Nutrition Research and Practice

Original Research

Check for updates

§**Corresponding Author:**
Sung-Bum Kim
Department of Business Administration, Inha
University, 100 Inha-ro, Michuhol-gu, Incheon
22212, Korea.
Tel. +82-32-860-7739
Fax. +82-32-863-1337
Email. kimsungb@inha.ac.kr

ORCID iDs
Eunhye Park
https://orcid.org/0000-0002-5470-3065
Sung-Bum Kim
https://orcid.org/0000-0003-2817-6457

Conflict of Interest
The authors declare no potential conflicts of
interests.

Food preparation on a budget: an analysis of food consumption practices and the role of health consciousness

Eunhye Park [iD] [1] and Sung-Bum Kim [iD] [2§]

[1]Department of Food Nutrition, College of BioNano Technology, Gachon University, Seongnam 13120, Korea
[2]Department of Business Administration, Inha University, Incheon 22212, Korea

ABSTRACT

BACKGROUND/OBJECTIVES: This study is of significant importance as it aims to understand the food consumption practices of those trying to save money on food and the role of health consciousness in food choices. The specific objectives of the current study are 1) to track levels of online community activation over time in 2 online budget food communities, 2) to explore specific ingredients and food groups that are frequently mentioned in budget communities, and finally, 3) to compare the foods and staples of regular budget food and healthy budget food communities. These objectives are crucial in providing a comprehensive understanding of food consumption practices and health consciousness.
SUBJECTS/METHODS: The data source for this study was Reddit, and subreddits related to budget foods were targeted for data preparation. After creating a food name dictionary, keyword analysis and topic modeling were conducted to identify key food groups. We compared the regular budget food group to the health-conscious budget food group.
RESULTS: The food items commonly mentioned in both groups could serve as key staples for people looking to save money on food preparation. Rice was mentioned the most in both groups. Whereas meat and flour products were more important to the regular budget food group, fruits and vegetables were more valuable to the healthy budget food group.
CONCLUSION: The results of this research offer insights into the food purchasing behaviors of those attempting to save money and provide practical strategies to make budget foods healthier. This information can be valuable for individuals, policymakers, and health professionals in promoting more nutritious food choices.

Keywords: Budget; food; price; health; consciousness; topic modeling

INTRODUCTION

For consumers, food price and cost increases directly influence household spending on food and dietary/purchasing choices [1]. People have reported facing challenges managing their limited household budgets, particularly when purchasing food. On the other hand, food price and cost pose a crucial barrier to healthy eating [2,3]. Food spending is typically the adjustable aspect of the weekly budget [4]. Since 2020, food prices have consistently risen due to global and national factors. These elements have also driven up the costs of fuel,

feed, and fertilizer, further worsening the increase in food prices. Income level, income fluctuations, and rising costs of living are crucial factors affecting economic access to healthy food [5]. The affordability of nutritious diets depends on the prices of food and beverages and the financial resources accessible to households [1].

Individuals are increasingly preparing homemade meals because restaurant meal costs have increased sharply. Individuals perceive homemade meals as more economical and healthier than restaurant meals [4]. Prior studies report the association between home-cooked foods and diet quality [6]. Many governmental and nongovernmental organizations worldwide advocate for home cooking as a fundamental element of strategies addressing obesity [7].

Health consciousness is a significant determinant of healthy eating habits. Previous studies investigated what health-related or health-unrelated attributes individuals consider significant when making dietary choices. Other studies also examined the connection between health consciousness and pricing [2,3,6]. Previous studies documented the challenges people face in meeting their food requirements within the confines of limited incomes. Other studies also delved into how high-income households handled their expenses and how strategies for budgeting food varied between low- and high-income groups. If a larger household food budget is the primary predictor of healthy eating, then the food choices of low-income individuals will improve if they have a higher food budget. If the food expenditure of high-income individuals is restricted, their diets will likely become less healthy [4].

A person's identity and self-image are based on a connection to a specific cluster or community [8]. Self-identity is an essential factor related to consumption behavior [9]. Health identity is "individuals' identification with being a healthy person" [10]. Health identity can be defined as "a combination of health consciousness and health orientation" (p. 394) [11,12]. Social media significantly shapes health consciousness by giving individuals easy, quick, and anonymous access to information about their health concerns or lifestyles [13]. It is a powerful platform for disseminating and supporting healthy eating among adolescents and adults [14]. Specifically, we chose to study Reddit because it is an anonymous online discussion forum comprised of sub-forums (subreddits) and is 1 of the 5 most frequently visited social networking sites in the United States [15] Reddit users choose to engage according to their interests and subjects. They communicate and discuss opinions and sensitive topics through submissions and comments.

To date, previous studies have mainly examined how relationships with social media and advertisements impact consumers' behaviors (e.g., consumption, food behavior, and food) [16-18]. Other studies have also reported on the factors (e.g., consumers' health consciousness, knowledge, subjective norms, motivations, and sociodemographic attributes) influencing consumers' buying and eating behaviors related to healthy foods [19-22]. However, social media and online platforms where individuals share health-related issues remain under-researched [23] within the food industry context.

This research aims to examine online budget food communities to address this research gap. The following are the specific objectives of this study. First, this study aims to track levels of online community activation over time to understand the effects of external variables, such as consumer food prices, on activity levels in 2 online budget food communities. Second, this study explores specific ingredients and food groups frequently mentioned in budget communities because these ingredients could serve as key staples for people looking to save

money on food consumption. Finally, to assess the significance of health consciousness in food consumption, this research compares the foods and staples of a regular budget food community and those of a healthy budget food community.

SUBJECTS AND METHODS

Data collection

The data source for the current study was Reddit, a social networking site that allows users to create and participate in online communities focused on various interests known as subreddits. For this study, we utilized the Reddit application programming interface (API) with HTTP requests within the Python programming language to extract data from public subreddits. The Reddit API permits developers to extract various data (e.g., user information, comments, and posts) from Reddit and to receive these data in a structured format.

A detailed data filtering process was implemented to ensure the relevance and quality of the data collected. This process involved removing duplicate posts, filtering out non-English content, and excluding posts and comments that did not contain any of the predetermined food-related keywords (i.e., food, ingredient, recipe, and grocery). This step was crucial to focusing on the most relevant discussions for our study.

Data collection was conducted in January 2023 and encompassed online community posts and comments from January 2015 through the end of January 2023. This study targeted subreddits that attracted members who were interested in budget-friendly recipes and grocery-shopping ideas. Several subreddits were focused on budget foods, such as r/budgetfood and r/EatCheapAndHealthy. The r/Frugal subreddit discussed ways to save money in food preparation and other areas of saving money. We used a list of food-related keywords (i.e., food, ingredient, recipe, and grocery) to look for food-related online discussions in the r/Frugal subreddit.

This study initiated its classification of "healthy budget food" and "regular budget food" by examining the self-described themes of the targeted subreddits. Specifically, the subreddit r/EatCheapAndHealthy describes its focus as "Eating healthy on a cheap budget," indicating its health-conscious intent. An exploratory review of recent posts and comments within r/EatCheapAndHealthy was conducted to validate this characterization, affirming its dedication to health-conscious discussions and themes. In contrast, r/budgetfood's description, "Food on a Budget," suggests a primary focus on cost-saving measures, with no explicit emphasis on health. After reviewing the explicit subreddit descriptions and conducting a qualitative analysis of the content, posts, and comments from r/EatCheapAndHealthy, we found that they were classified as "healthy budget food" due to their alignment with health-conscious themes. Conversely, content from r/budgetfood and similarly themed subreddits like r/Frugal, which discusses broader money-saving strategies without a specific health focus—was categorized as "regular budget food." Consequently, a health variable was created, labeling all posts and comments from r/EatCheapAndHealthy as healthy budget food and all documents from r/budgetfood and r/Frugal as regular budget food. **Table 1** summarizes the data obtained from the subreddits we used for data collection.

Before text analysis, all documents acquired from 3 subreddits were cleaned and preprocessed. The Natural Language Toolkit, a Python-based package, was used for text

Table 1. Summary of subreddit information for data collection

Subreddits	Members	Date created	Data collection method	Health variable
r/EatCheapAndHealthy	5.5 mil	December 27, 2012	All documents up to API limits in the order of recent documents	Healthy budget food
r/budgetfood	1.1 mil	May 21, 2011	All documents up to API limits in the order of recent documents	Regular budget food
r/Frugal	2.8 mil	March 3, 2008	All documents that contain food keywords	Regular budget food

API, application programming interface.

preprocessing tasks such as tokenizing, deleting non-English characters, lemmatizing, stemming, and constructing bigrams. Then, part-of-speech tagging was used to identify all noun terms. Following the selection of all noun terms, a word frequency test was conducted on all selected nouns to generate a food name dictionary. Upon selecting the 10,000 most common nouns, only food items (e.g., rice and noodles) remained in the list, whereas other nouns (e.g., day, life, and man) were deleted. The food item list was a food name dictionary used to search for all food items in the subreddits' documents. The dataset, including food names, was used for further text analysis.

Text analysis: word frequency and topic modeling

First, separate word frequency tests were conducted on the documents from the regular budget food community and those from the healthy budget food community to compare the communities' primary food interests. A high frequency of mentions of a specific food item implied that many Redditors were interested in sharing knowledge and talking about that food item. The food items were ranked based on their word frequencies, and these rankings were used to compare the items' importance in the 2 budget food communities.

Word frequency results could demonstrate key food ingredients that Redditors were interested in. However, each food ingredient could be used in various recipes and menus. For example, eggs can be used in omelets, sandwiches, toast, and fajitas. A food's usage can be understood through its relationships with other ingredients, which can be observed by evaluating food products commonly mentioned together. Hence, topic modeling was performed to group food items closely related to each other—in other words, food ingredients that are likely to be used in the same dishes.

Topic modeling is a statistical approach to uncovering latent topics or themes in large amounts of unstructured text data [24]. Topic modeling algorithms generate topics comprised of top words by calculating the probability distribution of topics over words [25]. The probability distribution of words related to a given topic is determined based on the frequency with which those words co-occur in the corpus. For instance, if documents frequently mention eggs with other ingredients, such as bread, pickles, or cheese, a topic containing those ingredient names could arise. By examining the list of top words associated with a topic, researchers can deduce that the topic is about egg sandwiches or toast.

Of the various topic modeling approaches available, we selected a structural topic modeling (STM) algorithm for its functions, including topic correlation or topical structural inference with covariates [26]. The R package STM was utilized to implement STM. This topic modeling algorithm can use textual data to produce topics automatically, but the user must determine the number of issues to be generated. After reviewing the topic results, the number of problems was set to 20. Based on the topic modeling result with 20 topics, topical structures were compared between the regular budget food and healthy budget food communities. Including the health variable when determining the topical structures allowed us to decide which topics were relevant in each community.
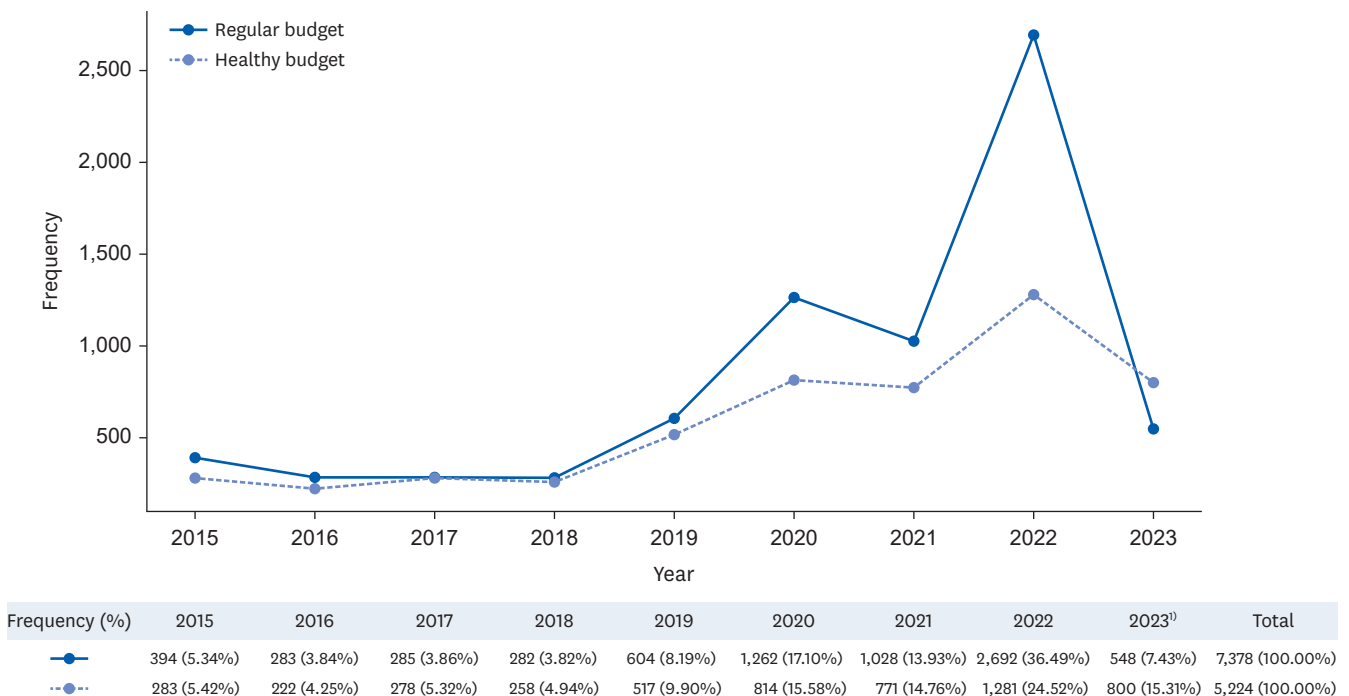
Ethics statement

RESULTS

Descriptive information about data

Fig. 1 illustrates the number of documents on regular and healthy budget food communities. Most of the posts and comments were written from 2019 to 2022. Both communities had the highest number of documents posted in 2022. Notably, the budget food community had significantly more documents posted in 2022 than in previous years.

Frequent food items from budget food communities

Table 2 depicts our findings regarding the food items most frequently mentioned in both budget food communities. We ranked each item according to its frequency to compare its relative importance.

Although the exact rankings may differ, the food items most frequently mentioned (e.g., rice, vegetables, eggs, and chicken) in the 2 budget food communities were similar, indicating that these items were critical staples for those trying to prepare foods on a budget. Specifically, rice was the most essential ingredient for both communities. Both budget food communities frequently mentioned eggs, chicken, and beans as chief protein sources. The term 'vegetable' was also used often in both budget food communities, but the rankings of the specific

Frequency (%)	2015	2016	2017	2018	2019	2020	2021	2022	2023[1]	Total
━●━	394 (5.34%)	283 (3.84%)	285 (3.86%)	282 (3.82%)	604 (8.19%)	1,262 (17.10%)	1,028 (13.93%)	2,692 (36.49%)	548 (7.43%)	7,378 (100.00%)
┅●┅	283 (5.42%)	222 (4.25%)	278 (5.32%)	258 (4.94%)	517 (9.90%)	814 (15.58%)	771 (14.76%)	1,281 (24.52%)	800 (15.31%)	5,224 (100.00%)

Fig. 1. The number of documents per budget food communities.
[1]The frequency for 2023 represents data collected in January only, as the data collection was conducted in that month.

vegetable items differed between the 2 communities. Dairy products such as cheese, butter, and milk were also repeatedly mentioned in both communities.

Table 2. Frequency of food items in regular and healthy budget food groups

Rank	Regular budget food group		Healthy budget food group	
	Words	Values	Words	Values
1	Rice	9,178 (5.90)	Rice	28,251 (6.22)
2	Meat	7,831 (5.03)	Vegetable	27,842 (6.13)
3	Vegetable	7,851 (5.05)	Egg	20,484 (4.51)
4	Chicken	7,451 (4.79)	Chicken	19,755 (4.35)
5	Egg	6,628 (4.26)	Bean	19,699 (4.34)
6	Bean	6,255 (4.02)	Water	19,394 (4.27)
7	Water	6,216 (3.99)	Meat	17,374 (3.83)
8	Sauce	5,452 (3.50)	Onion	16,061 (3.54)
9	Onion	5,145 (3.31)	Sauce	15,286 (3.37)
10	Bread	4,882 (3.14)	Salt	15,180 (3.34)
11	Oil	4,808 (3.09)	Pepper	14,711 (3.24)
12	Cheese	4,564 (2.93)	Oil	14,460 (3.18)
13	Butter	4,396 (2.82)	Protein	13,003 (2.86)
14	Milk	4,372 (2.81)	Butter	12,253 (2.70)
15	Salt	4,299 (2.76)	Cheese	12,086 (2.66)
16	Pepper	4,255 (2.73)	Potato	10,585 (2.33)
17	Potato	3,915 (2.52)	Milk	9,796 (2.16)
18	Protein	3,035 (1.95)	Sugar	9,054 (1.99)
19	Beef	2,921 (1.88)	Fruit	8,783 (1.93)
20	Soup	2,756 (1.77)	Soup	8,643 (1.90)
21	Pasta	2,650 (1.70)	Bread	7,900 (1.74)
22	Flour	2,599 (1.67)	Powder	7,108 (1.56)
23	Powder	2,487 (1.60)	Pasta	6,277 (1.38)
24	Pizza	2,439 (1.57)	Carrot	6,145 (1.35)
25	Sugar	2,330 (1.50)	Beef	5,908 (1.30)
26	Fruit	2,290 (1.47)	Spice	5,746 (1.27)
27	Sandwich	1,955 (1.26)	Peanut	5,330 (1.17)
28	Coffee	1,942 (1.25)	Mushroom	5,141 (1.13)
29	Noodle	1,886 (1.21)	Juice	5,066 (1.12)
30	Spice	1,870 (1.20)	Sandwich	5,062 (1.11)
31	Carrot	1,833 (1.18)	Tomato	5,033 (1.11)
32	Cream	1,746 (1.12)	Snack	5,010 (1.10)
33	Pork	1,737 (1.12)	Cream	4,844 (1.07)
34	Corn	1,671 (1.07)	Coffee	4,470 (0.98)
35	Snack	1,526 (0.98)	Garlic	4,412 (0.97)
36	Tomato	1,494 (0.96)	Spinach	4,317 (0.95)
37	Dough	1,437 (0.92)	Noodle	4,316 (0.95)
38	Chili	1,363 (0.88)	Corn	4,294 (0.95)
39	Garlic	1,338 (0.86)	Olive	4,252 (0.94)
40	Mushroom	1,322 (0.85)	Fish	4,132 (0.91)
41	Peanut	1,320 (0.85)	Lemon	4,119 (0.91)
42	Sausage	1,277 (0.82)	Lentil	4,017 (0.88)
43	Juice	1,263 (0.81)	Apple	3,862 (0.85)
44	Fish	1,259 (0.81)	Chili	3,830 (0.84)
45	Bone	1,121 (0.72)	Vinegar	3,784 (0.83)
46	Chip	1,102 (0.71)	Soy	3,638 (0.80)
47	Vinegar	1,090 (0.70)	Broccoli	3,466 (0.76)
48	Soy	1,076 (0.69)	Chip	3,436 (0.76)
49	Lentil	1,026 (0.66)	Sausage	3,297 (0.73)
50	Ramen	953 (0.61)	Oat	3,278 (0.72)
Total	155,612 (100.00)		454,190 (100.00)	

Values are presented as frequency (%).
Food items with higher rankings in the regular budget food group than in the healthy budget food group are marked in blue, and food items with higher rankings in the healthy budget food group than in the regular budget food group are marked in red.

Based on food frequency comparisons, we used blue font to indicate the food items relatively more prevalent in the regular budget food group than in the budget healthy food group. Aside from chicken, meat items were more important in the regular budget food community than in the healthy budget food communities. For example, the term 'meat' ranked second in the regular budget group but seventh in the healthy group. Similarly, 'beef' and 'pork' ranked 19th and 34th, respectively, in the regular budget group, whereas they ranked 34th and 53rd, respectively, in the healthy groups. Flour-based foods, such as bread, pizza, and dough, ranked higher in the regular budget food group than in the budget healthy food group. Specifically, pizza ranked 24th in the regular budget food group and 52nd in the budget healthy food group. Moreover, the higher rankings of some processed foods (e.g., sausage and ramen) and coffee in the regular budget food group indicate that these items were considered more important in the regular budget food group than in the healthy budget food group.

We used red font to highlight the food items relatively more prevalent in the healthy budget food group than in the regular budget food group. The most notable trait of the healthy budget food group was the higher ranks for fruit and vegetable items compared to these items' ranks in the regular budget food group. For instance, the term 'fruit' ranked 19th in the healthy budget food group and 26th in the regular budget food group. Specific types of fruits, such as lemons and apples, ranked higher in the healthy budget food group (46th and 43rd, respectively) than in the regular budget food group (56th and 55th, respectively). Likewise, specific vegetable types, such as carrot, spinach, and broccoli, ranked higher in the healthy budget food group (24th, 36th, and 47th, respectively) than in the regular budget food group (31th, 69th, and 58th, respectively).

Key groups of ingredients

To identify relationships among the ingredients and determine salient food groups, topic modeling was performed for food items in the budget food communities. This process allowed us to determine the top 20 food topics discussed based on both groups' data. **Table 3** illustrates the key topics and their proportions, indicating how often each topic was mentioned in the corpus. For example, Topic 15 was labeled 'seasoning' based on the

Table 3. Topic modeling result

| Topic No.	Label	Top words	Topic proportion
T15	Seasoning	Salt, oil, pepper, powder, spice	0.098
T10	Dairy and plant milk items	Milk, butter, oat, peanut, banana	0.085
T4	Meat	Meat, chicken, beef, pork, steak	0.069
T18	Rice	Rice, grain, congee, risotto, fajita	0.069
T14	Sandwich	Potato, sandwich, cheese, ham, tortilla	0.056
T12	Bread	Bread, pizza, flour, dough, yeast	0.053
T9	Bean	Bean, lentil, veggie, chickpea, spice	0.052
T6	Smoothie	Protein, smoothie, fruit, banana, supplement	0.050
T1	Vegetable	Onion, pepper, vegetable, veggie, cucumber	0.050
T8	Pasta	Pasta, veggie, cheese, spinach, broccoli	0.048
T11	Soup	Soup, bone, broth, veggie, chicken	0.047
T13	Chili	Mushroom, chili, beef, meatball, taco	0.046
T7	Sauce/plant-based protein	Sauce, soy, tofu, oil, pasta	0.045
T17	Egg dish	Egg, cake, quiche, waffle, yolk	0.043
T5	Juice	Sugar, fruit, juice, soda, lemon	0.038
T2	Tea/beverage	Water, tea, ice, ginger, lemon	0.036
T20	Snack	Snack, chip, hummus, cracker, cheese	0.035
T3	Noodle	Noodle, cabbage, ramen, oil, onion	0.034
T19	Fish	Fish, salmon, tuna, shrimp, lemon	0.032
T16	Coffee	Coffee, milk, water, bean, creamer	0.013

top words grouped with it (e.g., salt, oil, pepper, powder, and spice). This topic had the highest topic proportion of 0.098, indicating that this topic accounted for 9.8% of the issues mentioned in all the studied documents.

The second most popular topic was dairy and plant-based milk items (T10), with top words including milk, butter, oat, and peanut, and this topic accounts for 8.5% of the corpus. This topic includes not only dairy products but also plant milk ingredients, such as oats. Peanuts and bananas, often paired with dairy or plant milk in various dishes and recipes, also appear frequently alongside these terms, justifying their inclusion as top words in the topic.

The meat and rice groups were the third and fourth most popular topics in both budget food communities. The top words for the rice topic (T18) included ingredients (e.g., rice and grain), as well as rice dishes (e.g., congee, risotto, and fajita).

Ingredient group comparisons

Based on the topic modeling results, which indicated significant food groups, we conducted key ingredient group comparisons between the regular and healthy budget food communities (**Fig. 2**). **Fig. 2** demonstrates the mean scores and standard deviations of the groups' differences in topic proportions. The topics skewed to the right had significantly higher topic proportions in the regular budget food group than in the healthy budget food group, indicating that these topics were more likely to be mentioned in the regular budget food
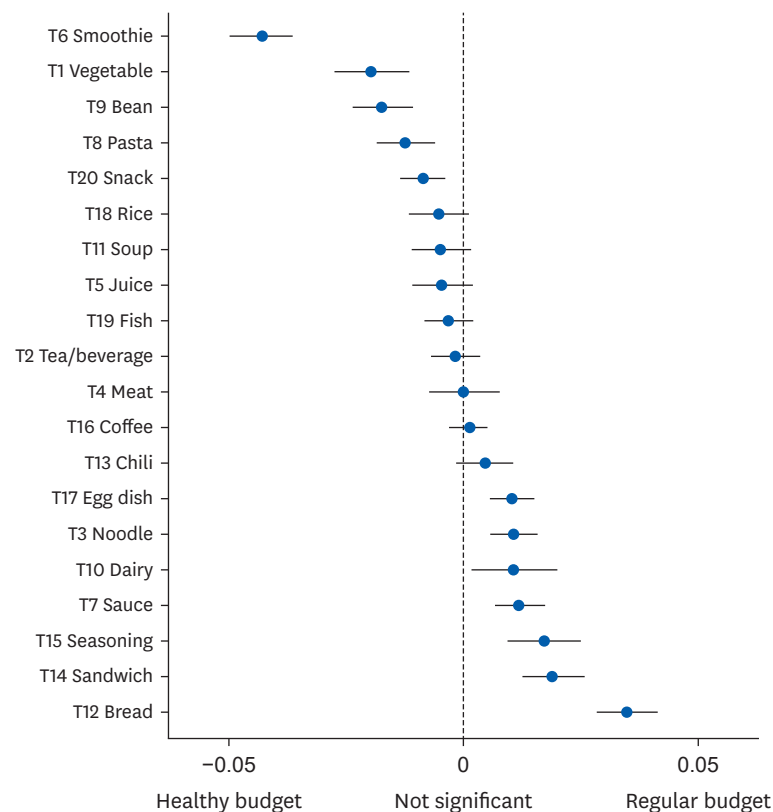
Fig. 2. Topical structure comparison between regular and healthy budget food communities.
Each dot represents the estimated mean score for a topic, with bars indicating the confidence interval. The x-axis shows how topics correlate with different budget preferences. Each label represents a topic number and a topic name based on the top words.

group. The topics skewed to the left had significantly higher topic proportions in the healthy budget food group than in the regular budget food group, indicating that these topics were more likely to be mentioned in the healthy budget food group. The topics with error bars crossing their middle-dotted lines did not demonstrate significant differences in topic proportions between the regular and healthy budget food groups.

The following topics were more frequently mentioned in the regular budget food communities than in the healthy budget food community: bread (T12), sandwiches (T14), seasoning (T15), sauce (T7), dairy (T3), noodle (T3), and egg dishes (T17). Flour-based foods, such as bread, sandwiches, and noodles, were frequently shared among Redditors in the regular budget communities; thus, we found foods high in carbohydrates to be important in the regular budget food communities. Eggs and dairy played key roles as protein and fat sources for the regular budget food communities. Additionally, seasonings and sauces were mentioned more frequently in the regular budget food communities than in the healthy budget food community.

The following topics were mentioned more frequently in the healthy budget food community than in the regular budget food communities: smoothies (T6), vegetables (T1), beans (T9), pasta (T8), and snacks (T20). Smoothies', vegetables', and snacks' elevated popularity within the healthy budget food group indicates that that group was interested in consuming fruits and vegetables, which are high in micronutrients. We also noted a high level of interest in snacks within the healthy budget food community. For example, the top words for the smoothie topic (T6) were protein, fruits, bananas, and supplements, implying that the healthy budget food community's members were interested in ways to make smoothies— healthy snacks that are rich in micronutrients. Moreover, plant-based ingredients and foods were popular in the healthy budget food community, as shown by the high topic proportions of beans (T9) and pasta (T8). Specifically, the top words for the bean topic were lentil, veggie, and chickpea, and the top words for pasta were veggie, cheese, spinach, and broccoli. These top words suggest that plant-based ingredients were preferred as protein and micronutrient sources in the healthy budget food community.

DISCUSSION

This study examined online communities made up of people with a shared goal of saving money on food consumption, with the aim of understanding strategies for saving money on foods and which ingredients can be used to make budget-friendly meals. In the studied subreddits, members shared knowledge and ideas for preparing meals on a budget, and this type of information exchange suggests that people willingly and voluntarily participate in informational support to those who share the same economic identity. The function of the online community, which connects people with similar social identities, has been underlined, particularly in light of the volatility of food prices caused by Russia's invasion of Ukraine and pandemic-related crises in food production and supply chains. According to the United States Department of Agriculture [27], prices for food items consumed at home went up by 3.5%, whereas prices of food items consumed away from home went up by 4.5% in 2021 compared to the previous year. In 2022, more significant rises in food costs were observed, as prices for food products consumed at home increased by 11.4%, while prices for food items consumed away from home increased by 7.1%. Consistent with the high food Consumer Price Index (CPI) in 2022, the number of documents posted in the regular budget food community in 2022 was also

escalated significantly. Although CPI remained high in 2023, the number of documents posted in both food communities in 2023 were low. Since data collection was conducted only through January of 2023, the activity level in 2 budget communities is likely to rise in 2023.

Although people have significant motives to reduce food expenditures, those who are concerned with their health may make a different dietary choice than those who are more concerned with their financial status than their health. To put this theory to the test, we compared a regular budget food group to a health-conscious budget food group. The food items commonly mentioned in both groups were the necessary staples, and rice was the most mentioned food item in both groups. Whereas meat and flour products were more important within the regular budget food group, fruits and vegetables were more critical within the healthy budget food group.

Our topic modeling results clearly demonstrate the differences between the 2 groups. Within the regular budget food group, bread, sandwiches, and noodles were mentioned more frequently than healthy budget foods. These topics were related to regular meals high in carbohydrates. Regarding protein sources, dairy and eggs were more frequently mentioned in the regular budget food groups than in the healthy budget food group. This disparity suggests that those who were more focused on saving than on health preferred animal products, such as dairy and eggs, as protein sources. Moreover, sauces and seasonings were more emphasized within the regular budget food group than within the healthy budget food group.

In summary, people who prioritized reducing food costs focused on preparing regular meals with affordable ingredients. The frequently mentioned food groups implied that the regular budget community members relied on Western or starchy dietary patterns, characterized by relatively high proportions of grains and meats and relatively low proportions of vegetables and fruits [28]. However, these dietary patterns can increase individual risk of developing cardiovascular disease and all-cause mortality [28]. Furthermore, one previous study [29] has reported that consuming fewer heavy meals (i.e., breakfast, lunch, and dinner) with high levels of carbohydrates and fat may result in metabolic and intestinal overload and micronutrient deficiency. The food items and food groups frequently shared in the regular budget food community can be useful for saving money; nevertheless, these foods may not be healthy in the long run and thus should be approached with caution.

Unlike the regular budget food community, the healthy budget food community valued a great variety of plant-based products rich in micronutrients. Another important difference between the healthy budget food group and the regular budget food group was that the healthy group prioritized snacks more than regular meals, which was supported by the high topic weight of the snack topic in the healthy budget food group. The biggest difference in dietary patterns between the regular and healthy budget communities occurred within the smoothie topic, which had the most remarkable weight difference between the groups. This high difference in topic weight implies that the healthy budget food group frequently mentioned various smoothie recipes and ingredients, whereas the regular budget food group did not. The top words related to the smoothie topic indicate that people discussed various fruits and health supplements while discussing smoothie recipes. Vegetables and beans were also more frequently discussed within the healthy budget community than within the regular budget food community. Additionally, pasta was found to be an important source of carbohydrates, whereas fresh and plant-based ingredients were more emphasized in the heathy budget food group than in the regular budget food group.

This study revealed key food ingredients and dietary patterns of people who are trying to save money. By comparing regular and healthy budget food communities, we aimed to discover strategies to reduce food costs and maintain healthy diets.

Existing studies on food budgeting behavior have utilized face-to-face interviews, surveys, or quasi-experimental designs to investigate the influence of food budgets and health consciousness on food choices. This study also makes the contributions to the existing body of research by revealing the crucial role of online platforms in facilitating the exchange of information to overcome the challenges associated with dietary choices, thereby highlighting the central role of social identity and community in the decision-making process. In this context, online platforms like Reddit emerge as virtual spaces for fostering communities united by shared goals, such as achieving budget-friendly and health-oriented dietary habits.

Seraj [30] posited that individuals participate in online communities to fulfill various objectives, including self-presentation, knowledge exchange, and social interaction. This study supports Seraj's observations, demonstrating that online communities serve as critical arenas for developing and strengthening identities, which, in turn, influence specific behaviors like dietary choices. Thus, this research can illuminate insights for future studies regarding how identities shaped in online spaces may influence particular food consumption behaviors within digital arenas. This insight underscores the growing importance of virtual communities in influencing dietary behaviors and social bonds, offering a valuable perspective for exploring the relationship between identity formation, communal engagement, and behavioral patterns in the realm of digital interaction.

Practically, the distinctions between regular and health-conscious budget food groups identified in this study have implications for public health initiatives and policy-making. The regular budget food community tends to prioritize cost over nutritional value, often selecting cheaper ingredients like meat and processed foods, which can increase health risks, such as metabolic disorders and cardiovascular disease. In contrast, the health-conscious budget community demonstrates that it is possible to prioritize both health and cost by choosing more fruits, vegetables, and plant-based proteins.

Given the trend towards cost-saving dietary choices that may not always align with nutritional guidelines, there is a clear need for educational campaigns and interventions that provide accessible, budget-friendly, and healthy eating options. Public health policies must aim to reduce the cost barrier to nutritious foods, ensuring that all individuals, regardless of income, have the opportunity to maintain a healthy diet. Additionally, providing resources and education on meal planning and preparation can help individuals make healthier choices without exceeding their budgets.

Despite this study's findings, it has several limitations. When choosing foods to reduce budget, the type of ingredients and the quantity and quality of ingredients would be crucial factors. Our study provides a comprehensive overview of budget-friendly and health-conscious food choices within English-speaking Reddit communities, predominantly reflecting a Western context. Particularly, the demographic distribution of Reddit users is predominantly American (48.46%), followed by other English-speaking Western countries, such as the United Kingdom (7.16%), Canada (6.97%), and Australia (4.05%) as reported by Statista [31]. This demographic trend indicates that discussions on Reddit, including those on dietary behaviors, are likely influenced by American and Western cultural norms

and values. Hence, it is critical to consider the cultural specificity of these findings. Another study that could be considered is the comparison of different regions and generations to understand their behaviors. Therefore, future research should explore similar online communities in various cultural settings to assess the universality of the observed patterns and the potential for localized strategies to support budget-friendly and healthy eating. This study examined only food choices as a means of reducing food prices, although there are other methods available, such as investigating eating habits [32], improving cooking skills, and improving food storage techniques [33]. Future studies might, therefore, consider various food-saving techniques and methods that have been discussed online.

REFERENCES

1. Lewis M, Herron LM, Chatfield MD, Tan RC, Dale A, Nash S, Lee AJ. Healthy food prices increased more than the prices of unhealthy options during the COVID-19 pandemic and concurrent challenges to the food system. Int J Environ Res Public Health 2023;20:3146. **PUBMED | CROSSREF**

2. Drewnowski A. Fat and sugar: an economic analysis. J Nutr 2003;133:838S-840S. **PUBMED | CROSSREF**

3. Dowler E, Calvert C. Budgeting for food on state benefits: poor lone parents in the United Kingdom. In: Köhler B, Feichtinger E, Barlösius E, Dowler E, editors. Poverty and Food in Welfare Societies. Berlin: Wissenschaftszentrum Berlin für Sozialforschung; 1997. p.307-315.

4. Kim KJ, Kim DY. I want to eat out, but something holding me back: Mom's cooking stress and family dining out constraints. Int J Hosp Manag 2021;99:103069. **CROSSREF**

5. Temple JB. The association between stressful events and food insecurity: cross-sectional evidence from Australia. Int J Environ Res Public Health 2018;15:2333. **PUBMED | CROSSREF**

6. Wolfson JA, Leung CW, Richardson CR. More frequent cooking at home is associated with higher Healthy Eating Index-2015 score. Public Health Nutr 2020;23:2384-94. **PUBMED | CROSSREF**

7. Mills S, White M, Brown H, Wrieden W, Kwasnicka D, Halligan J, Robalino S, Adams J. Health and social determinants and outcomes of home cooking: a systematic review of observational studies. Appetite 2017;111:116-34. **PUBMED | CROSSREF**

8. Tajfel H, Turner J. An integrative theory of intergroup conflict. In: Hatch MJ, Schultz M, editors. Organizational Identity: A Reader. Oxford: Oxford Academic; 2000. p.56-65.

9. Zhang M, Zhang Y, Hallman WK, Williams JD. Eating green for health or social benefits? Interactions of attitudes with self-identity on the consumption of vegetarian meals among U.S. and Chinese college students. Appetite 2021;167:105652. **PUBMED | CROSSREF**

10. Jeon HJ, Ratner K, Wang Q. The effects of labelling and health identity on subjective health. Br J Health Psychol 2023;28:174-87. **PUBMED | CROSSREF**

11. Dutta-Bergman MJ. An alternative approach to social capital: exploring the linkage between health consciousness and community participation. Health Commun 2004;16:393-409. **PUBMED | CROSSREF**

12. Moorman C, Matulich E. A model of consumers' preventive health behaviors: the role of health motivation and health ability. J Consum Res 1993;20:208-28. **CROSSREF**

13. Dong M, Chen L, Wang L. Investigating the user behaviors of sharing health- and fitness-related information generated by Mi Band on Weibo. Int J Hum Comput Interact 2019;35:773-86. **CROSSREF**

14. Kilb M, Giese H, Mata J. How eating-related social media postings influence healthy eating in senders and network members: two field experiments with intensive longitudinal data. Appetite 2023;182:106430. **PUBMED | CROSSREF**

15. Auxier B, Anderson M. Social media use in 2021 [Internet]. Washington, D.C.: Pew Research Center; 2021 [cited 2024 June 30]. Available from: https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021.

16. Sobal J, Bisogni CA. Constructing food choice decisions. Ann Behav Med 2009;38 Suppl 1:S37-46. **PUBMED | CROSSREF**

17. Kucharczuk AJ, Oliver TL, Dowdell EB. Social media's influence on adolescents' food choices: a mixed studies systematic literature review. Appetite 2022;168:105765. **PUBMED | CROSSREF**

18. Vidal L, Ares G, Machín L, Jaeger SR. Using Twitter data for food-related consumer research: a case study on "what people say when tweeting about different eating situations". Food Qual Prefer 2015;45:58-69. **CROSSREF**

19. Narangajavana Kaosiri Y, Callarisa Fiol LJ, Moliner Tena MA, Rodriguez Artola RM, Sanchez Garcia J. User-generated content sources in social media: a new approach to explore tourist satisfaction. J Travel Res 2019;58:253-65. **CROSSREF**

20. Shin J, Mattila AS. When organic food choices shape subsequent food choices: the interplay of gender and health consciousness. Int J Hosp Manag 2019;76:94-101. **CROSSREF**

21. Singh A, Verma P. Factors influencing Indian consumers' actual buying behaviour towards organic food products. J Clean Prod 2017;167:473-83. **CROSSREF**

22. Werthmann J, Tuschen-Caffier B, Ströbele L, Kübel SL, Renner F. Healthy cravings? Impact of imagined healthy food consumption on craving for healthy foods and motivation to eat healthily - results of an initial experimental study. Appetite 2023;183:106458. **PUBMED | CROSSREF**

23. O'Donnell NH, Guidry JP. #BeTheMatch: assessing how testimonials on reddit promote the importance of donating bone marrow. J Health Commun 2020;25:660-70. **PUBMED | CROSSREF**

24. Blei DM. Probabilistic topic models. Commun ACM 2012;55:77-84. **CROSSREF**

25. Blei DM, Ng AY, Jordan MI. Latent dirichlet allocation. J Mach Learn Res 2003;3:993-1022.

26. Roberts ME, Stewart BM, Tingley D, Airoldi EM. The structural topic model and applied social science. Proceedings of the Advances in Neural Information Processing Systems Workshop on Topic Models: Computation, Application, and Evaluation; 2013 Dec 5-10; Lake Tahoe, Nevada.

27. US Department of Agriculture. Summary findings: food price outlook, 2024 [Internet]. Washington, D.C.: US Department of Agriculture; 2024 [cited 2024 June 30]. Available from: https://www.ers.usda.gov/data-products/food-price-outlook/summary-findings.

28. Olea López AL, Johnson L. Associations between restrained eating and the size and frequency of overall intake, meal, snack and drink occasions in the UK adult national diet and nutrition survey. PLoS One 2016;11:e0156320. **PUBMED | CROSSREF**

29. Marangoni F, Martini D, Scaglioni S, Sculati M, Donini LM, Leonardi F, Agostoni C, Castelnuovo G, Ferrara N, Ghiselli A, et al. Snacking in nutrition and health. Int J Food Sci Nutr 2019;70:909-23. **PUBMED | CROSSREF**

30. Seraj M. We create, we connect, we respect, therefore we are: intellectual, social, and cultural value in online communities. J Interact Market 2012;26:209-22. **CROSSREF**

31. Regional distribution of desktop traffic to Reddit.com as of December 2023, by country [Internet]. New York (NY): Statistica Inc.; 2023 [cited 2024 June 30]. Available from: https://www.statista.com/statistics/325144/reddit-global-active-user-distribution.

32. Lee Y, Kim T, Jung H. The relationships between food literacy, health promotion literacy and healthy eating habits among young adults in South Korea. Foods 2022;11:2467. **PUBMED | CROSSREF**

33. Bender KE, Badiger A, Roe BE, Shu Y, Qi D. Consumer behavior during the COVID-19 pandemic: an analysis of food purchasing and management behaviors in U.S. households through the lens of food system resilience. Socioecon Plann Sci 2022;82:101107. **PUBMED | CROSSREF**