



What is the availability, affordability, and quality of foods and beverages aligned with dietary guidance in Louisiana Supplemental Nutrition Assistance Program (SNAP) authorized stores?

Bailey Houghtaling^{a,*}, Melissa Cater^b, De'Jerra Bryant^a, Allie Brooks^a, Denise Holston^a

^a School of Nutrition and Food Sciences, Louisiana State University (LSU) & LSU Agricultural Center, Baton Rouge, LA 70803, USA

^b Agricultural and Extension Education and Evaluation, Louisiana State University (LSU) & LSU Agricultural Center, Baton Rouge, LA 70803, USA

ARTICLE INFO

Keywords:

Food assistance
Food
Beverages
Public health
Food security
Food access

ABSTRACT

Healthy food retail strategies are delivered by Cooperative Extension Services in Louisiana to improve public health among communities with lower income. To guide Cooperative Extension Services Programming, the aim of this study was to assess healthy food access among SNAP-authorized stores. This included comparing the availability, affordability, and quality of healthy foods sold in these stores by geography, ownership, and store type. Seventy-five Louisiana SNAP-authorized stores were selected for measurement. Between October 2019 and March 2020 (prior to the COVID-19 national emergency declaration), trained researchers used the Nutrition Environment Measures Survey in Stores (NEMS-S) to assess the availability, affordability, and quality of healthy versus less healthy foods and beverages in 42 SNAP-authorized stores, including: grocery (n = 12, 29%), convenience (n = 17, 41%), drug (n = 1, 2%), dollar (n = 11, 26%), and butcher/meat (n = 1, 2%). Multivariate analysis of variance (*a priori*, $p < 0.05$) determined if differences in total NEMS-S scores or subscores existed by geography (urban versus rural), ownership (corporate/chain versus independent), or store type. No urban/rural differences were identified. Corporate/chain SNAP-authorized stores scored higher on average than independent SNAP-authorized stores for the total NEMS-S score (17.2 versus 8.1; $p = 0.009$) and availability subscore (13.1 versus 6.1; $p = 0.02$). SNAP-authorized grocery stores scored higher than all other store types (total NEMS-S score 27.6), followed by SNAP-authorized dollar stores (total NEMS-S score 10.7), and SNAP-authorized convenience stores (total NEMS-S score 5) ($p < 0.001$). Louisiana Cooperative Extension Services should explore ways to scale healthy food retail strategies statewide with a specific emphasis on independent and smaller SNAP-authorized retailers.

1. Introduction

The United States Department of Agriculture's Supplemental Nutrition Assistance Program (SNAP) is the largest federal nutrition assistance program, with US\$ 64.4 billion expended in 2019 to provide supplemental food dollars to Americans with lower incomes for use at authorized retailers (Tiehen, 2020). However, SNAP participants consistently purchase fewer foods and beverages aligned with the Dietary Guidelines for Americans 2020–2025 (DGA) (U.S. Department of

Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020) than SNAP eligible and ineligible populations (Mancino et al., 2018). This disparity cannot be fully explained by differences in sociodemographic characteristics, indicating the potential value of policy, systems, and environmental changes among SNAP settings (Singleton et al., 2020). For example, food policy, systems, and environmental change (PSE) change strategies seek to reduce structural barriers to make it easier for people to adhere to the DGA (U.S. Department of Agriculture and U.S. Department of Health and

Abbreviations: PSE, policy, systems, and environmental; DGA, 2020–2025 Dietary Guidelines for Americans; SNAP, Supplemental Nutrition Assistance Program; SNAP-Ed, Supplemental Nutrition Assistance Program Education; EFNEP, Expanded Food and Nutrition Education Program; CDC, Centers for Disease Control and Prevention; NEMS-S, Nutrition Environment Measures Survey in Stores; RUCC, Rural-Urban Continuum Code; WIC, Special Supplemental Nutrition Assistance Program for Women, Infants, and Children.

* Corresponding author.

E-mail addresses: bhoughtaling@agcenter.lsu.edu (B. Houghtaling), mcater@agcenter.lsu.edu (M. Cater), abroo62@lsu.edu (A. Brooks), dholston@agcenter.lsu.edu (D. Holston).

<https://doi.org/10.1016/j.pmedr.2021.101578>

Received 11 February 2021; Received in revised form 20 September 2021; Accepted 23 September 2021

Available online 28 September 2021

2211-3355/© 2021 The Author(s).

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Human Services. Dietary Guidelines for Americans, 2020; Mancino et al., 2018; Frieden, 2010; Story et al., 2008; Singh et al., 2017; Singleton et al., 2020).

Healthy food retail is an example of a PSE change strategy to make 'healthy choices the easy choices' in community food retail settings. (Story et al., 2008; Ammerman et al., 2017; Hecht et al., 2020; Winkler et al., 2020) Evidence suggests proximal food environments matter for those relying on them (Glickman et al., 2021) and populations living in rural geographies and with lower incomes are disproportionately exposed to (Holston et al., 2020; Byker Shanks et al., 2015; Houghtaling et al., 2021; Larson et al., 2009; Cafer et al., 2018) and influenced by (Chen et al., 2019; Swinburn et al., 2011) food environments where products aligned with the DGA are less available, affordable, or high quality. As such, SNAP-authorized healthy food retail interventions may help to improve SNAP participants' dietary purchases to better align with the DGA. This may also help to mitigate persisting income and place-based health disparities described in Healthy People 2030 (Office of Disease Prevention and Health Promotion, 2030).

Cooperative Extension Services is a national organization with representatives in each U.S. state that has acted as an intermediary between evidence-based interventions and community implementation for over 100 years. (Strayer et al., 2020; National Institute of Food and Agriculture, 2021) Cooperative Extension Services often delivers Supplemental Nutrition Assistance Program Education (SNAP-Ed), the Expanded Food and Nutrition Education Program (EFNEP), and the Centers for Disease Control and Prevention (CDC) Division of Nutrition and Physical Activity, and Obesity High Obesity Programs, which are all practice organizations that have formally adopted PSE change strategies for population health and health equity (U.S. Department of Agriculture, 2019; United States Department of Agriculture, 2020; Centers for Disease Control and Prevention, 2018). In Louisiana, Cooperative Extension Services currently delivers healthy food retail strategies as part of a multi-component Healthy Communities Initiative (Gittelsohn and Lee, 2013) in select SNAP-Ed and CDC High Obesity Program parishes – i.e., those classified as rural and lower income (Greene et al., 2020; Greene et al., 2020).

However, Louisiana Cooperative Extension Services resources (e.g., funding, available Agents) are limited (Holston et al., 2021) and healthy food retail strategies are only one of many potential community health interventions (Kendall et al., 2019). A needs assessment regarding healthy food access disparities is required to inform resource distribution and inform program scaling through Louisiana Cooperative Extension Services SNAP-Ed as well as EFNEP (this program recently adopted PSE change strategies in 2019) (U.S. Department of Agriculture, 2019). Given Louisiana ranks 49th in population health outcomes (University of Wisconsin Population Health Institute, 2020), directing limited Cooperative Extension Services to the highest need communities and settings may help improve the reach and public health impact of healthy food retail strategies.

Prior research has shown healthy food access disparities by store geography, ownership, and store type; (Byker Shanks et al., 2015; Thomson et al., 2020; Shikany et al., 2018; Winkler et al., 2019) however, such an investigation has not been carried out in Louisiana. The goal of this study was to describe the food access landscape among SNAP-authorized stores in Louisiana using the Nutrition Environment Measures Survey in Stores (NEMS-S) (Glanz et al., 2007). Total NEMS-S scores and availability, affordability, and quality subscores were compared by geography (urban versus rural), ownership (corporate/chain versus independently owned SNAP stores) and store type (grocery, dollar, and convenience settings). Results are being used in combination with local Healthy Communities Initiative evidence (Seals et al.) to inform future Louisiana Cooperative Extension Services healthy food retail strategies. The approach described herein demonstrates a research-practice collaboration that could be used to inform healthy food retail strategies in other low resource states.

2. Materials and methods

A cross-sectional assessment of SNAP-authorized food environments in Louisiana using the NEMS-S (Glanz et al., 2007) was carried out between October 31, 2019 and March 5, 2020. This timeframe was determined based on researcher availability to travel to store site locations and COVID-19 pandemic mitigation measures. At the time of this study, a Market Basket Assessment Tool (MBAT) (Misyak et al., 2018) and Grocery Promotional Tool (Kerr et al., 2012) were also implemented to assess MBAT validity against NEMS-S and to characterize SNAP-authorized store marketing environments (data not shown here). This research was determined exempt from institutional oversight by the Louisiana State University Agricultural Center Institutional Review Board (Protocol HE19-18).

2.1. Sampling

Both systematic and random sampling were used in 2019 to select SNAP-authorized stores for measurement. The SNAP Retailer Locator is a public database that provides store name and address information for SNAP-authorized stores nationally (U.S. Department of Agriculture. SNAP Retailer Locator, 2019). This database was used to identify all SNAP-authorized stores in Louisiana. Then, systematic sampling was used to select urban and rural Louisiana parishes (i.e., counties) among five state regions: northwest, northeast, central, southwest, southeast (Fig. 1). For urban versus rural classification, the 2013 Rural-Urban Continuum Code (RUCC) (U.S. Department of Agriculture, 2013) was used where RUCC values describe population size and adjacency to metropolitan areas. RUCC values 1 to 3 are designated as urban and RUCC values 4 to 9 are considered rural. Higher RUCC values indicate lower population sizes and increased distance from metropolitan areas in relation to lower RUCC values (U.S. Department of Agriculture, 2013).

For rural parish selection, all those classified as RUCC 8 and 9 (i.e., most rural based on the RUCC classification criteria⁴⁰) across all state regions (Fig. 1) were systematically selected and included Red River, Caldwell, Catahoula, Tensas, and West Carroll parishes. One rural parish classified as either a RUCC 6 or 7 was randomly selected in each state region using a random number generator and included Claiborne, Morehouse, Beauregard, Assumption, and Washington parishes. Rural RUCC 4 and 5 parishes were not selected to allow for a comparison between the most urban parishes and the more rural settings. For urban parish selection, those housing the largest cities in each state region, classified as RUCC 1, were also systematically selected, and included Caddo, Ouachita, Rapides, Lafayette, and Orleans parishes. A similar sampling approach was used among researchers in Montana to assess rural-urban differences using NEMS-S (Byker Shanks et al., 2015).

A sample size of 64 SNAP-authorized stores was calculated using GPower 3.1 based on relevant literature (Byker Shanks et al., 2015; Winkler et al., 2019) for a minimum of 0.80 power. A random number generator was used to sample five SNAP-authorized stores in each selected parish (total, n = 75); SNAP-authorized stores were over-sampled in anticipation that some store management would decline. The Special Supplemental Nutrition Assistance Program for Women, Infants, and Children (WIC) stocking guidelines for store authorization have stricter requirements for products aligned with the DGA in relation to SNAP authorization (DeWeese et al., 2016). Grocery stores are also used most frequently among consumers for household food purchasing (Volpe et al., 2017). Therefore, at least one of five SNAP-authorized stores per parish was required to be a WIC-authorized grocer. Random selection continued until conditions were met.

2.2. Study setting

Sampled SNAP-authorized stores were located in parishes that ranged from 20% (Lafayette) to 48% (Tensas) of households with

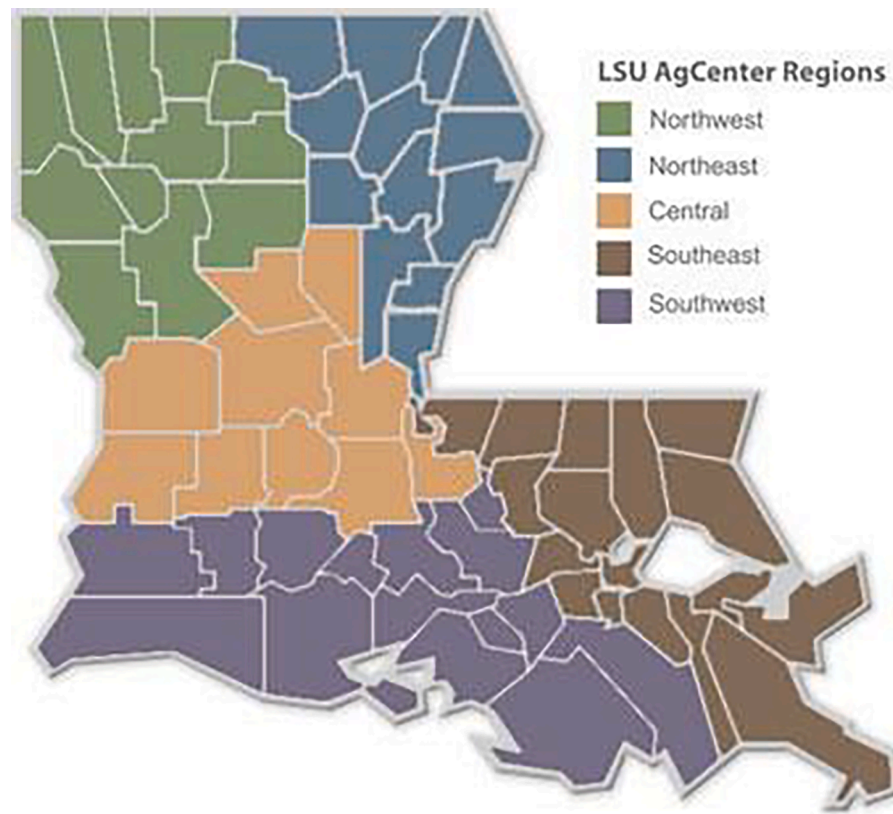


Fig. 1. State Regions used by Louisiana State University Agricultural Center for Louisiana Cooperative Extension Programming.

children in poverty (University of Wisconsin Population Health Institute, 2020). The degree of segregation between white and black residents (scored 0–100, representing no to complete segregation) ranged from 38 (Tensas and Caldwell) to 66 (Orleans). The percent of adults living with a diabetes diagnosis in parishes where SNAP-authorized stores were located ranged from 10% (Lafayette) to 23% (Washington) (University of Wisconsin Population Health Institute, 2020).

2.3. Measures

The NEMS-S (Glanz et al., 2007) was used to measure the availability, affordability, and quality of DGA aligned foods and beverages in relation to less healthy alternatives. The NEMS-S is a standardized measure found both reliable and valid and is paired with online training. This tool is considered a gold standard in the field and has been widely used, allowing for comparisons across study settings. The NEMS-S is a paper survey and measures availability, price, and quality among ten product categories including milk, fresh fruits and vegetables, ground beef, hot dogs, frozen dinners, baked goods, soda and juice (beverages), bread, chips, and cereal, which are common purchases among American households (Glanz et al., 2007).

2.4. Data collection

Two researchers who completed the NEMS-S online training implemented the tool with SNAP-authorized owner/manager permission. The lead author implemented the NEMS-S in select areas that were perceived as having higher crime rates (based on Cooperative Extension Services recommendation) and a graduate research assistant completed all other NEMS-S data collection. Three store managers denied NEMS-S implementation. Also, early mitigation measures for the COVID-19 pandemic in March 2020 interrupted data collection for a remaining 30 SNAP-authorized stores that were primarily located in northwestern

Louisiana (the furthest distance from the researchers' institution). The last NEMS-S was implemented on March 5, 2020, about 1 week prior to the national emergency declaration on March 13, 2020 (Trump, 2020).

2.5. Data analysis

The NEMS-S data coding and scoring was completed by a research assistant who completed the online training. Total scores and subscores for availability, price, and quality were calculated using the standard NEMS-S protocol. Higher NEMS-S scores indicate that dietary options aligned with the DGA are available, affordable, and high quality in comparison to less healthy alternatives (Glanz et al., 2007). Two of the lead authors (BH and DH) reached agreement regarding the classification of SNAP-authorized store ownership as corporate/chain or independent using a combination of Google searches and expert knowledge of study site locations.

IBM SPSS Statistics version 26 (IBM Corp, Armonk, New York) was used for statistical analysis. Descriptive statistics were calculated for total NEMS-S scores and subscores. Multivariate analysis of variance (MANOVA) was used to determine if differences in total NEMS-S scores or availability, price, or quality subscores existed by geography (i.e., urban versus rural SNAP-authorized stores), ownership (i.e., corporate/chain versus independent SNAP-authorized stores), or store type. For the omnibus multivariate test of significance (*a priori*, $p < 0.05$), Pillai's trace was used to determine if, overall, the groups differed significantly regarding the dependent variables (Field, 2017). Next, univariate tests of between-subjects effects were used to identify specific areas of difference among groups. Finally, Tukey's HSD was used for the post-hoc test of significance between store types (Field, 2017).

3. Results

Forty-two SNAP-authorized stores were measured using the NEMS-S.

These sites had an average of 2.9 cash registers (range 1 to 14) and were categorized as grocery (n = 12, 29%), convenience (n = 17, 41%), drug (n = 1, 2%), dollar (n = 11, 26%), and butcher/meat (n = 1, 2%) stores. Most (n = 8, 67%) grocery stores, all dollar stores (n = 11, 100%), and few (n = 4, 24%) convenience stores were corporate/chain. All other SNAP-authorized stores were independent. Twelve SNAP-authorized stores were located in urban Louisiana (29%) and thirty were in rural Louisiana (71%).

Total NEMS-S scores had a possible range of -9 to 54 (reflecting lowest to highest availability, affordability, and quality of DGA-aligned products relative to less healthy products) and an actual range of 1 to 43 in this study. The availability subscore had a possible range of 0 to 30 and an actual range of 1 to 27. The price subscore had a possible range of -9 to 18 and an actual range of -2 to 11. The quality subscore had both a possible and actual range of 0 to 6.

Pillai's trace (MANOVA omnibus test) indicated differences in NEMS-S scores by ownership ($V = 0.9, F(3,3) = 3.7, p = 0.02$). Tests of between-subjects effects indicated a significant effect of ownership for total NEMS-S and availability (see Table 1). Post-hoc results of Tukey's HSD indicated that corporate/chain SNAP-authorized stores scored higher on average than independent SNAP-authorized stores for the total NEMS-S score (17.2 versus 8.1, respectively) and availability subscores (13.1 versus 6.1, respectively) (see Table 1).

Pillai's trace also indicated differences in NEMS-S scores by SNAP-authorized store type ($V = 0.9, F(3,6) = 10.7, p < 0.001$). Tests of between-subjects effects indicated a significant effect of store type for total NEMS-S scores and availability and quality subscores (see Table 1). Tukey's HSD revealed that SNAP-authorized grocery stores scored higher than SNAP-authorized convenience stores for the total NEMS-S score (27.6 versus 5, respectively) and the availability (19.2 versus 4.2, respectively) and quality (5.6 versus 0.9, respectively) subscores. SNAP-authorized grocery stores scored higher than SNAP-authorized dollar stores for the total NEMS-S score (27.6 versus 10.7, respectively) and the availability (19.2 versus 9.6, respectively) and quality (5.6 versus 0, respectively) subscores. SNAP-authorized dollar stores scored higher than SNAP-authorized convenience stores for the total NEMS-S score (10.7 versus 5, respectively) and the availability subscore (9.6 versus 4.2, respectively) (see Table 1).

There were no significant differences in total NEMS-S scores or the availability, price, or quality subscores between rural and urban SNAP-authorized stores. See Table 1. Additionally, a significant interaction was identified for ownership and SNAP-authorized store type ($V = 0.90, F(3,3) = 3.9, p = 0.02$) for the total NEMS-S score ($F = 9.1; p = 0.005$) and availability subscore ($F = 12.0; p = 0.002$). Corporate grocery stores

(Total NEMS-S $M = 31.6; SD = 6.2$; Availability $M = 22.0; SD = 3.7$) and convenience stores (Total NEMS-S $M = 6.3; SD = 4.6$; Availability $M = 4.8; SD = 2.2$) had higher scores than independent grocery stores (Total NEMS-S $M = 19.5; SD = 6.8$; Availability $M = 13.5; SD = 3.4$) and convenience stores (Total NEMS-S $M = 4.6; SD = 4.0$; Availability $M = 4.0; SD = 2.3$). There were no independent dollar stores.

4. Discussion

The NEMS-S was used to measure the availability, affordability, and quality of dietary options aligned with the DGA among SNAP-authorized stores in Louisiana. This study was the first assessment of healthy food access in Louisiana aiming to identify differences between SNAP-authorized stores by geography, ownership, and store type using the NEM-S. Louisiana is a state that consistently ranks near last on population health outcomes (University of Wisconsin Population Health Institute, 2020) and SNAP-authorized stores are a critical setting for PSE change strategies to improve opportunities for consumers with low-income to meet DGA recommendations (Singleton et al., 2020; Mancino et al., 2018; Singleton et al., 2020). The results of this work are useful to inform healthy food retail strategies championed by Louisiana Cooperative Extension Services Agents in SNAP-Ed, EFNEP, and CDC High Obesity Program settings.

Results of this research indicated Louisiana SNAP-authorized stores to score low overall, with no food access disparities found between urban and rural settings. This finding does not align with Byker Shanks et al. (Byker Shanks et al., 2015), who found reduced produce quality in more rural Montana stores using the NEMS-S (Byker Shanks et al., 2015). However, low NEMS-S scores in general were found among retail sites in two other southeastern states in close proximity to Louisiana (Thomson et al., 2020; Shikany et al., 2018). Results of this study provide additional evidence that poor food environments are likely one factor driving health disparities among southern regions in the United States, given this region continues to demonstrate some of the worst health outcomes in the nation (Miller and Vasan, 2020). Together results indicate prioritizing healthy food retail strategies in SNAP-authorized stores among both urban and rural Louisiana communities with lower income are warranted. However, additional research is needed to engage with Cooperative Extension Services Agents to understand resource and capacity building needs to allow for statewide healthy food retail strategy scaling through SNAP-Ed and EFNEP.

Independent SNAP-authorized stores in Louisiana on average scored lower than corporate/chain SNAP-authorized stores on measures of healthy food access. This result was surprising, given research

Table 1

Means (M) and Standard Deviations (SD) for Total NEMS-S Score and Availability, Price, and Quality Subscores for All Stores; Urban and Rural Stores; Grocery, Dollar, and Convenience Stores; and Corporate/Chain and Independently Owned Supplemental Nutrition Assistance Program (SNAP)-Authorized Stores in Louisiana (n = 42).

	Total Scores		Availability Subscore		Price Subscore		Quality Subscore	
	M	SD	M	SD	M	SD	M	SD
All SNAP-Authorized Stores	13.1	11.0	9.9	7.2	1.1	2.6	2.1	2.7
Rurality								
Urban	15.0	12.8	10.6	8.7	1.6	3.2	2.8	3.0
Rural	12.3	10.3	9.7	6.6	0.9	2.3	1.8	2.6
SNAP-Authorized Store Ownership								
Corporate/Chain Owned	17.2 ^a	11.7	13.1 ^b	7.4	1.8	3.1	2.3	2.9
Independently Owned	8.1	7.8	6.1	4.8	0.2	1.4	1.8	2.5
SNAP-Authorized Store Type ^f								
Grocery	27.6 ^c	8.5	19.2 ^d	5.4	2.8	3.7	5.6 ^e	0.8
Dollar	10.7	2.6	9.6	1.9	1.1	2.4	0.0	0.0
Convenience	5.0	4.0	4.2	2.2	-0.1	0.6	0.9	2.1

^a Test of between-subjects effects ($F = 7.8, p = 0.009$).

^b Test of between-subjects effects ($F = 11.42, p = 0.002$).

^c Test of between-subjects effects ($F = 58.2, p < 0.001$); Tukey's HSD (grocery and convenience, $p < 0.001$; grocery and dollar, $p < 0.001$; dollar and convenience, $p = 0.008$).

^d Test of between-subjects effects ($F = 73.6, p < 0.001$); Tukey's HSD (grocery and convenience, $p < 0.001$; grocery and dollar, $p < 0.001$; dollar and convenience, $p < 0.001$).

^e Test of between-subjects effects ($F = 36.6, p < 0.001$); Tukey's HSD (grocery and convenience, $p < 0.001$; grocery and dollar, $p < 0.001$).

^f SNAP-authorized drug and meat shops were excluded from the analysis due to low sample size (n = 1, respectively).

conducted in Minneapolis and St. Paul, Minnesota found independent stores to have more healthy options available to consumers than corporate/chain counterparts (Winkler et al., 2019). Independent stores are important economic drivers of local communities (Cho and Volpe, 2017). Encouraging independent SNAP-authorized retailers to adopt healthy food retail strategies in partnership with Cooperative Extension Services could be a valuable investment regarding local business success and community health in Louisiana (Winkler et al., 2020). Directing Cooperative Extension Services Agents available time and resources (e. g., travel funds) to initiating partnerships among independent SNAP-authorized retailers may be most efficient from a programming perspective. Also, these stores likely have more agency than corporate/chain SNAP-authorized stores for food environment changes and therefore may be more open to partnership opportunities, if provided funds and technical assistance (Kendall et al., 2019; Seals et al.; Houghtaling et al., 2021; Houghtaling et al., 2019). However, few studies have explored food access disparities among lower income communities by the type of store ownership (Winkler et al., 2019). Mixed method research in this area is recommended to understand contributing factors from the perspective of SNAP-authorized retailers and to understand how Cooperative Extension Services can best assist in overcoming stated barriers.

Last, variations in NEMS-S scores were also found among SNAP-authorized stores in Louisiana by store type. Unsurprisingly, SNAP-authorized grocery stores scored highest using the NEMS-S (although none received a perfect score), which aligned with food access research conducted in Alabama and the Mississippi Delta region (Thomson et al., 2020; Shikany et al., 2018). These formats tend to have more retail space for increased product assortments and are more likely than other formats to be WIC-authorized (DeWeese et al., 2016). While 'less healthy' stores such as dollar and convenience formats in this research may not be used to the frequency of grocery stores for household food and beverage purchases (Volpe et al., 2017), consumers with low-income in particular report using these formats consistently, both in Louisiana (Holston et al., 2020) and elsewhere (Volpe et al., 2017). Independent SNAP-authorized convenience stores may be key sites for Cooperative Extension Services partnerships to ensure DGA aligned options are available, affordable, and high quality for consumers who rely on these settings. Amendments to SNAP authorization policy could be explored for opportunities to improve healthy food access among SNAP-authorized dollar formats as well as corporate/chain SNAP-authorized stores that may be less likely to engage in local partnerships for healthy food retail (U.S. Department of Agriculture, 2016).

5. Limitations

This research represents a research-practice approach for informing healthy food retail strategies that could improve opportunities for consumers with low income to meet DGA recommendations in Louisiana. Using random sampling methods as well as the NEMS-S tool are strengths. Limitations of this research include the reduced sample size due to mitigation measures in response to the COVID-19 pandemic in March 2020. This prevented the measurement of SNAP-authorized stores mostly located in northwestern Louisiana and results may not be an accurate statewide representation of SNAP food access.

Additionally, stores located in RUCC 4 and 5 classified parishes were not sampled, which further limits generalizability. However, rural health outcomes are a large public health focus and given limited resources, the research team was interested in understanding if needs varied among the lowest resource settings (i.e., most rural) compared to the most populated parishes. The timeframe of NEMS-S implementation (beginning in Fall) may have also limited results based on seasonal stocking differences; however, fruits and vegetables measured by the NEMS-S are expected to be available year-round throughout the United States. Further, measuring only stores authorized to accept SNAP benefits may be considered a limitation, although SNAP-authorized stores

are prevalent (U.S. Department of Agriculture, 2019) and should reflect most available food stores in community settings.

Despite the NEMS-S being considered the gold-standard in the field, (Glanz et al., 2007) use of this tool provides a narrow picture of the food environment (as with all tools). Promotional aspects and contextual factors that may influence opportunities for healthy food retail are not systematically captured. For example, a grocery store in New Orleans had an armed officer positioned near the entrance and one convenience store inventory was entirely behind a plastic barrier with available food products selected off a list and passed through a window. Community crime is a noted barrier to healthy food retail (Gravlee et al., 2014) and is a factor that deserves more focus in the field. Combined food environment assessments (i.e., diverse tools and qualitative inquiry) are recommended to inform healthy food retail strategies that meet retailer and community needs.

6. Conclusions

The present study suggests that there is a need to improve access to healthy food across SNAP-authorized stores in Louisiana. Cooperative Extension Services-delivered healthy food retail strategies should be a statewide priority, especially in partnership with independent SNAP-authorized retailers and smaller formats that are important pillars in local communities. While working with community organizations like Cooperative Extension Services is a favorable local solution, city/town, state, and national policy solutions are needed to support improved food access to influence consistently poor health outcomes observed in Louisiana and southeastern United States regions (University of Wisconsin Population Health Institute, 2020; Miller and Vasan, 2020). Until these food environments improve, we can continue to expect health disparities among those who rely on SNAP-authorized stores for access.

7. Disclosure of funding and conflicts of interest

This work was supported by the Louisiana State University Agricultural Center and the United States Department of Agriculture, National Institute of Food and Agriculture, Hatch project 1024670. Funders were not involved in the design, analysis, or interpretation of study results. Authors have no conflicts of interest, financial or otherwise, to report. Authors thank anonymous peer reviewers who helped to strengthen this manuscript.

CRedit authorship contribution statement

Bailey Houghtaling: Conceptualization, Data Curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing - original draft, Writing - review & editing. **Melissa Cater:** Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **De'Jerra Bryant:** Data Curation, Investigation, Writing - review & editing. **Allie Brooks:** Data Curation, Investigation, Writing - review & editing. **Denise Holston:** Investigation, Project administration, Resources, Supervision, Writing - original draft, Writing - review & editing.

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