, an online questionnaire was administered by Qualtrics Panel Services (Provo, UT, USA) to existing panel members, using quota sampling to approximate the US population for parental age, annual income and adult education level for households with children aged 11–14 years. The sample consisted of one self-selected adult/parent respondent over the age of 18 years from each household. Participants were compensated with points that could be used to redeem gift cards.

Parents provided informed consent before beginning the questionnaire measures. This project was reviewed and approved by the Institutional Review Board for the Protection of Human Subjects of the University of Illinois at Urbana-Champaign (Urbana, IL, USA; protocol #15425).

Measures

The instrument combined previously validated questionnaires of sociodemographic variables⁽²⁰⁾, household food security⁽⁸⁾ and household food preparation equipment⁽¹⁸⁾. Human nutrition professionals pilot tested the instrument for comprehension and length, without changes to the text or time for completion.

Sociodemographic variables included age, sex, ethnicity, highest level of education completed, annual household income, food assistance programmes utilised, household size, marital status and primary food preparer⁽²⁰⁾. Self-reported height (feet, inches) and weight (pounds) were queried, and investigators used height and weight data to calculate the body mass index (BMI; kg m^{-2}) of each respondent.

Household food security was assessed using the 18-item US Department of Agriculture, Household Food Security Survey Module with a 12-month reference period⁽²¹⁾. The sum of affirmative responses to 18 questions produced the household food security score, with higher scores indicating lower food security. Scores were categorised as high (0), marginal (1,2), low (3–7) and very-low food security (8–18). Scores of high and marginal food security were classified as 'food secure', whereas low and very-low food security were classified as 'food insecure'⁽⁸⁾.

To assess household food preparation equipment, adult respondents marked their ownership of 44 common kitchen items (0 = no; 1 = yes) and indicated frequency of use (1 = owned but not used within the last 6 months; 2 = used less than once a month but within the last 6 months; 3 = used once a month; 4 = used 2–3 times per month; 5 = used once per week; 6 = used 2–4 times per week; or 7 = used every day). Use responses were condensed to less than once per month (1 or 2 = 1), one to three times per month (3 or 4 = 2) and greater than or equal to once per week (5, 6 or 7 = 3) as a result of low responses for some response choices. The checklist was based on an equipment and utensils list developed by Appelhans *et al.*⁽¹⁸⁾, with table and food storage container removed and six items added [i.e. food thermometer, table dishes (plate and bowl), colander/strainer, liquid measuring cup, stovetop/range and oven].

Statistical analysis

Statistical analyses were performed using STATA/MP, version 14.1 (StataCorp, LP, College Station, TX, USA). Descriptive statistics were used to characterise participants and their food security status, as well as ownership and use of household food preparation items. Sociodemographic characteristics, number of food

preparation items owned and frequency of item use were statistically compared by household food security status. Categorical variables were compared using chi-squared tests [or Fisher's exact test when one or more cell(s) contained less than five responses]. Continuous variables were compared using Student's *t*-test. Given the high number of tests, $P < 0.01$ was considered statistically significant for all analyses.

Results

Of the 173 parents who initiated the questionnaire, 135 individuals completed the entire instrument (78.0%). Table 1 displays the characteristics of the respondents. Adults were primarily female ($n = 93$; 68.9%), non-Hispanic white ($n = 108$; 80.0%) and with at least an associate's degree or technical degree ($n = 71$; 52.6%). Almost half of the respondents ($n = 61$; 45.2%) were aged 40–49 years, with an additional 33.3% ($n = 45$) aged 18–39 years. The BMI of respondents ($n = 128$) indicated that 32.0% ($n = 41$) were classified as being overweight and 26.6% ($n = 34$) were categorised as being obese (based on self-reported heights and weights), which is approximately comparable to that of the US population⁽²²⁾. The mean (SD) BMI was 27.1 (7.5) kg m^{-2} in 18–39-year-olds ($n = 41$), 27.3 (5.8) kg m^{-2} in 40–49-year-olds ($n = 59$) and 28.2 (9.9) kg m^{-2} in 50–69-year-olds ($n = 28$) ($P > 0.01$).

Food security was reported by 71.1% ($n = 96$) of parents (54.1% high; 17.0% marginal), whereas 28.9% ($n = 39$) reported FI (11.1% low; 17.8% very-low). The incidence of household FI was higher for study participants (28.9%) compared to reports for the general US population (11.8% in 2017)⁽⁸⁾.

Of the 44 items queried on the food preparation equipment checklist, households ($n = 135$) reported owning a mean (SD) of 36.0 (7.8) tools. Table 2 presents those household food preparation items owned within each subgroup by household food security status. There was a significant difference ($P < 0.001$) in the total number of food preparation items reported as owned between food secure [37.6 (6.2)] and FI [32.3 (9.8)] households and within each subgroup of items (all $P < 0.01$) (Table 2). There was no individual item that was owned by every household (Table 3). The five most commonly owned items included refrigerator ($n = 130$; 96.3%), microwave ($n = 128$; 94.8%), dishes ($n = 128$; 94.8%), can opener ($n = 123$; 91.1%) and oven ($n = 121$; 89.6%). The five least commonly owned items included hot plate ($n = 18$; 13.3%), specialty machine (e.g. ice cream maker) ($n = 37$; 27.4%), waffle iron ($n = 43$; 31.9%), electric grill/griddle ($n = 50$; 37.0%) and food processor ($n = 58$; 43.0%).

When a post-hoc analysis comparing ownership of each item was conducted, households that were FI compared to food secure were significantly less likely to report owning 13 of the 44 items compared (Table 4). These included baking pan/bakeware (71.8% versus 81.3%, $P = 0.003$), baking sheet (64.1% versus 84.4%, $P = 0.001$), barbecue grill (51.3% versus 70.8%, $P = 0.002$), cookbook (53.8% versus 67.7%, $P = 0.001$), crockpot (59.0% versus 79.6%, $P = 0.001$), cutlery set/knife set (66.7% versus 89.6%, $P = 0.001$), grater (46.2% versus 61.5%, $P < 0.001$), large pot (71.8% versus 88.5%, $P = 0.001$), mixing bowls (71.8% versus 84.4%, $P = 0.008$), mixing spoon (64.1% versus 83.3%, $P = 0.010$), rolling pin (35.9% versus 54.2%, $P = 0.010$), spice rack (38.5% versus 58.3%, $P = 0.009$) and whisk (56.4% versus 75.0%, $P < 0.001$).

For all households ($n = 135$), the five most frequently used items (equal to or more than once per week) were refrigerator ($n = 130$; 100%), microwave ($n = 126$; 98.4%), dishes ($n = 125$; 97.7%), sink/dishwasher ($n = 119$; 99.2%) and oven ($n = 118$; 97.5%) (Table 3). Every household (100%) that owned a freezer ($n = 113$) used it once or more per week and, of the 118 households that owned a stove top/range, 98.3% used it once or more per week. When comparisons for each item were expanded to include values indicating frequency of use (one or more times per week, one to three times per month and less than once per month) between FI and food secure households, those reporting FI had no statistically significant differences in frequency of use for any of the 44 items (Table 4).

Discussion

The hypothesis that there would be a difference in ownership of household food preparation equipment between food secure and FI households was supported by the data obtained in the present study. Food insecure households owned five fewer items, on average, than food secure households. Although more than 87% of food secure and FI households owned a can opener, dishes, microwave and refrigerator, more than 87% of food secure households also owned a cutlery set/knife set, cutting board, large pot, measuring cups, oven, sink/dishwasher and stove top/range. These differences may help to explain dietary intake and food pattern differences between FI and food secure households observed in other studies, notably a lower consumption of fruits and vegetables^(4,23–25), a reliance on convenience and fast foods^(23,26) and a lower intake of specific nutrients^(4,25).

The hypothesis that a difference in frequency of use of kitchen equipment items between food secure and FI

Table 1 Demographic characteristics of study respondents (*n* = 135), compared by household food security classification

Characteristic	All parents (<i>n</i> = 135)	Parents in food secure households (<i>n</i> = 96)	Parents in food insecure households (<i>n</i> = 39)	<i>P</i> -value*
Age group, % (<i>n</i>)				
18–39 years	33.3 (45)	29.2 (28)	43.6 (17)	0.273
40–49 years	45.2 (61)	47.9 (46)	38.5 (15)	
50–69 years	21.5 (29)	22.9 (22)	18.0 (7)	
Sex, % (<i>n</i>)				
Female	68.9 (93)	71.9 (69)	61.5 (24)	0.240
Male	31.1 (42)	28.1 (27)	38.5 (15)	
Ethnicity, % (<i>n</i>)				
Non-Hispanic White	80.0 (108)	80.2 (77)	79.5 (31)	0.302
Non-Hispanic Black	11.9 (16)	9.4 (9)	18.0 (7)	
Latino/a	6.7 (9)	8.3 (8)	2.6 (1)	
Other/multiple	1.5 (2)	2.1 (2)	0.0 (0)	
Highest level of education completed, % (<i>n</i>)				
High school, general equivalency diploma, or less	22.2 (30)	21.9 (21)	23.1 (9)	0.131
Associate's or technical degree	30.4 (41)	26.0 (25)	41.0 (16)	
Bachelor's degree	34.8 (47)	40.6 (39)	20.5 (8)	
Graduate or professional degree	12.6 (17)	11.5 (11)	15.4 (6)	
Annual household income, % (<i>n</i>)				
Less than \$50 000 USD	33.3 (44)	24.7 (23)	53.9 (21)	0.018
\$50 000–\$99 999 USD	31.8 (42)	35.5 (33)	23.1 (9)	
\$100 000–\$149 999 USD	25.8 (34)	29.0 (27)	18.0 (7)	
\$150 000 or more USD	9.1 (12)	10.8 (10)	5.1 (2)	
Food assistance programmes utilised, % (<i>n</i>)				
Supplemental nutrition assistance program	17.8 (24)	11.5 (11)	33.3 (13)	0.003
Special supplemental program for women, infants, and children	5.9 (8)	4.2 (4)	10.3 (4)	0.174
National school lunch programme	25.2 (34)	14.6 (14)	51.3 (20)	0.000
Household size				
Number of members, mean (SD)	4.2 (1.5)	4.2 (1.2)	4.3 (1.9)	0.524
Marital status, % (<i>n</i>)				
Married/domestic partnership	81.5 (110)	86.5 (83)	69.2 (27)	0.036
Divorced/separated	8.2 (11)	7.3 (7)	10.3 (4)	
Single	10.4 (14)	6.3 (6)	20.5 (8)	
Primary food preparer, % (<i>n</i>)				
Yes	79.9 (107)	82.3 (79)	73.7 (28)	0.263
No	20.2 (27)	17.7 (17)	26.3 (10)	
Body mass index (BMI, kg m ⁻²), mean (SD)				
Underweight, BMI < 18.5 kg m ⁻² , % (<i>n</i>), mean (SD)	4.7 (6), 17.8 (0.4)	4.4 (4), 17.8 (0.1)	5.3 (2), 17.7 (0.9)	0.833
Normal weight, BMI = 18.5–24.9 kg m ⁻² , % (<i>n</i>), mean (SD)	36.7 (47), 22.2 (1.8)	43.3 (39), 22.3 (1.8)	21.0 (8), 21.6 (1.5)	0.284
Overweight, BMI = 25.0–29.9 kg m ⁻² , % (<i>n</i>), mean (SD)	32.0 (41), 26.8 (1.4)	32.2 (29), 26.4 (1.2)	31.6 (12), 27.7 (1.6)	0.021
Obese, BMI ≥ 30.0 kg m ⁻² , % (<i>n</i>), mean (SD)	26.6 (34), 37.3 (6.7)	20.0 (18), 37.5 (7.8)	42.1 (16), 37.0 (5.5)	0.850

**P*-values when comparing characteristic by household food security classification using chi-squared, Fisher's exact and Student's *t*-tests (dependent on variable type and sample size per cell). Columns may not add to 100% because of rounding.

households would be found was not supported. This suggests that individuals in FI households have the same pattern of use of food preparation equipment as in food

secure homes and that, if additional items were available in FI homes, they would be used. This supposition requires further inquiry.

Table 2 Ownership of food preparation equipment among a sample of US households ($n = 135$), compared by household food security classification

Food preparation equipment category, mean (SD)	All households ($n = 135$)	Food secure households ($n = 96$)	Food insecure households ($n = 39$)	<i>P</i> -value*
Large appliances [†]	5.5 (0.9)	5.6 (0.8)	5.2 (1.2)	0.010
Small appliances [‡]	7.1 (2.3)	7.5 (2.2)	6.3 (2.5)	0.008
Food preparation utensils [§]	12.4 (3.0)	13.0 (2.4)	10.9 (3.8)	<0.001
Cooking utensils [¶]	11.0 (2.8)	11.5 (2.2)	9.9 (3.6)	0.001
Total equipment ^{††}	36.0 (7.8)	37.6 (6.2)	32.3 (9.8)	<0.001

**P*-values when comparing pieces of equipment owned by household food security classification using Student's *t*-test.

[†]Tally of six items (barbecue grill, freezer, oven, refrigerator, sink/dishwasher, and stove top/range).

[‡]Tally of 11 items (blender, crockpot, electric grill/griddle, electric mixer, food processor, hot plate, microwave, specialty machine, toaster, toaster oven and waffle iron).

[§]Tally of 14 items (can opener, cutlery set/knife set, cutting board, grater, liquid measuring cup, measuring cups, measuring spoons, mixing bowls, mixing spoon, peeler, rolling pin, spatula, tongs, and whisk);

[¶]Tally of 13 items (baking pan/bakeware, baking sheet, colander/strainer, cookbook, dishes, food thermometer, ladle, large pot, oven mitt/pot-holder, potato masher, saucepan, skillet/frying pan/wok, and spice rack);

^{††}Tally of 44 items (summation of all equipment listed in subcategories).

A positive relationship between the number of food preparation items available in a home and household income has been previously reported by Appelhans *et al.*⁽¹⁸⁾, who found that households with higher incomes had more items than those with lower incomes. The presence of equipment within the home in the present study is similar to that of other studies that focused on specific low-income populations, including rural, urban and suburban residences^(18,19). Among a sample of 142 households with toddlers, those living with food insecurity possessed fewer food preparation appliances compared to those who were self-rated as food secure⁽²⁷⁾. The likelihood of being FI was greater among households that did not possess specific kitchen appliances, including a freezer, refrigerator and stove⁽²⁸⁾.

The implications of a lack of cooking equipment and fewer kitchen utensils in FI households compared to food secure households remains unclear. There is a lack of consensus on what food preparation items are essential for healthful meal preparation⁽²⁹⁾. For example, if a whisk were not available, a fork may serve as a substitute, making the essentiality of a whisk unnecessary⁽²⁹⁾. Across eight households of low-income and FI Mexican-immigrant women in Texas (USA), a variety of cooking techniques were used, despite limited cooking appliances and utensils⁽³⁰⁾. Available utensils were often used for dual or multiple purposes (e.g. knife for can opener or dish for cutting board)⁽³⁰⁾. Cooking videos, classes and demonstrations often use specialty equipment items, such as a spiraliser to create noodles from vegetables or a mandolin slicer to rapidly slice fruits and vegetables for quick preparation. The perception that specialty cooking items are critical tools for food preparation may serve as a

deterrent for individuals in some FI households to attend cooking classes or modify cooking and eating behaviours in the household.

Some household kitchen equipment appears to be common in most homes. Among 103 low-income households with children, aged 6–13 years, in Chicago, Illinois (USA), all owned a refrigerator and skillet/frying pan/wok⁽¹⁸⁾. Within the sample of households of low-income, the greater the number of cooking appliances owned, the more frequent the number of family meals and the higher the number of home-prepared dinners their children consumed⁽¹⁸⁾. These observations were linked to ownership of large kitchen appliances (e.g. freezer, microwave, refrigerator, etc.), food preparation utensils (e.g. colander/strainer, food storage container, large spoon, measuring cup, measuring spoon, spatula, etc.) and specialty items (e.g. cookbook) but not to small appliances or cooking utensils⁽¹⁸⁾. The results from the study by Appelhans *et al.*⁽¹⁸⁾ suggest that ownership of household food preparation equipment is a conduit for in-home meal preparation, presumably of higher quality because they also found that children in these homes ingested less sugar sweetened beverages, consumed more fruits and vegetables (excluding fried potatoes and salad) and ate fewer fast foods.

Although not statistically significantly different, an electric grill/griddle and hot plate were the only two items that FI households owned more than food secure households in the present study. Even so, ownership of an electric grill/griddle was only approximately 41% and that of a hot plate approximately 15% in FI households in the present study compared to 30% and 25%, respectively, in a previous study of low-income households⁽¹⁸⁾. This has

Table 3 Frequency of use by those who owned 44 food preparation items in a sample of US households ($n = 135$) and number of households owning these items

Item	Frequency of use (n)			Ownership of items (n)
	More than once per week	One to three times per month	Less than once per month	
Baking pan/bakeware	78	27	1	106
Baking sheet	83	23	0	106
Barbecue grill	35	40	13	88
Blender	39	44	7	90
Can opener	111	12	0	123
Colander/strainer	84	22	2	108
Cookbook	46	34	6	86
Crockpot	35	52	10	97
Cutlery set/knife set	109	3	0	112
Cutting board	99	13	0	112
Dishes	125	2	1	128
Electric grill/griddle	27	15	8	50
Electric mixer	31	42	9	82
Food processor	23	32	3	58
Food thermometer	31	20	14	65
Freezer	113	0	0	113
Grater	36	35	6	77
Hot plate	8	7	3	18
Ladle	66	26	2	94
Large pot	94	19	0	113
Liquid measuring cup	81	22	1	104
Measuring cups	102	14	1	117
Measuring spoons	89	18	1	108
Microwave	126	2	0	128
Mixing bowls	94	15	0	109
Mixing spoon	91	13	1	105
Oven	118	3	0	121
Oven mitt/pot-holder	103	7	0	110
Peeler	60	31	3	94
Potato masher	33	25	4	62
Refrigerator	130	0	0	130
Rolling pin	17	33	16	66
Saucepan	101	7	0	108
Sink/dishwasher	119	1	0	120
Skillet/frying pan/wok	102	8	0	110
Spatula	101	11	0	112
Specialty machine	17	17	3	37
Spice rack	67	4	0	71
Stove top/range	116	2	0	118
Toaster	107	4	2	113
Toaster oven	42	16	2	60
Tongs	76	26	0	102
Waffle iron	12	27	4	43
Whisk	66	28	0	94

implications for programmes and interventions designed to increase food utilisation among FI households because appliances such as crockpots, electric grill/griddle and food processor and utensils such as cutlery set/knife set and measuring cups and measuring spoons are often not available⁽¹⁹⁾. There are many examples of successful interventions^(31–33) and assistance programmes^(34–36) that develop cooking skills among low-income and FI adults and children. However, cooking appliances and utensils may need to be provided to these individuals to facilitate long-term adoption and application of these skills.

Several limitations existed for the present study. The overall response rate for this questionnaire was lower than desired; however, it still fell within the acceptable range for online panel studies and mailed surveys⁽³⁷⁾. The use of an existing panel limited the control that the investigators had over response factors, including invitation design, contact delivery modes, notification reminders and exact incentives^(37,38). Quota sampling was used to increase the diversity of socio-economic status among study participants, although the lack of ethnic diversity among participants limits the generalisability of this sample to broader audiences. A definition of 'own' was not provided to respondents; therefore, this word may have been unclear to some individuals living in rental residences or with shared kitchens where ownership of an oven, freezer, refrigerator and/or microwave, as examples, was ambiguous. As another example, pots and pans may be 'owned' by the landlord, even as the respondent has access to these items for household food preparation.

Conclusions

These exploratory data suggest that the number of unique household food preparation items is associated with household food security status and may contribute to further divergences between food secure and FI households regarding in-home food preparation. Future studies are needed to understand how these differences in equipment ownership and availability influence behaviours determining which food preparation equipment items are essential to healthful meal preparation such that FI households move toward dietary intakes and patterns promoting optimal health.

Acknowledgments

Some of the data included in this manuscript were presented in abstract and poster form at the Food and Nutrition Conference and Expo in 2015, in Nashville, TN, USA.

Table 4 Frequency of use by those who owned 44 food preparation items in a sample of US households ($n = 135$) and ownership of these items, compared by household food security classification

Item	Frequency of use (n)			Owner ship of items*, n (%)
	More than once per week	One to three times per month	Less than once per month	
Baking pan/bakeware				
Food secure ($n = 96$)	57	20	1	78 (81.3) ^a
Food insecure ($n = 39$)	21	7	0	28 (71.8)
Baking sheet				
Food secure ($n = 96$)	61	20	0	81 (84.4) ^b
Food insecure ($n = 39$)	22	3	0	25 (64.1)
Barbecue grill				
Food secure ($n = 96$)	25	35	8	68 (70.8) ^c
Food insecure ($n = 39$)	10	5	5	20 (51.3)
Blender				
Food secure ($n = 96$)	29	36	4	69 (71.9)
Food insecure ($n = 39$)	10	8	3	21 (53.8)
Can opener				
Food secure ($n = 96$)	81	8	0	89 (92.7)
Food insecure ($n = 39$)	30	4	0	34 (87.2)
Colander/strainer				
Food secure ($n = 96$)	61	16	2	79 (82.3)
Food insecure ($n = 39$)	23	6	0	29 (74.4)
Cookbook				
Food secure ($n = 96$)	34	26	5	65 (67.7) ^b
Food insecure ($n = 39$)	12	8	1	21 (53.8)
Crockpot				
Food secure ($n = 96$)	26	39	9	74 (77.1) ^b
Food insecure ($n = 39$)	9	13	1	23 (59.0)
Cutlery set/knife set				
Food secure ($n = 96$)	85	1	0	86 (89.6) ^b
Food insecure ($n = 39$)	24	2	0	26 (66.7)
Cutting board				
Food secure ($n = 96$)	77	7	0	84 (87.5)
Food insecure ($n = 39$)	22	6	0	28 (71.8)
Dishes				
Food secure ($n = 96$)	90	1	1	92 (95.8)
Food insecure ($n = 39$)	35	1	0	36 (92.3)
Electric grill/griddle				
Food secure ($n = 96$)	16	11	7	34 (35.4)
Food insecure ($n = 39$)	11	4	1	16 (41.0)
Electric mixer				
Food secure ($n = 96$)	21	33	7	61 (63.5)
Food insecure ($n = 39$)	10	9	2	21 (53.8)
Food processor				
Food secure ($n = 96$)	17	26	2	45 (46.9)
Food insecure ($n = 39$)	6	6	1	13 (33.3)
Food thermometer				
Food secure ($n = 96$)	20	17	13	50 (52.1)
Food insecure ($n = 39$)	11	3	1	15 (38.5)
Freezer				
Food secure ($n = 96$)	81	0	0	81 (84.4)
Food insecure ($n = 39$)	32	0	0	32 (82.1)

Table 4. Continued

Item	Frequency of use (n)			Owner ship of items*, n (%)
	More than once per week	One to three times per month	Less than once per month	
Grater				
Food secure ($n = 96$)	27	26	6	59 (61.5) ^d
Food insecure ($n = 39$)	9	9	0	18 (46.2)
Hot plate				
Food secure ($n = 96$)	5	5	2	12 (12.5)
Food insecure ($n = 39$)	3	2	1	6 (15.4)
Ladle				
Food secure ($n = 96$)	49	19	1	69 (71.9)
Food insecure ($n = 39$)	17	7	1	25 (64.1)
Large pot				
Food secure ($n = 96$)	70	15	0	85 (88.5) ^b
Food insecure ($n = 39$)	24	4	0	28 (71.8)
Liquid measuring cup				
Food secure ($n = 96$)	63	13	1	77 (80.2)
Food insecure ($n = 39$)	18	9	0	27 (69.2)
Measuring cups				
Food secure ($n = 96$)	75	10	0	85 (88.5)
Food insecure ($n = 39$)	27	4	1	32 (82.1)
Measuring spoons				
Food secure ($n = 96$)	69	12	0	81 (84.4)
Food insecure ($n = 39$)	20	6	1	27 (69.2)
Microwave				
Food secure ($n = 96$)	90	1	0	91 (94.8)
Food insecure ($n = 39$)	36	1	0	37 (94.9)
Mixing bowls				
Food secure ($n = 96$)	74	7	0	81 (84.4) ^e
Food insecure ($n = 39$)	20	8	0	28 (71.8)
Mixing spoon				
Food secure ($n = 96$)	72	8	0	80 (83.3) ^f
Food insecure ($n = 39$)	19	5	1	25 (64.1)
Oven				
Food secure ($n = 96$)	86	3	0	89 (92.7)
Food insecure ($n = 39$)	32	0	0	32 (82.1)
Oven mitt/pot-holder				
Food secure ($n = 96$)	78	3	0	81 (84.4)
Food insecure ($n = 39$)	25	4	0	29 (74.4)
Peeler				
Food secure ($n = 96$)	45	26	1	72 (75.0)
Food insecure ($n = 39$)	15	5	2	22 (56.4)
Potato masher				
Food secure ($n = 96$)	22	21	4	47 (49.0)
Food insecure ($n = 39$)	11	4	0	15 (38.5)
Refrigerator				
Food secure ($n = 96$)	93	0	0	93 (96.9)
Food insecure ($n = 39$)	37	0	0	37 (94.9)
Rolling pin				
Food secure ($n = 96$)	14	26	12	52 (54.2) ^f
Food insecure ($n = 39$)	3	7	4	14 (35.9)
Saucepan				
Food secure ($n = 96$)	77	4	0	81 (84.4)

Table 4. Continued

Item	Frequency of use (n)			Owner ship of items*, n (%)
	More than once per week	One to three times per month	Less than once per month	
Food insecure (n = 39)	24	3	0	27 (69.2)
Sink/dishwasher				
Food secure (n = 96)	87	0	0	87 (90.6)
Food insecure (n = 39)	32	1	0	33 (84.6)
Skillet/frying pan/wok				
Food secure (n = 96)	74	6	0	80 (83.3)
Food insecure (n = 39)	28	2	0	30 (76.9)
Spatula				
Food secure (n = 96)	74	6	0	80 (83.3)
Food insecure (n = 39)	27	5	0	32 (82.1)
Specialty machine				
Food secure (n = 96)	12	14	3	29 (30.2)
Food insecure (n = 39)	5	3	0	8 (20.5)
Spice rack				
Food secure (n = 96)	55	1	0	56 (58.3) ^g
Food insecure (n = 39)	12	3	0	15 (38.5)
Stove top/range				
Food secure (n = 96)	86	1	0	87 (90.6)
Food insecure (n = 39)	30	1	0	31 (79.5)
Toaster				
Food secure (n = 96)	78	3	2	83 (86.5)
Food insecure (n = 39)	29	1	0	30 (76.9)
Toaster oven				
Food secure (n = 96)	30	13	2	45 (46.9)
Food insecure (n = 39)	12	3	0	15 (38.5)
Tongs				
Food secure (n = 96)	56	20	0	76 (79.2)
Food insecure (n = 39)	20	6	0	26 (66.7)
Waffle iron				
Food secure (n = 96)	10	20	4	34 (35.4)
Food insecure (n = 39)	2	7	0	9 (23.1)
Whisk				
Food secure (n = 96)	52	20	0	72 (75.0) ^d
Food insecure (n = 39)	14	8	0	22 (56.4)

*P-values when comparing each piece of equipment owned by household food security classification using chi-squared or Fisher's exact tests (for comparisons with ≤ 5 in one or more cells), ^aP = 0.003, ^bP = 0.001, ^cP = 0.002, ^dP < 0.001, ^eP = 0.008, ^fP = 0.010, ^gP = 0.009.

Conflict of interests, source of funding and authorship

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ARO and SMNR actively contributed to the conception and design of the study and data collection. CJN and BE actively contributed to data analyses. All authors contributed to the interpretation of data, drafting of the paper and a critical review of its content and the final version submitted for publication.

Transparency statement

All authors affirm that this manuscript is an honest, accurate and transparent account of the study being reported. The reporting of this work is compliant with STROBE guidelines. All authors affirm that no important aspects of the study have been omitted. This study was not registered.

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