



# The Nutritional Quality of Food Provided from Food Pantries: A Systematic Review of Existing Literature

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## ABSTRACT

**Background** In many affluent countries, food-insecure households use food pantries to keep their family fed. The long-term dependence of many users on these programs calls for a systematic review of studies on the nutritional quality of food provided by food pantries.

**Objective** The purpose of this systematic review was to summarize the current scientific evidence about the nutritional quality of food bags distributed by food pantries.

**Methods** A systematic literature search was conducted in the electronic databases PubMed, PsycINFO, PsycARTICLES, and Psychology Behavioral Sciences Collection to identify cross-sectional, cohort, and intervention studies reporting baseline data conducted in high-income countries and published between 1980 and 2015, which reported the nutritional quality of food bags distributed by food pantries. Identified citations were screened in two stages and data were independently extracted by two authors using a predefined data sheet. The quality of included studies was evaluated using criteria of an adapted Ottawa Scale. The systematic review was reported in accordance to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.

**Results** Applying the two-stage screening, 9 of 1,546 articles were identified for inclusion. Nutritional quality of food bags varied widely between and within studies. Milk products, vitamins A and C, and calcium were provided in particularly low amounts. None of the studies were nationally representative and only a few studies controlled for the household composition of the recipients of food bags.

**Conclusion** Food pantries likely have a strong influence on users' diets, but the food pantries examined in the selected studies were largely unable to support healthy diets. The distribution of more perishable foods would increase users' diet quality and may have an immense potential to address malnutrition in vulnerable population groups.

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**I**N MANY AFFLUENT COUNTRIES, THE PREVALENCE OF food insecurity has increased in recent years.<sup>1-3</sup> Food insecurity exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain.<sup>4</sup>

Food insecurity tends to be higher in households relying on social assistance, in households of single parents, and in

ethnic minorities.<sup>1,3</sup> Many food-insecure households use various coping strategies, including prioritizing food quantity over quality, “stretching” food, and finding sources of free food, such as food banks and food pantries.<sup>5,6</sup> Food-insecure households are much more likely to use a food pantry than food-secure households.<sup>7-9</sup>

Traditional food pantry programs supply eligible households with predetermined bags of nonprepared food items donated by retailers, manufacturers, industries, producers, churches, and community members, which are intended to last a certain number of days, usually 3 to 5 days.<sup>10,11</sup> Recently, some food pantries have adopted a choice model where clients can shop in a grocery store-like atmosphere and choose food based on needs, preferences, and household size.<sup>12,13</sup> Although food pantries have initially been established as temporary food assistance, many users chronically rely on food pantry assistance.<sup>14,15</sup> The number of clients of most food pantries has increased steadily,<sup>16,17</sup> and over the last several decades food pantries have become a fixed part of

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food landscapes in countries such as the United States,<sup>16</sup> Canada,<sup>17</sup> Australia,<sup>18</sup> and several European countries.<sup>19–22</sup>

While food pantries usually allow people to receive their food assistance at least once per month or even weekly,<sup>23,24</sup> many users are reported to use the food pantry whenever possible.<sup>14</sup>

Long-term dependence on food pantries, in combination with the unpredictable nature of donated foods, calls for a comprehensive evaluation of the literature to summarize studies investigating the nutritional quality of food bags provided by food pantries.

This knowledge might contribute to a better understanding of the potential impacts and limitations of food pantries and may help managers of food banks and pantries identify nutritional gaps in their food supply. Finally, it may inform welfare case workers, social agencies, and other providers that often refer people to food pantries and food banks.<sup>10</sup>

This systematic review aims to summarize information with regard to the nutritional quality of food bags provided by food pantries in high-income countries. For this purpose, the review synthesizes findings of studies comparing the nutritive value of food provided by the studied pantries compared to national recommendations.

## METHODS

The systematic review adheres to the reporting guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.<sup>25</sup> Data on the nutritional quality of food bags that were distributed by food pantries were summarized according to defined outcome categories. Methods and inclusion criteria were specified in advance and the review was registered in the International Prospective Register of Systematic Reviews (PROSPERO, registration no. CRD42015024509).

## Definitions

*Food aid programs, community food programs, and food rescue programs* are just a few of the diverse terms used to denote programs that provide charitable food assistance. Throughout this article, the terms *food banks* and *food pantries* are used according to the definitions presented here. When citing results of the included studies, the definitions of the study authors were used.

Food banks usually receive large quantities of foods from industry, manufacturers, and federal or supranational sources, such as The Emergency Food Assistance Program<sup>26</sup> or the European Union Food Aid,<sup>27</sup> and distribute these foods to smaller charitable agencies, including soup kitchens and food pantries.

Food pantries tend to be smaller than food banks and serve clients directly.<sup>28</sup> In addition to foods received from food banks, food pantries usually collect foods, including perishable food items, and provide those in bags for clients to take home.<sup>16</sup>

## Study Eligibility Criteria

To be included in this systematic review, articles had to describe a cross-sectional, cohort, or intervention study reporting baseline data. In addition, included studies had to report on activities that regularly provide food in bags to take home alone or in combination with other food-related

services, such as assistance related to government programs or nonfood services, such as assistance with clothes. The distribution of food bags had to be free of charge or at minimal fixed costs and had to be undertaken by nonfederal charitable food assistance agencies and conducted in high-income countries. World Bank definitions were used to categorize high-income countries.<sup>29</sup>

Furthermore, the article must have provided original data on the nutritional quality of the supplied food bags by comparing the dietary content with dietary recommendations and had to be published in English or German.

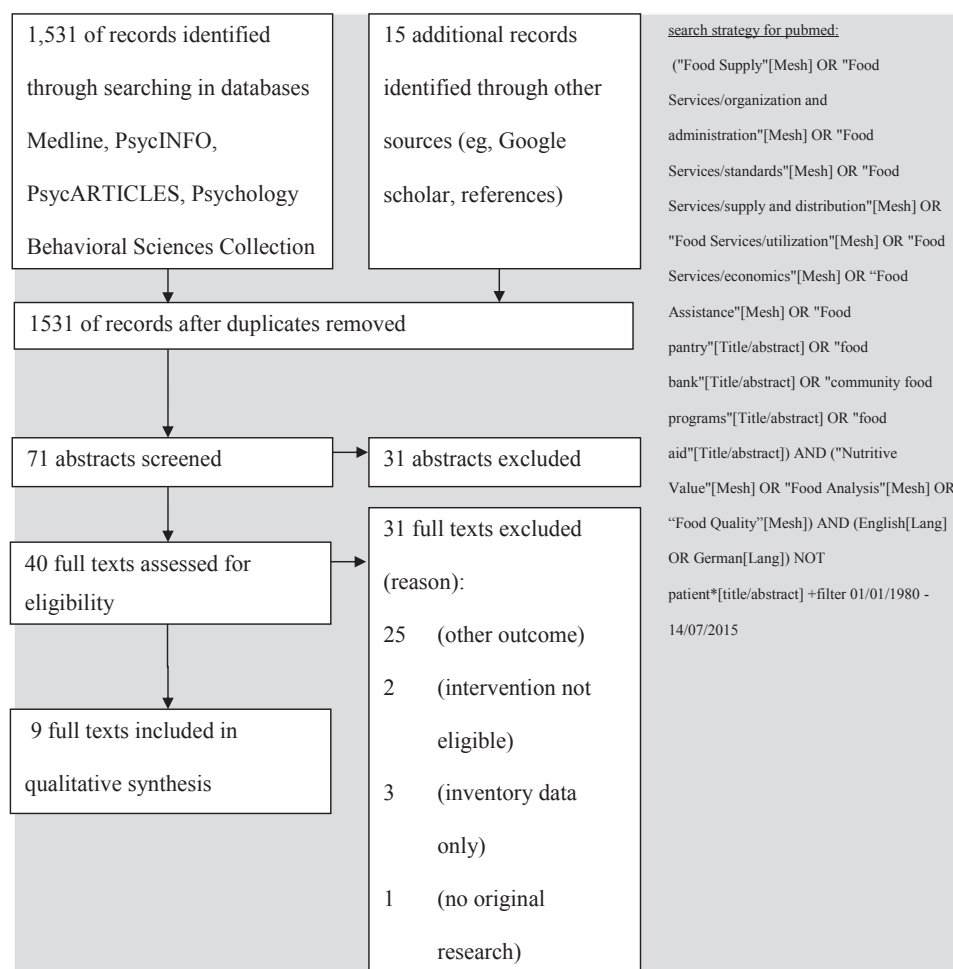
Although there are common features of food banks operating in low-, middle-, and high-income countries, food bank programs in low-, and middle-income countries differ from food banks in high-income countries in several measures. For instance, food banks in Uganda provide seeds and practical training in farmer methods and agribusiness to farmers directly,<sup>30</sup> whereas food banks in high-income countries sometimes cooperate with local farmers and farmers' cooperatives to expand their range of donors, but they do not usually teach them.<sup>16</sup> Due to the complexity of these differences, studies conducted outside high-income countries were excluded. Due to differences in operations, aims, and eligibility criteria between usual food pantries and food pantries for children only, articles were excluded from formal review if they focused on children and/or youth programs only. They were also excluded if they reported on beverage and food inventory of food banks or food pantries only, because the inventory data may not necessarily reflect the amount and quality of food provided to any single user. Articles were likewise excluded if they reported on interventions that provided prepared meals to participants, such as soup kitchens or Meals on Wheels programs; on food subsidy programs, including interventions providing food vouchers; or on community garden and community-supported agriculture programs. Finally, intervention studies providing foods to individuals for a short time (study duration <6 months) were excluded. These interventions may be promising approaches to improve the nutritional quality of provided food, but they may not reflect the "usual" food supply of food pantries in the long term.

## Searching

A systematic literature search was performed in the electronic database Medline using the medical subject headings (MeSH) *food supply*, *food services*, *food assistance*, and *nutritive value*, *food quality*, and free-text keywords such as *food bank*, *food pantry*, and *community food assistance* (Figure 1). In the electronic databases PsycINFO, PsycARTICLES, and Psychology Behavioral Sciences Collection, combined free-text keywords were used. The last search was conducted on July 14, 2015.

In addition, reference lists of all included articles were screened by hand for potentially eligible articles. Specialized websites, including food bank website, were scanned and organization's publications including annual reports were reviewed to identify relevant gray literature.

All citations were screened in two stages. The initial screening (conducted by author A.S.) was based on titles, abstracts, and keywords. Full-text versions of the citations were obtained if there was doubt regarding eligibility. At the second stage, full texts were independently assessed for



**Figure 1.** Flow diagram of study selection to identify studies investigating the nutritional quality of food provided from pantries.

eligibility by two authors (A.S. and J.D.). Differences between the authors' assessments were resolved by discussion and, when necessary, in consultation with a third author (N.S.-B.). In cases where multiple articles reported on the same food assistance program, articles were included if they reported different results.

### Data Extraction and Quality Assessment

The data extraction was independently performed by two authors (A.S. and J.D.) using an *a priori* data extraction form. Extracted data included study authors, publication year, study design, description of intervention, sample size and sizes of food bags, description of data collection method, and references used for the evaluation of the nutritional quality of foods provided, as well as outcomes. Primary outcome was the nutritional quality of food bags supplied by food banks and/or pantries with the following outcome categories: overall nutritional quality, energy, food groups, and nutrients. Nutritional quality was defined as the amount and type of food and nutrients compared to (national) recommendations.

To illustrate the extracted quantitative results of the primary studies, graphs were created by using a spreadsheet program (Excel 2007, Microsoft Corporation).

Due to the heterogeneity of study designs and outcome assessment measures, summaries consist primarily of qualitative information.

Included studies were independently evaluated for risk of bias by two authors (A.S. and J.D.) using three criteria (selection, comparability, and outcome) of the Newcastle-Ottawa scale<sup>31</sup> adapted for cross-sectional studies.

### RESULTS

The systematic literature search in databases yielded 1,431 citations, of which 7 fulfilled the inclusion criteria. An additional 15 studies were identified by articles' references lists or website hand-searches, of which two fulfilled the inclusion criteria. The detailed study selection process is illustrated in Figure 1.

### Characteristics of Included Studies

Of the nine studies, eight were cross-sectional in design<sup>32-39</sup> and one study was based on data from 3 nonconsecutive years (Table).<sup>40</sup>

Five studies were conducted in Canada,<sup>33,34,37,38,40</sup> and two of them investigated the same food pantry at different time points<sup>34,40</sup>; three were conducted in the United States,<sup>35,36,39</sup>

**Table.** Characteristics of nine articles reporting the nutritional quality of food bags provided from food pantries

Author(s), year, reference	Country	Study design	No. of food bags	No. of food banks/ pantries	Investigated bag sizes (separate results)	Intended no. of days	Perishable items available	Nutritive outcome	Comparison of group mean with reference (reference)	Percentage of bags with inadequate supply (reference)	No. of days of adequate provision (reference)
Jessri and colleagues, 2014 <sup>40</sup>	Canada	Time series	1,025	1	1-5 (yes)	4	Yes	G, <sup>a</sup> F/V, <sup>b</sup> MD, <sup>c</sup> MA, <sup>d</sup> En, <sup>e</sup> Cb, <sup>f</sup> Pr, <sup>g</sup> Fa, <sup>h</sup> Fi, <sup>i</sup> A, <sup>j</sup> C, <sup>k</sup> Ca, <sup>l</sup> Fe, <sup>m</sup> Zn <sup>n</sup>	Yes (CFGHE, <sup>o</sup> RNI <sup>p</sup> )	No	No
O'Reilly and colleagues, 2012 <sup>32</sup>	Australia	Cross- sectional	21	1	Not declared (no)	6.8±0.5	Not declared	G, F, <sup>q</sup> V, <sup>r</sup> MD, MA	Yes (AGHE <sup>s</sup> )	No	No
Irwin and colleagues, 2007 <sup>33</sup>	Canada	Cross- sectional	180	1	1-6 (no <sup>t</sup> )	3	Yes, but not included in analyses	G, F/V, MD, MA, En, Cb, Pr, Fa, A, B-12, <sup>u</sup> C, D, <sup>v</sup> Ni, <sup>w</sup> Ri, <sup>x</sup> T, <sup>y</sup> Ca, Fe, Mg, <sup>z</sup> Zn	Yes (CFGHE, DRI <sup>aa</sup> )	Yes (DRI)	Yes (CFGHE, DRI)
Willows and Au, 2006 <sup>34</sup>	Canada	Cross- sectional	4	1	1; 2 (yes)	4	Yes	G, F/V, MD, MA, En, Fa	Yes (CFGHE)	No	No
Akobundo and colleagues, 2004 <sup>35</sup>	USA	Cross- sectional	133	19	Not declared (no)	—	Not declared	G, F, V, MD, MA, Cb, Pr, Fa, Fi, A, C, Fo, <sup>bb</sup> Ca, Fe	Yes (INQ <sup>cc</sup> : Nutrition Facts, RDA <sup>dd</sup> )	No	Yes (FGP <sup>ee</sup> )
Greger and colleagues, 2002 <sup>36</sup>	USA	Cross- sectional	58	2	3; 4 (no)	3	No, but optional foods	En, Pr, A, C, Fo, Ca, Fe	Yes (RDA)	No	No
Teron and colleagues, 1999 <sup>37</sup>	Canada	Cross- sectional	85	18	Not declared (no)	3	No	En, Pr, A, B-12, C, D, Fo, Ni, Ri, T, Ca, Fe, Mg, Zn	No	Yes (RNI)	Yes (RNI)

(continued on next page)

**Table.** Characteristics of nine articles reporting the nutritional quality of food bags provided from food pantries (*continued*)

Author(s), year, reference	Country	Study design	No. of food bags	No. of food banks/ pantries	Investigated bag sizes (separate results)	Intended no. of days	Perishable items available	Nutritive outcome	Comparison of group mean with reference (reference)	Percentage of bags with inadequate supply (reference)	No. of days of adequate provision (reference)
Starkey, 1994 <sup>38</sup>	Canada	Cross- sectional	25	1	Not declared (no)	3	No	G, F/V, MD, MA, En, Pr, A, B-12, C, D, Fo, Ni, Ri, T	Yes (CFGHE, RNI)	No	No
Friedman, 1991 <sup>39</sup>	USA	Cross- sectional	68	4	Not declared (no)	3	Yes, sometimes	G, F/V, MD, MA, En, Pr, A, C, Ni, Ri, T, Ca, Fe, K, <sup>ff</sup> Ph <sup>99</sup>	Yes (RDA)	No	No

<sup>a</sup>G=grain products.  
<sup>b</sup>F/V=fruit and vegetable.  
<sup>c</sup>MD=milk and other dairy products.  
<sup>d</sup>MA=meat and alternatives.  
<sup>e</sup>En=energy.  
<sup>f</sup>Cb=carbohydrates.  
<sup>g</sup>Pr=protein.  
<sup>h</sup>Fa=fat.  
<sup>i</sup>Fi=Fiber.  
<sup>j</sup>A=vitamin A.  
<sup>k</sup>C=vitamin C.  
<sup>l</sup>Ca=Calcium.  
<sup>m</sup>Fe=Iron.  
<sup>n</sup>Zn=Zinc.  
<sup>o</sup>CFGHE=Canadian Food Guide to Healthy Eating.  
<sup>p</sup>RNI=Reference Nutrition Intake.  
<sup>q</sup>V=vegetables.  
<sup>r</sup>F=fruits.  
<sup>s</sup>AGHE=Australian Guide to Healthy Eating.  
<sup>t</sup>Because no differences were found.  
<sup>u</sup>B-12=vitamin B-12.  
<sup>v</sup>D=vitamin D.  
<sup>w</sup>Ni=niacin.  
<sup>x</sup>Ri=riboflavin.  
<sup>y</sup>T=thiamin.  
<sup>z</sup>Mg=magnesium.  
<sup>aa</sup>DRI=Dietary Reference Intake.  
<sup>bb</sup>Fo=folate.  
<sup>cc</sup>INQ=Index of nutritional quality calculated as the nutrient content of the food bags' foods per 1,000 kcal, compared with a standard reference nutrient value adjusted per 1,000 kcal of intake.  
<sup>dd</sup>RDA=Reference Dietary Allowance.  
<sup>ee</sup>FGP=US Food Guide Pyramid.  
<sup>ff</sup>K=potassium.  
<sup>99</sup>Ph=phosphorus.

and one in Australia.<sup>32</sup> Sample sizes ranged from four food bags<sup>34</sup> to >1,000 bags,<sup>40</sup> selected from single food pantries<sup>32-34,38,40</sup> or 2<sup>36</sup> up to 19 pantries.<sup>35</sup> Pantries usually provided bags of diverse sizes, depending on the number of individuals in recipient's households, but only two studies reported results for different sizes separately.<sup>34,40</sup> Bags were typically intended to last 3<sup>33,36-39</sup> or 4 days<sup>34,40</sup> and included mainly nonperishable staple foods. Additional perishable foods, such as fruit and/or vegetables, were provided when available,<sup>33,34,39,40</sup> but only two studies calculated the nutritional quality for bags containing nonperishable foods and those containing nonperishable and perishable foods separately.<sup>34,40</sup>

All studies collected data by recording the food items available in the bags. Adequacy of nutritive value of supplied food bags was mostly evaluated by comparing the mean nutritive value with references.<sup>32-36,38-40</sup> Two studies calculated the percentage of bags with inadequate supply (Table).<sup>33,37</sup> Three studies also calculated the number of days the bag content provided the recommended minimum number of servings per food group<sup>33,35</sup> or nutrients.<sup>37</sup> The references used most often for food groups were national guidelines, such as the Canadian Food Guide to Healthy Eating or the Food Guide Pyramid,<sup>32-35,38,40</sup> and for nutrients the Recommended Dietary Allowance or the Reference Nutrient Intake (Table).<sup>33,35-40</sup>

Reported outcomes varied widely, with seven studies reporting supply of energy.<sup>33,34,36-40</sup> All of the included studies also reported supply of at least one macronutrient.<sup>33-40</sup> Seven studies evaluated the nutritive value of supplied food groups<sup>32-35,38-40</sup> and eight studies reported the nutritional adequacy of between 5 and 12 micro-nutrients (Table).<sup>33-40</sup>

### Risk of Bias of Included Studies

The nine included studies were rated, on average, with 2.7 of a maximum of 4 stars, where 4 stars was a low risk of bias.

Using the criterion "selection" of the Newcastle-Ottawa Scale<sup>31</sup> adapted for cross-sectional studies, none of the studies were found to be nationally representative of food pantries. However, three studies were based on random samples of bags of one<sup>33,38</sup> or two food pantries<sup>39</sup> and two were rated to be at least somewhat representative.<sup>34,37</sup> While most studies controlled bag content for the number of days the bags were originated to last and adjusted for the number of individuals in the household, only two studies controlled for household composition by differentiating between adults and children (criterion "comparability").<sup>34,37</sup> All studies except one, which did not describe the assessment of outcome,<sup>34</sup> used standardized methods to assess the outcome (criterion "outcome"). The detailed evaluation of the risk of bias for the included studies is available on request from the corresponding author.

### Results of Included Studies

The study that investigated the food bags over 3 nonconsecutive years reported that the nutritional quality improved between 2006, 2010, and 2011 for almost all food groups and nutrients and all five bag sizes.<sup>40</sup> In this review, results are presented for the most recent year (2011) only.

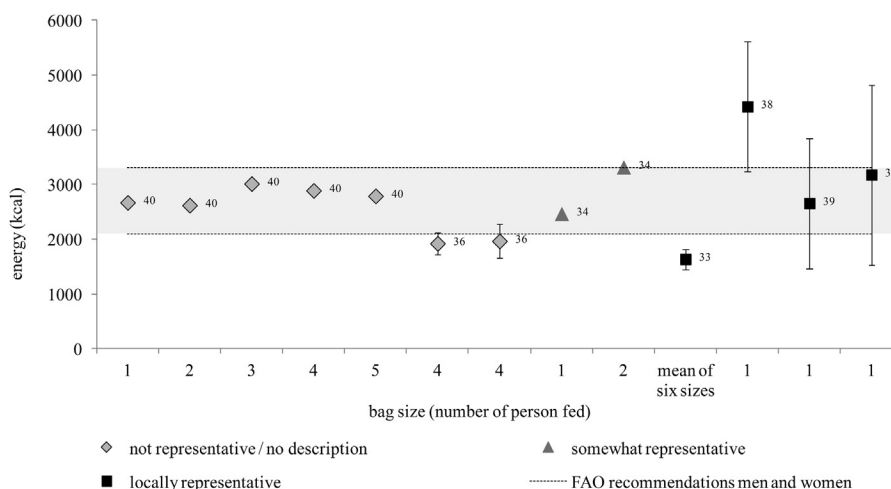
For studies reporting results for studied food pantries or sizes of food bags separately, results were also reported separately in this review.

### Overall Nutritional Quality

None of the studies investigated the overall nutritional quality of food provided by food pantries.

### Energy

Figure 2 shows the mean energy supply reported by six studies along with recommendations of the Food and Agriculture Organization of the United Nations for energy intake given a moderate activity level (mean physical activity level



**Figure 2.** Mean supply of energy per person in food bags provided from food pantries reported in six studies. Note: each sign represents an average supply per person from the reviewed literature; the vertical lines represent standard deviations, where available; the gray space between lines represents the recommendations from the Food and Agriculture Organization of the United States (FAO). Greger and colleagues<sup>36</sup> reported the results for two pantries separately; Friedman<sup>39</sup> reported the results for urban and rural food pantries separately.



of 1.75) and an assumed body weight of 60 kg and 80 kg for women and men, respectively.<sup>41</sup> Mean provision of energy met or exceeded recommendations in four of six studies (five of eight pantries) (Figure 2).<sup>34,38–40</sup> Two papers reported the percentage of bags with inadequate energy supply and found that 33%<sup>37</sup> and 99%<sup>33</sup> of bags did not meet the recommendations (see Figure 3).

As seen in Figure 4, two studies calculated the mean number of days for which the bag content provided the recommended minimum energy. Large variations were evident within and between these two studies.<sup>33,37</sup>

## Food Groups

Dairy products were one of the food groups most often provided in inadequate amounts, as four of five studies reported an insufficient supply at least for some sizes (Figure 5).<sup>32,33,38,40</sup> Three studies reported that the mean number of servings provided was adequate for the intended number of days for fruits and vegetables (F/V),<sup>34,38,40</sup> but one Australian and one Canadian study reported inadequate supply of F/V.<sup>32,33</sup> Supply of meat and alternatives exceeded recommendations in two studies,<sup>34,40</sup> but was low in animal protein.<sup>34,40</sup> Two studies reported insufficient provision of meat and alternatives<sup>32,33</sup> and one reported adequate supply.<sup>38</sup> All five studies comparing provision of food groups with recommendations reported adequate provision of grain products for the intended number of days (Figure 5).<sup>32–34,38,40</sup>

Supporting these results, in both studies calculating the minimum number of days for which the bag content provided the recommended minimum number of servings of food groups, milk products would last the least longest, with 3 days<sup>35</sup> and 0 days.<sup>33</sup> The supply of meat and alternatives would last longest (Figure 4).

## Macronutrients and Micronutrients

While the mean supply of macronutrients mostly met recommendations, two studies, which were conducted in the same campus-based food bank at the same university at different times, reported a relatively low supply of fat

(Figure 5).<sup>34,40</sup> Teron and Tarasuk<sup>37</sup> found 9% of bags supplied by 18 randomly selected food pantries in Toronto had an inadequate supply of protein (Figure 3), whereas the mean number of days of adequate supply was more than 6 days, clearly above the intended minimum of 3 days (Figure 5).

Considering nonperishable foods only, the amounts of vitamins A and C provided by six pantries were, on average, below or borderline above Recommended Dietary Allowance values with large variations (Figure 5).<sup>33,34,36,38–40</sup> Folate, niacin, riboflavin, thiamin, and vitamins B-12 and D were, on average, provided in adequate amounts (Figure 5).<sup>33,37–39</sup>

Mean supply of calcium, iron, and zinc was reported to be inadequate in some of the studies (Figure 5).<sup>33–36,40</sup> Iron was mostly provided by beans, which is nonheme.<sup>33,34</sup>

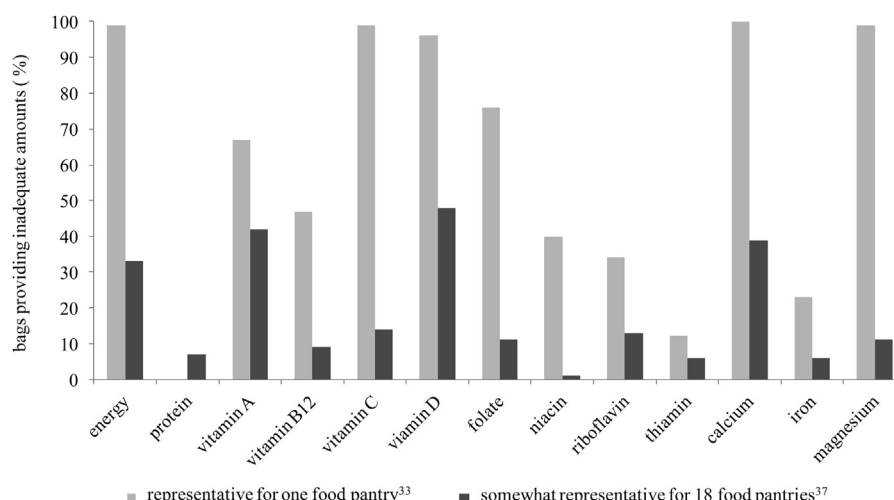
As seen in Figure 3, large percentages of investigated bags did not provide an adequate amount of vitamins A and D and calcium. However, large differences in the percentage of bags with inadequate supply were evident between the two studies reporting on these data. For instance, Irwin and colleagues<sup>33</sup> found 99% of bags provided inadequate amounts of vitamin C, whereas Teron and Tarasuk<sup>37</sup> reported that 14% of the 85 bags examined from 18 food pantries provided an inadequate supply of vitamin C.

Large variations within and between studies were also found for the estimated number of days of adequate supply of nutrients provided by the bags (Figure 4).

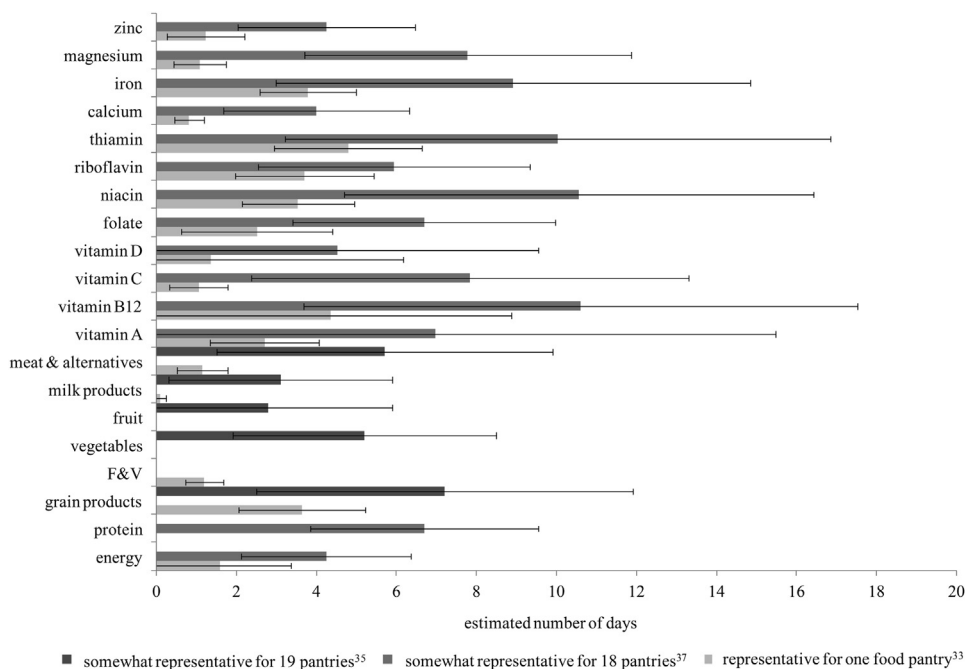
For instance, Teron and Tarasuk found the mean supply of vitamins A and C was adequate for 7 and 8 days, respectively.<sup>37</sup> In contrast, Irwin and colleagues<sup>33</sup> found vitamins A and C lasted only around 2 days and 1 day.

## DISCUSSION

Systematically reviewing existing data from published data showed large variations in the supply of energy, food groups, and nutrients provided by food pantries between the included study samples. Two studies concluded that the food supply of food pantries was adequate,<sup>36,39</sup> while seven studies found that the amount and type of food was inadequate for the number of days the food was intended to last.<sup>32–35,37,38,40</sup>



**Figure 3.** Percentage of food bags providing inadequate amounts of energy and nutrients reported in two studies. Note: each column represents the prevalence of inadequate supply reported in the review literature.



**Figure 4.** Mean number of days of inadequate provision of energy, food groups, and nutrients provided by food pantries reported in three articles. Note: each bar represents the mean number of days of adequate provision reported in the reviewed literature; the horizontal lines represent standard deviations, where available. F&V=fruit and vegetable.

Similar variations were observed within study samples with the results that even food groups and nutrients for which the mean supply was sufficient, a substantial percentage of the food bags did not meet recommendations. In particular, the supply of dairy products and products containing vitamin A, vitamin C, zinc, and calcium was insufficient for the intended number of days and people. F/V were mostly represented by tomato sauce, canned fruit or vegetables, and juice,<sup>34,38</sup> but some food pantries provided perishable foods, such as fresh apples, carrots, and yogurt when available.<sup>34,39,40</sup> These items improved the nutritional quality of bags, but their supply strongly depended on donations from retailers or manufacturers.<sup>40</sup>

The observed low supply of dairy products and calcium is a finding of particular concern, given that many users of food pantries have been shown to have an inadequate intake of dairy products and calcium.<sup>42-44</sup> Surprisingly, the mean supply of F/V was adequate in all studies except two, despite vitamins A and C often being supplied in amounts lower than recommended. In contrast, many studies investigating the dietary quality of users of food pantries reported that pantry users had an adequate intake of vitamins A and C, but an inadequate intake of F/V.<sup>44-47</sup> Although the results of this review are not able to explain these mismatches, the discrepancy might be caused by differences in sampling and data collection. In addition, food pantries are likely not the only source of food for food pantry users.

Recipients of food pantries' assistance may buy additional food items to increase the nutritional value of their meals. As reported by Daponte and Bade<sup>48</sup> conducting focus groups among food pantry recipients in Pennsylvania, the provision of some ingredients for a complete meal, for instance, spaghetti sauce and pasta, may encourage recipients to buy additional food items, such as meat, in order to make their

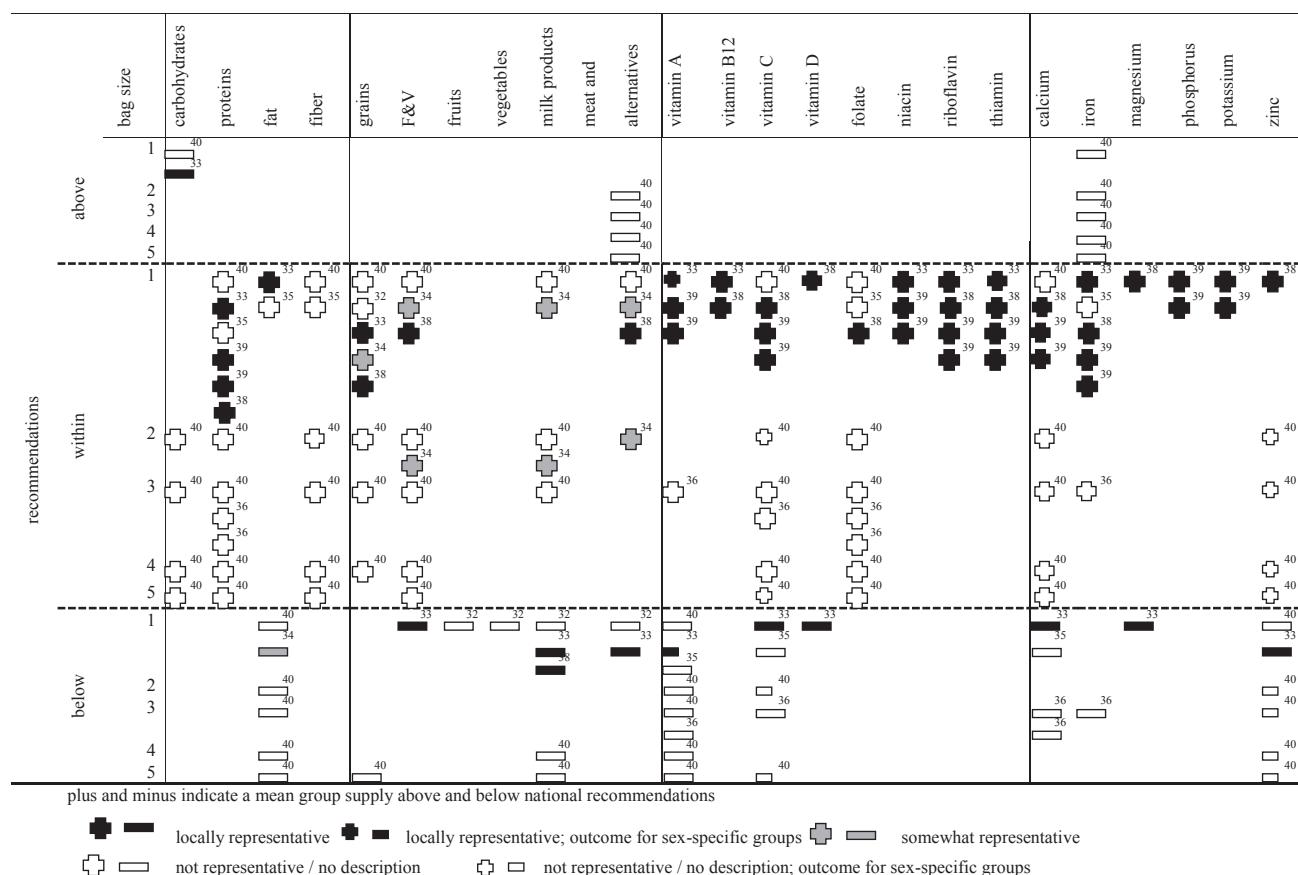
meal "complete." Some food pantry users were reported to use multiple food pantries,<sup>36,49,50</sup> indicating that food-insecure households tend to combine multiple food sources to keep their families fed.

Given that many clients rely on food bags from food pantries on a chronic basis,<sup>14,15,47,51-53</sup> it has been argued that the initial mission of food pantries to distribute food in order to alleviate hunger in the short term no longer met the nutritional and social needs of typical food pantry users.<sup>54</sup>

The observation that food pantries today may provide continuous food support rather than emergency food assistance might have contributed to the controversial debate about the role of food pantries in the whole food-security safety net.<sup>10,55,56</sup> While there seems broad consent that food pantries' assistance serves as a supplement to federal food security activities,<sup>24</sup> in US national samples, only around 50%<sup>16</sup> and in regional (convenience) samples between 15% and nearly 90% of food pantry users also used federal food assistance programs.<sup>50,57-60</sup> In countries such as in Canada, France, or Germany, large percentages of food pantry users relied on social assistance,<sup>42,61,62</sup> suggesting that social benefits may be insufficient to ensure that all households are able to acquire enough food to feed their families. A detailed analysis of the political, economical, and individual reasons for these observations is beyond the scope of this review. However, it is important to note that in diverse countries with different federal welfare systems, many food pantry users chronically rely on the assistance of charitable food assistance.

Some food pantries and food banks have begun to respond to the shifting needs of their clients. For instance, in 2004 the Food Bank of Central New York adopted a "no soda, no candy" donation policy, with the result of a substantial decrease in the amount of soda and candy accepted at the food bank.<sup>63</sup> To increase the supply of F/V, some food pantries and food banks





**Figure 5.** Comparisons of food supplied from food pantries with national recommendations reported in eight studies. Note: Jessri and colleagues<sup>40</sup> provided data for six bag sizes separately; supply of iron was more than recommended but non-heme; Willows and Au<sup>34</sup> presented data for two bag sizes separately; Greger and colleagues<sup>36</sup> reported data for two food pantries separately; Friedman<sup>39</sup> presented data for urban and rural food pantries separately.

have begun to work with local farmers and farmers' cooperatives.<sup>16,64</sup> Supplying mainly fresh produce rather than nonperishable items may have particular benefits to the diet of low-income populations, as many low-income individuals state that they cannot afford fresh produce due to the high costs.<sup>65–67</sup>

While around half of the US food banks participating in a national online survey reported that they used “common sense” in classifying the nutritional quality of their food inventory,<sup>68</sup> other food banks and researchers applied a nutrition-profiling system to measure the food distributed in terms of MyPyramid days<sup>69</sup> or used linear programming to identify food items required to mitigate nutritional deficiencies in the food donations.<sup>70</sup> While these approaches may be useful for measuring nutritional quality of food distributed by food pantries, their potential benefits depend on whether food pantries have the personal and financial capacity and facilities to manage required changes in their food supply. For instance, fresh milk products, a food item that was found to be supplied in particularly low amounts, usually need to be stored in refrigerators; new food donors have to be gained; fresh produce involves prompt distributions from donors to clients requiring investments in trucks and fuel.<sup>54,71</sup>

Staff of food banks often have concerns that if they implement bans of food items of low nutritional quality, donors may discontinue or reduce donations of all foods, including those of higher nutritional quality.<sup>68,71</sup> Future research may explore the extent to which donors will accept or even encourage providing a more selective range of foods.

Many food banks are concerned about the nutritional quality of the food they distribute,<sup>68,71</sup> but due to their charitable character they not only have to deal with limited resources but also might lack the professional background to develop strategies to improve nutritional quality. Therefore, they might benefit from national resources such as nutritional guidelines, public health programs, and reliable, user-friendly tools to assess the nutritional quality of foods. Trained registered dietitian nutritionists could assist food banks in developing donor policies and applying diet quality rating tools. Nutrition specialists could also provide nutrition education and cooking programs to clients and food safety training to staff.<sup>72</sup>

### Limitations

There are food pantries and food banks in many industrialized countries,<sup>16–18,73</sup> but most of the identified articles reported studies from the United States or Canada only. Many

European food pantries and banks, including the German food bank network, are arguing to distribute more perishable food<sup>74,75</sup> than those observed in the included US and Canadian studies. However, due to insufficient data, it is not possible to exactly quantify differences in types and amounts of supplied food between countries. In addition, welfare systems are different between countries in which studies were conducted, possibly affecting demands on the charitable food sector. Therefore, results of the included studies can hardly be generalized or transferred to all food pantry and food banks operating in high-income countries.

Finally, studies were excluded if they investigated food bank's or pantry's inventory only. For instance, Ross and colleagues<sup>76</sup> reported a significant increase in F/V donations in the six investigated food banks over the last years, whereas Campbell and colleagues<sup>63</sup> observed a notable reduction in donations of vegetables. The limitation of articles reporting the nutritional quality of food provided to clients might give an incomplete picture of food-related activities of food pantries and food banks.

Otherwise, articles reporting inventory data do not necessarily reflect the nutritional quality of food provided to food pantry users, which is the subject of this review.

## CONCLUSIONS

Results of this review suggest that most studied food pantries were not able to provide amounts and types of foods that were adequate for a balanced diet for the intended number of days the food bags were declared to last. Given the direct provision of food items (and not prepared meals), food pantries likely have a strong influence on users' diets, resulting in an immense potential to address malnutrition in vulnerable population groups.

The future success of food banks and food pantries may be determined by their ability to respond to the shifting nutritional needs of their clients. Increasing the distribution of perishable foods, such as fresh F/V, whole grains, and milk products, is likely to have the potential to improve the diet quality of food pantry users. By focusing on selected nutritious foods and providing educational and/or practical interventions, the institutionalized food bank net might have the chance to be developed into an individual-oriented public health provider in the future. Changing the claim to provide a full supply for a certain number of days to the distribution of perishable, nutrient-dense foods as an addition to clients' own resources requires the clients' ability to cover their basic needs with own resources. In the absence of a political solution, many food pantry users have no alternative to the charitable food relief, as they simply do not have enough resources to feed themselves and their families. The problem's solution has to be a political one and cannot be delegated to charities. Due to the unpredictable nature of food donations, they are hardly able to provide a reliable full menu plan and it is our profound conviction that they should not have to.

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