Research Article

NEFPAT Plus: A Valid and Reliable Tool for Assessing the Nutrition Environment in Food Pantries

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ABSTRACT

Objective: To develop a consumer nutrition environment assessment tool to assess policy, systems, and environmental initiatives that are implemented in food pantries, which incorporates recent national guidance, and evaluate its validity and reliability.

Setting: Illinois, US.

Design: This study had 4 phases: (1) tool revision, (2) pilot testing, (3) content validity assessment, and (4) interrater and test-retest reliability assessment. The original Nutrition Environment Food Pantry Assessment Tool (NEFPAT) was revised to incorporate evidence from updated guidelines and evidence. The NEFPAT+ was pilot-tested by 9 professionals at 5 food pantries. After revisions, 18 experts rated the content validity. Interrater and test-retest reliability was based on 2–4 professionals completing independent evaluations at 21 food pantries twice, 1 month apart.

Analysis: Content validity indices and intraclass correlation (ICC) coefficients for reliability estimates were compared with established thresholds.

Results: The NEFPAT+ was rated content valid by 94% of experts. The ICC for NEFPAT+ scores indicated excellent interrater reliability (ICC: 0.96; 99% confidence interval, 0.75–0.97) and good test-retest reliability (ICC: 0.80; 99% confidence interval, 0.60–0.92).

Conclusions: Evidence supports the content validity, interrater reliability, and test-retest reliability of the NEFPAT+. Future studies can assess how NEFPAT+ scores relate to intervention outcomes and dietary behaviors.

Key Words: food insecurity, hunger, consumer nutrition environment, health equity, measure development (J Nutr Educ Behav. 2024;000:1–7.)

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INTRODUCTION

Food insecurity, the inability of household members to access sufficient nutritious food at all times, is a pressing public health concern.1 In 2021, an estimated 1 in 6 adults in the US sought free food from the charitable food system.2 This system is a nongovernmental private network of storage warehouses and program providers, made up of food banks and networks of food pantries, that redistribute food received from farmers, food corporations, federal programs, and private citizens to individuals and families. This system serves individuals who are ineligible for federal food assistance programs and households that receive insufficient federal food assistance to meet their needs.1

Historically, the charitable food system was referred to as the emergency food system because it provided short-term food supplies.4 However, the term emergency does not reflect the reality of the system. A considerable proportion of clients use food pantries long-term,5,6 and the food provided by the charitable food system is a nonnegligible proportion of clients’ dietary intake.7–9 A systematic review of studies shows consistent shortcomings in the nutrients and food groups available in the inventory at food pantries.10 Therefore, many professionals have advocated for nutrition-focused practices in the charitable food system to better address the diet and health needs of clientele.11

One increasingly common method for nutrition promotion in food pantries is through policy, systems, and environmental (PSE) interventions.12 These interventions are a collection of approaches that facilitate healthy lifestyle behaviors by changing the PSEs in the places in which people eat, learn, live, play, shop, and work.13,14 In food pantries, PSE interventions include developing suggested donation lists for donors,15,16 updating

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Tool (NEFPAT) showed strong to excellent interrater reliability in the initial development and was recently used to illustrate increased PSE strategy adoption from 2017–2020 in > 80 food pantries across the state of Illinois, reflecting the commitment of many in the charitable food system to improve the consumer nutrition environment for their clientele.

However, all published tools were developed between 2014–2017. Since then, Healthy Eating Research (HER), a national program of the Robert Wood Johnson Foundation, convened a panel of experts to develop the HER Nutrition Guidelines for the Charitable Food System to promote consistent and approachable nutrition classifications for diverse charitable food settings. Updated tools that complement the updated nutrition guidelines as well as other newly published research, address aspects of equity and culture, and changes to the charitable food system that resulted from the coronavirus disease 2019 pandemic are warranted. The objective of the current study was to revise an existing tool and evaluate evidence of its validity and reliability.

**METHODS**

**Context**

The NEFPAT was originally developed in 2017 by a collaborative team of community nutrition and public health professionals and researchers who worked for Cooperative Extension. The NEFPAT is an environmental assessment wherein observations are made of 47 strategies using a simple yes/no checklist. The strategies were organized into 5 objectives, which included: (1) increasing client choice, (2) nudging healthful foods, (3) diversifying fruit/vegetable (FV) forms, (4) diversifying FV types, (5) promoting additional resources, and (6) accommodating alternative eating patterns. At the end of the assessment, the number of strategies present is summed to produce a final score that can be categorized into bronze, silver, or gold, according to predetermined thresholds, to be used by Extension staff or food pantries to communicate progress or substantive change over time. Since its initial development, Extension and community-based professionals have used the NEFPAT when providing technical assistance to improve the consumer nutrition environment in Illinois and in other states across the US.

Although the NEFPAT has been a valuable tool for reviewing and guiding PSE initiatives, the research team decided to update the tool and related implementation material to ensure relevance to the charitable food system landscape, which has changed since 2017. This update was instigated from insights gathered while using the NEFPAT in Illinois and revealed by requests from other states to adapt the tool, new national nutrition guidelines for charitable settings, and the publication of new relevant literature. A summary of the key aspects of each stage undertaken to update and test the updated NEFPAT, referred to as the NEFPAT+, is shown in the Figure. This study is nonhuman subjects research because data were collected on the institutions and assessment processes, not about individuals and/or their personal experiences, and Institutional Review Board approval was not applicable.
Tool Review and Revision

Updating the NEFPAT began with a review of the tool in January, 2022, in which each strategy in the tool was discussed by the research team in consideration of relevant evidence. Evidence included published charitable food system nutrition guidelines, internal and external user feedback surveys, practical/implementation experience of 5 research team members, and published research not incorporated into the original NEFPAT. The internal and external user feedback surveys focused on the terminology, flow, and overall usefulness or relevance of each section of the original NEFPAT. Published research was identified through targeted searches on academic databases as well as reference lists and cited reference searches on the basis of the relevant identified literature. An extensive in-person review took place when each of the 6 research team members voted to retain, edit, add, or remove strategies. In addition, how the published charitable food system nutrition guidelines should be integrated into the updated tool was decided. Guiding rules for the review included capturing diverse perspectives and that a majority (not a consensus) was needed for each decision. After the review was complete, the resulting NEFPAT+ was sent in June, 2022 to professionals outside of the research team who worked in the field of nutrition education and/or charitable foods. These professionals provided feedback via a survey on the instructions, usability by food pantry personnel (as a secondary possible user of the tool), clarity of terms used, scoring preferences, overall length, and any other aspects they wanted to comment on. The research team reviewed the feedback from the survey in a series of meetings to make further revisions to the NEFPAT+.

Pilot Testing

The draft of the NEFPAT+ produced after the iterative revisions was pilot-tested in July, 2022 by 9 professionals at 5 food pantries in urban and rural areas of Illinois. Professionals who participated in the pilot test included food pantry personnel, as well as Extension staff with a range of prior experience using PSE assessment tools. The goal of the pilot test was to assess the feasibility of using the NEFPAT+ in the field. Pilot testers were asked to note areas of confusion, areas in need of improvement, as well as the time and effort required to complete the assessment. One research team member interviewed pilot testers after the completion of each assessment to document these impressions. After all interviews were performed, comments were reviewed by the team, and a consensus was reached on how to use each comment in updating the NEFPAT+ draft.

Content Validity Assessment

After pilot testing, expert reviewers were recruited in July, 2022 to assess the content validity of the tool. Reviewers were identified through professional networks, as authors of relevant literature, and email listservs of professionals working in charitable foods. Evaluations from 18 respondents were quantified with a content validity index in which each objective and the overall NEFPAT+ was assessed on a standardized scale of 1–4 (from not relevant to extremely relevant). At least 80% of evaluators needed to assess each item as content valid, a selection of relevant but needs minor alterations or extremely relevant to establish validity. In addition to these scores, assessors also provided qualitative comments to supplement or elaborate on their ratings. These qualitative comments were reviewed by the research team, and a consensus was reached for the NEFPAT+ draft revision.

Interrater and Test-retest

Reliability Assessment

Between August and November, 2022, Extension staff recruited food pantries to support the reliability assessment of the NEFPAT+. Efforts in food pantry recruitment were made to maximize diversity in food pantry size, urbanicity, and adoption of PSE strategies. Each food pantry was scheduled to complete the NEFPAT+ twice, with the same assessors completing the NEFPAT+ 4 to 5 weeks apart. This time interval was selected as a reasonable timeframe for a food pantry’s nutrition environment to be stable, and any changes planned for the food pantry were requested to be delayed until after the second assessment. At a minimum, 2 Extension staff completed the NEFPAT+. Food pantry personnel were also invited to complete the NEFPAT+ but were not mandated to participate in the reliability phase. Assessors (ie, Extension and food pantry professionals) were not provided training specific to the NEFPAT+ to position the NEFPAT+ as a potential self-assessment. However, participating Extension staff had a range of experience completing environmental assessments. Assessors completing the assessment were instructed not to discuss their selections on the tool with each other. A total of 22 Extension professionals and 18 food pantry personnel completed NEFPAT+ assessments at 21 food pantries. The second assessment at each food pantry 4 to 5 weeks later was completed by the same assessors. All data were collected on paper versions of the NEFPAT+ and entered into a database by a research assistant. A second research team member confirmed data entry accuracy by comparing the electronic database to paper entries.

Data Analysis

Qualitative data resulting from the tool review and revision, pilot testing, and content validity assessment stages of the study were analyzed using a basic inductive content analysis approach. Qualitative comments were collected and organized by suggestion type. Each suggestion was then independently reviewed by the research team during synchronous meetings wherein edits to integrate into the NEFPAT+ were decided on the basis of alignment with the tool’s objective, correspondence with underlying evidence and guidelines, and the feasibility of implementation.

Both reliability outcomes were estimated with intraclass correlation coefficients (ICCs). Interrater reliability was calculated by comparing
overall NEFPAT+ scores and scores for each objective produced at the initial assessment by the different staff. The ICC for interrater reliability was produced from a 1-way random-effects model because of the variation of different staff making assessments at each food pantry. The 1-way random-effects model was first generated on the basis of all assessors present at the initial assessment, and then a second model was built based only on the Extension staff completing assessments at the initial assessment to compare the interrater reliability produced. Test-retest reliability was calculated by comparing the overall NEFPAT+ scores and scores for each objective produced at the 2 different assessments by the same staff members. The ICC for test-retest reliability was produced from a mixed-effects model on the basis of all assessors who completed both a first and second assessment at their respective food pantries. A second model was built after removing data provided by food pantry personnel to assess whether estimates improved when considering only assessments completed by Extension staff. Each ICC and the corresponding 95% confidence interval (CI) was interpreted as < 0.5 (poor reliability), 0.5–0.75 (moderate reliability), 0.75–0.90 (good reliability), and > 0.9 (excellent reliability). 29 Although formal power analyses were not conducted, sample size recommendations for reliability studies were consulted. 30 All statistical analyses were conducted in Stata/MP software (version 17.0, StataCorp, 2021).

RESULTS

Tool Review and Iterative Revisions

After the research team considered each strategy on the basis of the evidence reviewed, 1 strategy was removed, 13 strategies were not changed, and the remaining 33 strategies from the original NEFPAT received major (n = 17) or minor (n = 16) revisions, which included re-wording, incorporation of additional examples, and/or separation into multiple strategies. Twenty-seven new strategies were considered for addition, of which 17 were added. Ten strategies considered but not added had reasons that included being outside of the tool’s scope, redundancy with existing strategies, inability to quantify, and better alignment with un-scored sections of the NEFPAT or in the supporting technical assistance guide. In total, the revision resulted in 105 strategies (see Supplementary Table for details about each revised, removed, and new strategy) organized into 8 objectives on the basis of similarities in overarching goals. The research team included the HER Nutrition Guidelines for the Charitable Food System’s guidance on foods to choose often, choose sometimes, and choose rarely in the cover pages, and strategies used these terms as benchmarks for which foods should be encouraged, increased, or minimized.

The draft of the tool produced after this review meeting was assessed by 13 NEFPAT users, including 4 food pantry representatives external to the research team. The user feedback surveys were positive overall, with suggestions to improve clarity for acronyms and jargon. Respondents noted that the nutrition guidelines incorporated into the tool may cause confusion, and the length of the tool may be cumbersome. One tentative new strategy related to processed and packaged snacks was revised to a multiple-choice response instead of a check-all-that-apply option before pilot testing. In addition, the research team remained attentive to areas in which clarity and length could be further improved in the subsequent research phases.

Pilot Testing

Overall, pilot testers thought the NEFPAT+ was feasible to implement, but assessors noted confusing terms, strategies that did not have clear evaluation criteria, and sections that were lengthy to complete. Many interviewees expressed concerns about the NEFPAT+ being used as a self-assessment by food pantry personnel without support from an external technical assistance provider. Interviewees reported an average time to complete of 61 minutes (range 41–90 minutes). Thus, strategies were revised for clarity, and objectives were condensed to reduce the time required to complete, bringing the total number of strategies from 105 to 87.

Content Validity Assessment

Eighteen assessors completed a content review of the drafted NEFPAT+. All objectives were rated content valid (89% to 100% scored as extremely relevant or relevant but needs minor revisions). Ninety-four percent of raters considered the overall tool content valid (3.6 ± 0.6); therefore, no content changes were made to the tool. Many assessors supplemented their ratings with qualitative comments. The research team reviewed these comments and adopted those that might improve clarity or ease in completing the NEFPAT+. Consequently, objectives were reordered, a redundant strategy was removed, and an objective assessing FV provision was combined with an objective assessing the provision of other food groups to form 1 objective encompassing all MyPlate food groups. In addition, the metrics for identifying nutritious foods throughout the assessment were simplified. Instead of including the guidance on foods to choose often, choose sometimes, and choose rarely in the cover pages and referencing these terms within strategies, each food group’s criteria to be considered choose often and/or choose sometimes was integrated into the objective encompassing all MyPlate food groups. Any subsequent strategies considered these foods to be nutritious and were referenced as such in subsequent strategies. The resulting draft had 85 strategies across 7 objectives (Table).

Interrater and Test-retest Assessment

The ICC estimates for the interrater and test-retest reliability per objective and for the NEFPAT+ overall are shown in the Table. When multiple raters completed independent assessments at the same food pantries, the ICC for the overall NEFPAT+ scores exceeded the threshold for excellent interrater reliability (ICC, 0.96; 99% CI, 0.75–0.97). Intraclass correlations for interrater reliability of the 7
The NEFPAT+ has notable advantages when compared with other existing food pantry assessment tools. The NEFPAT+ incorporates the recently published HER Nutrition Guidelines for the Charitable Food System, which used evidence-based nutrition research to outline specific recommendations for this setting. Recommendations included food-specific thresholds for categorizing foods as healthy on the basis of reviews of prior nutrition ranking systems in addition to considerations of the unique charitable foods context (eg, reliance on volunteers, respect and dignity, etc). The NEFPAT+ used these thresholds to inform strategies for different food groups. In contrast to the original NEFPAT, the NEFPAT+ also has a bolstered focus on equity, inclusion, and cultural responsiveness with the expansion of 1 strategy in the original tool to an objective with 14 strategies that food pantries can employ. Finally, in contrast with prior tools, findings support the interrater and test-retest reliability is similar whether external Extension staff or food pantry professionals complete assessments. Thus, the NEFPAT+ can be completed as a self-assessment. The NEFPAT+ is freely available for those interested in using the tool, given attribution to the original development team is indicated.

This study should be interpreted with attention to its limitations. It was only feasible for the research team to collect data to determine the reliability of food pantries in Illinois. This may limit the generalizability of results to other contexts. However, in attempts to mitigate this restriction, user feedback and content validity reviews were solicited from professionals outside of Illinois to attain perspectives from professionals in diverse US regions in which policies and practices may impact expected content. An additional limitation is that no food pantry clientele outcomes were assessed, but the dietary behaviors of food pantry clients are outside of the concept of PSE characteristics. However, this relationship would be of interest to practitioners and policymakers. Future research could explore the relationship of food pantry PSE interventions with clients’ food selection and dietary intake.

**IMPLICATIONS FOR RESEARCH AND PRACTICE**

Numerous research branches can build from these findings. Importantly, surveys of clientele at various food pantries could be used to assess whether food behaviors or dietary intake were associated with the adoption of PSE strategies in the NEFPAT+. Observational studies could also investigate how pantry or community characteristics relate to NEFPAT+ scores. This research would complement prior research, such as those that found pantry characteristics are related to food offerings and donation programs. Such research can highlight changes that facilitate the

**DISCUSSION**

The objective of this study was to revise and evaluate the validity and reliability of a food pantry nutrition environment assessment tool that incorporates the latest empirical evidence. The resulting NEFPAT+ was consistently rated as content valid by surveyed experts. In addition, the NEFPAT+ had strong to excellent interrater and test-retest reliability when used by Extension staff and food pantry personnel.

Objectives within the NEFPAT+ indicated good to excellent reliability (all ICCs > 0.85). When raters repeated assessments at the same food pantries approximately a month apart (21–73 days), the ICC for the overall NEFPAT+ scores exceeded the threshold for good test-retest reliability (ICC, 0.80; 99% CI, 0.60–0.92). Intraclass correlations for the majority of objectives exceeded the moderate or good thresholds for test-retest reliability, with the exception of objective 1. When models were restricted to a subsample of only assessments completed by Extension staff, interrater or test-retest reliability ICCs estimates were similar to the full sample (data available on request). The list of all strategies in the final NEFPAT+ is shown in the Supplementary Table, but a copy of the NEFPAT+ that is suitable for use in the field (as well as related supporting materials) will be freely available online.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Strategy No.</th>
<th>Interrater Reliability</th>
<th>Test-Retest Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1: Offer a variety of fruits and vegetables</td>
<td>3</td>
<td>0.86 (0.34–0.89)</td>
<td>0.23 (0.06–0.59)</td>
</tr>
<tr>
<td>Objective 2: Offer nutritious foods from each MyPlate food group</td>
<td>24</td>
<td>0.96 (0.74–0.97)</td>
<td>0.79 (0.58–0.92)</td>
</tr>
<tr>
<td>Objective 3: Increase the client’s choice of nutritious foods</td>
<td>6</td>
<td>0.86 (0.34–0.88)</td>
<td>0.68 (0.42–0.86)</td>
</tr>
<tr>
<td>Objective 4: Market, promote, and nudge nutritious foods</td>
<td>6</td>
<td>0.96 (0.74–0.97)</td>
<td>0.86 (0.69–0.94)</td>
</tr>
<tr>
<td>Objective 5: Has guidelines for food safety, nutrition, and customer service</td>
<td>12</td>
<td>0.95 (0.70–0.96)</td>
<td>0.58 (0.31–0.81)</td>
</tr>
<tr>
<td>Objective 6: Prioritizes health and inclusion in pantry operations</td>
<td>14</td>
<td>0.88 (0.41–0.90)</td>
<td>0.65 (0.39–0.85)</td>
</tr>
<tr>
<td>Objective 7: Promotes partnerships and provides additional resources</td>
<td>20</td>
<td>0.89 (0.44–0.91)</td>
<td>0.76 (0.53–0.90)</td>
</tr>
<tr>
<td>Overall: Identify ways food pantries promote health and nutrition</td>
<td>85</td>
<td>0.96 (0.75–0.97)</td>
<td>0.80 (0.60–0.92)</td>
</tr>
</tbody>
</table>

Note: The presented values are intraclass correlation (ICC) coefficients (99% confidence interval); ICC estimates for interrater reliability were produced from 1-way random-effects models on the basis of 2 assessments completed by 2 raters at 19 food pantries; ICC estimates for test-retest reliability were produced from mixed-effects models on the basis of 2 assessments completed by 2–3 raters at 17 food pantries.
adoption of PSE interventions. NEFPAT+ can also be used to assess the effects of policies or community-based interventions. In a recent qualitative study with food pantry personnel, a variety of interventions at the food pantry, food bank, and governmental levels were identified as potential avenues for fresh food distribution,42 and the NEFPAT+ could be used in evaluating direct or ripple effects of these initiatives.

Evidence supports the content validity, interrater reliability, and test-retest reliability of the NEFPAT+. The NEFPAT+ can be completed by community-based nutrition and public health professionals such as Extension staff as external reviewers or by food pantry personnel as self-assessments. Though developed in the US context, professionals based in countries with similar charitable food system models may consider whether research or practice that uses the NEFPAT+ may be of relevance to them. Future studies that assess how NEFPAT+ scores relate to intervention outcomes and clients’ dietary behaviors are warranted. Practitioners can use the NEFPAT+ to evaluate their PSE efforts and community-based initiatives. The NEFPAT+ was developed to support these efforts and the larger movement to promote food security, nutrition, and equity in the charitable food system.

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jneb.2024.02.004.

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