Kaur R., Orr E, Dalstrom M. 2025. "Evaluating the Physical and Nutritional Environments of Rural Communities in Illinois." *World Nutrition*, *16*(1), March, 40–48. https://doi.org/10.26596/wn.202516140-48

Research

Evaluating the physical and nutritional environments of rural communities in Illinois

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Keywords: rural active living assessment (RALA), nutritional environment measurement survey (NEMS), rural, nutrition, and physical activity

https://doi.org/10.26596/wn.202516140-48

World Nutrition 2025;16(1):40-48

Background

Rural communities often have higher rates of physical inactivity and obesity than their urban counterparts. Numerous studies have shown that physical environments and access to unhealthy food are linked to poor health outcomes.

Objective

The objective of this descriptive study was to measure the physical activity and nutrition environments of three rural counties in Northern Illinois, where the prevalence of obesity is high.

Methods

The physical activity and nutrition environments of nine rural towns in three Illinois counties were assessed between December 2022 and June 2023 using adapted versions of the Rural Active Living Assessment (RALA) and Nutritional Environment Measurement Survey (NEMS). This study aimed to assess the physical and nutritional environments of rural towns so that a coalition of community stakeholders could make data-informed policy and intervention decisions.

Results

The RALA Program and Policy (PPA) and Town Wide (TWA) assessments were conducted in all nine towns and were scored from (0-100). The PPA scores ranged from 13 to 76, and the TWA scores ranged from 49 to 96. The NEMS with a possible score range of 0-45 was conducted in 51 stores in nine towns, and the score ranged from 11.3-21.5. NEMS availability scores for each type of store (convenience, grocery, and other) were significantly different from each other ($p<0.0001$). Differences across counties for the same type of store were not statistically significant.

Conclusions

Each town had different facilitators and barriers to being physically active and eating healthy. Most towns had a variety of amenities but lacked policies and programs that supported physical activity. There was no consistent pattern between amenities for physical activity and healthy eating. The results also suggest that access to healthy food and physical activity amenities are not the only determinants of whether a town is a healthy place to live.

INTRODUCTION

Obesity is more prevalent in rural counties, where 34% of the population is obese, as compared to 29% in urban counties (Lundeen et al., 2018). It is a risk factor for numerous preventable chronic diseases, which are the leading causes of morbidity and mortality in the United States (Bhaskaran et al., 2014; National Heart, Lung, and Blood Institute, 2013). Several studies suggest that behavior and the built environment play a significant role in the multifactorial issue of obesity (Drewnowski et al., 2020; Swinburn et al., 1999). The built environment is critical in shaping health

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behavior, as it determines access to resources (Feng et al., 2010). Rural and urban communities have some common challenges related to physical activity and healthy eating, such as a lack of access to affordable active living facilities and stores offering healthy food (Larson et al., 2009; Pelletier et al., 2021). However, rural populations have additional challenges, including lack of transportation and walkability, that exacerbate regional health disparities (Hansen et al., 2015). Research has found that rural adults are less active and consume fewer fruits and vegetables than urban individuals (Cohen et al., 2018; Trivedi et al., 2015). Understanding physical activity and healthy eating-related contextual barriers among rural communities is important to address these regional disparities.

Focusing on the built environment is an efficient way to assess community-wide issues and identify places for intervention. There has been an exponential growth of studies measuring physical activity and urban food environment using the Physical Activity Resources Assessment (PARA) (Lee et al., 2005) and Nutrition Environment Measurement Survey (NEMS)(Glanz et al., 2023) in the past two decades. However, research examining the built environment of rural communities is limited. Furthermore, few studies have used the Rural Active Living Assessment (RALA) and NEMS simultaneously to assess rural towns' physical activity and nutritional environments (McCormack et al., 2021; Meendering et al., 2023).

In 2022, the Ogle County Health Department (OCHD) was awarded a grant from the Centers for Disease Control and Prevention to address the social determinants of health, specifically physical activity and nutrition insecurity in three counties. For the project, the OCHD collaborated with a local coalition to develop data-informed strategies addressing obesity in targeted counties. The purpose of this descriptive study was to measure the physical activity and nutrition environments of these three rural counties in Northern Illinois, where the prevalence of obesity is high. In addition to fulfilling the specific needs of OCHD, the findings from this paper address the unique characteristics of rural obesogenic environments and how the RALA and NEMS can be adapted to meet local needs.

METHODS

SETTING/DESIGN

This observational study was conducted by a medical anthropologist and public health researcher in three counties (labeled A, B, C) in Illinois from December 2022 through June 2023. To achieve maximum variation, the OCHD used a typical case approach and selected a typical small and larger town, from different parts of each county that had similar levels of physical inactivity and health outcomes. The population of the towns ranged from approximately 800-15,000, with rural-urban continuum codes ranging from 4-6, indicating that they all were located in micropolitan areas (U.S. Department of Agriculture, 2024). Over 24% of the adult population in each town was physically inactive. Moreover, the prevalence of diabetes and obesity was over 9% and 35%, respectively (Centers for Disease Control and Prevention, n.d.) (Table 1).

Table 1. Demographic characteristics of selected towns for physical activity and nutritional environment assessment in Illinois

Town	Population (2021)[a]	Obesity[b]	Physical Inactivity [b]	Diabetes[b]	County
1	3,623	35.1%	23.9%	10.7%	A
2	4,046	35.2%	24.5%	10.4%	A
3	8,724	38.0%	27.4%	11.0%	A
4	1,421	36.9%	25.3%	9.9%	B
5	3,579	36.3%	25.7%	10.4%	B
6	9,367	37.2%	27.4%	10.1%	B
7	2,257	35.7%	25.6%	10.8%	C
8	15,380	36.8%	26.1%	10.6%	C
9	818	35.2%	24.6%	9.9%	C

[a] Data provided by the United States Census Bureau. Available at: https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html [b] Model-based estimates from Center for Disease Control and Prevention. Available at: https://experience.arcgis.com/experience/22c7182a162d45788dd52a2362f8ed65

DATA COLLECTION METHODS

The RALA consists of three tools used to assess the physical activity environment of rural communities (Yousefian et al., 2010). Town Wide Assessment (TWA) and Program Policy Assessment (PPA) tools were used because they score the physical environment at the town level. We did not use the Street Segment Assessment because we were only interested in amenities and policies supporting physical activity. The TWA collects general information on town characteristics (e.g., population density, town layout, and location of schools) along with the number, location, and type of recreational amenities such as parks, walking trails, bike paths, recreational centers, public pools, and private fitness facilities located within 15 miles of the town center. It then groups the amenities into five domains that are scored based on the presence of specific physical activity amenities and their proximity to the town center. It also gathers information on the condition and accessibility of those resources but does not include those factors in the overall score. The PPA collects information on programs and policies within the town that potentially impact physical activity. For example, the tool gathers information about local and school policies, including whether the town has a policy for clearing snow from sidewalks, requirements for constructing sidewalks or bike paths, and whether there is a walk-to-school program. It also explores physical activity programming within the town, such as the presence of a recreation department and public transportation for after-school activities. The PPA results are grouped into three domains, with the score calculated based on the presence of certain policies or programs. Both tools are scored from 0-100, allowing towns to compare activity-friendliness and assess changes over time. For a more detailed discussion of the RALA and tools and domains assessed, see Hartley et al., 2009.

As part of our assessments, we reviewed town websites, physical activity blogs, and digital maps that listed physical activity amenities. We also obtained information on community resources and policies by talking with local community members such as school athletic directors, principals, and park district staff. Between December 2022 and June 2023, one author (MD) traveled to all of the towns to complete the assessments. Both the TWA and PPA were conducted according to the RALA codebook directions

(Hartley et al., 2009). Additionally, photographs, descriptions of the amenities, and corresponding websites with information on policies and amenities were also collected to provide a visual description of the amenities and information available. Because the towns are located close to each other, most within 10 to 15 miles, the TWA was modified to only include physical activity amenities within 10 miles of the town center instead of the recommended 15 miles. This decision was made to avoid counting the same amenities multiple times. In addition, physical activity resources (other than playgrounds) located on school properties (e.g., tennis courts) were not included in the TWA assessment because, in some towns, community members are not allowed to use them. In cases where two towns were within 10 miles of each other, the amenities in the adjacent town were included only if that type of amenity was not present in the assessed town (e.g., a recreation center in one town but not the other). The PPA was not modified.

To assess the nutritional environment, the OCHD provided a list of all the retailers registered under grocery store business licenses. It included different types of stores such as chain grocery stores (Walmart, Aldi), non-chain local ethnic grocery stores, dollar stores, corner stores, gas stations, and drug stores selling groceries. Researchers collected data from December 2022 to June 2023 in all listed stores. Adapted NEMS (Glanz et al., 2007) was used, which is a validated observational measure to assess the community and consumer nutrition environment. Further details about NEMS are available here. Since there are different types of NEMS based on the type of store, for this study, the NEMS-Store (Glanz et al., 2007) and the NEMS-Corner Store (Cavanaugh et al., 2013) were combined to develop a common survey measure that was used to assess the grocery stores as well as the corner stores. A question regarding whether the store participates in the Supplemental Nutrition Assistance Program (SNAP) and/or Women, Infants, and Children (WIC) program to assess if the store serves low-income families was added. When there was no sign demonstrating SNAP and WIC participation, the data collector confirmed this information with a store employee. In addition, 'Canned Beans (low sodium)' and 'Dried Beans' were added to the survey, considering the increased demand for canned foods and the health benefits of beans (Mitchell et al., 2009). This changed the possible score for 'availability' from 37 points to 39 points. After pilot testing the adapted NEMS in the first five stores, the researcher found that: (1) collecting prices would not be useful due to approximately equal prices of healthy vs. less healthy items; (2) price could not be compared across stores due to variation in store types i.e., dollar stores, drug stores vs. chain grocery stores; and (3) the beverage size was not useful, as some specific sizes (such as 20oz, 14oz) were not available in any store. Therefore, the NEMS was further adapted by removing beverage size and price score calculation. This resulted in a total possible score of 0-45 points (Availability=0-39 points; Quality=0-6 points). The tool was programmed in Qualtrics, and the data were collected from all stores with permits to sell food.

ANALYSIS

A descriptive analysis was performed using SPSS. Frequency distributions and scores were calculated and are reported here. To compare the nutrition environment between towns, the Fisher test was performed for frequency data as it allows to test the significance for a sample when cell size is less than five. To compare the RALA and NEMS mean scores between counties, Kruskal-Wallis Tests were calculated, as the sample is not normally distributed.

RESULTS

RURAL ACTIVE LIVING ASSESSMENT

Table 2 provides the detailed bases for the TWA score and PPA scores for the towns. Our study had a TWA range of 49-96. Most towns had schools within one mile of the town center, as well as playgrounds and parks. All but one town had walking trails or bike paths. The two domains that the towns scored lowest on were water activities and recreational facilities. Since all the towns were landlocked or only had a river nearby, it was unsurprising that they scored the lowest in the water activities category, including access to a swimming beach, a public pool, and a boat launch. There was significant variation within the recreational facilities category, which assesses whether a town has amenities such as gyms and a town recreational center such as a YMCA. The recreation center accounts for a third of the score for the category; thus, towns with a recreational center, larger towns (or those within ten miles of larger towns with one), scored closer to 30, while the other towns scored between 7 and 13 in this domain.

In terms of accessibility, many of the physical activity amenities lacked clearly marked signs or sidewalks leading to the amenity. The PPA evaluates town programs and policies alongside school programs and policies. The towns assessed scored between 13-76, with a mean score of 46.3. Within the town policy and program categories, towns scored lower if they did not have policies requiring the development of pedestrian walkways and bikeways with new developments and whether they had a recreation department, which is often not feasible in tiny towns. Overall, the towns scored the lowest in the school programs (11.7 out of 30) and policies (11.1 out of 30) compared to other dimensions of the RALA. There were no significant differences between TWA or PPA scores by county.

NUTRITIONAL ENVIRONMENT ASSESSMENT FINDINGS

All stores (N=51) in the three counties were included (i.e., A=16, B=20, and C=15) (Table 3). Overall, most stores (71%) were convenience stores, including 28% (n=10) dollar stores. While 75% of all stores accepted SNAP debit cards, fewer than 25% accepted WIC cards. The NEMS score ranged from 11.3 to 21.5, with a higher score for grocery stores (25.0-44.0) as compared to convenience stores (8.7 – 13.4) ($p < 0.05$). Every town except one had access to at least one-dollar store, but the NEMS score for dollar stores was also low (16.5). The large standard deviations (SD) demonstrate that the availability of food varied widely within each category, i.e., grocery stores and convenience stores. NEMS availability scores for each type of store (convenience, grocery, and other) were significantly different from each other ($p<0.0001$). Differences across counties for the same type of store were not statistically significant.

Table 2. Physical activity amenities and policy assessments of selected towns in three counties in Illinois

	County A			County B			County C			
	Town 1	Town 2	Town 3	Town 4	Town 5	Town 6	Town 7	Town 8	Town 9	Mean[a] (Range)
Town-Wide Assessment Scores[b]										
School Location (15)[c]	15	15	15	15	15	15	15	15	15	15.0 (15)
Trails (20)[c]	20	17	20	17	20	20	12	20	0	16.2 (0-20)
Parks and Playgrounds (25)[c]	25	25	25	25	25	25	25	25	25	25.0 (25)
Water Activities (10)[c]	2	6	6	0	6	6	0	1	0	3.0 (0-6)
Recreational Facilities[d] (30)[c]	17	30	30	7	30	30	13	27	9	21.4 (9-30)
Total Score[e] (100)	79	93	96	64	96	96	65	88	49	79.6 (49-96)
Access to Physical Activity Locations										
Number of Physical Locations[f]	12	11	19	6	24	24	7	23	2	14.2 (2-24)
Clearly Marked Signs	7	7	14	3	15	21	6	12	1	9.6 (1-21)
Designated Parking	8	8	13	3	14	14	7	11	1	8.8 (1-14)
Sidewalks Leading to Amenity	4	5	11	0	6	13	3	17	0	6.6 (0-13)
Town Program and Policy Assessment										
Town Policies (10)[g]	10	10	3	3	10	3	10	10	3	6.9 (3-10)
Town Programs (30)[g]	30	30	22	4	26	30	4	30	0	19.6 (4-30)
School Policies (30)[g]	15	0	15	30	30	0	0	15	0	11.7 (0-30)
School Programs (30)[g]	10	10	10	15	10	10	10	15	10	11.1 (10-15)
Total Score (100)[g]	65	50	50	52	76	43	24	70	13	49.2 (13-76)

[a] County means were all compared, and no statistically significant differences were found. [b] The TWA was modified from a 15-mile radius to 10 miles driving distance from town center. [c] The maximum score for each domain. [d] Does not include resources at schools. [e] In situations where the town is within 10 miles of another town, the only amenities that are included from the other town are those not available in the accessed town. [f] Only includes amenities that have an address within the town. Does not include amenities located within other towns, primary schools, secondary schools, or private fitness locations. Each location was counted only once even if it had multiple amenities. [g] Total possible points per category.

Table 3. Characteristics and type of food available in stores selling food items in selected towns of three counties in Illinois

	County A			County B			County C		
	Town 1	Town 2	Town 3	Town 4	Town 5	Town 6	Town 7	Town 8	Town 9
Number assessed (N)	3	4	8	3	6	11	4	10	2
Type	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Convenience Store[a]	2 (67)	3 (75)	6 (75)	3 (100)	5 (83)	7 (64)	3 (75)	6 (60)	1 (50)
Grocery Store[b]	0 (0)	1 (25)	2 (25)	0 (0)	1 (17)	3 (27)	1 (25)	4 (40)	1 (50)
Other[c]	1 (33)	0 (0)	0 (0)	0 (0)	0 (0)	1 (9)	0 (0)	0 (0)	0 (0)
Accepts SNAP[d]or WIC[e]									
SNAP	3 (100)	2 (50)	6 (75)	3 (100)	5 (83)	7 (64)	3 (75)	7 (70)	2 (100)
Both	0 (0)	1 (25)	2 (25)	0 (0)	1 (17)	4 (36)	1 (25)	3 (30)	0 (0)
None	0 (0)	1 (25)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
NEMS Availability scores[f]	**Mean (SD)[g]**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Overall	12.7 (5.1)	17.3 (17)	14.6 (9.1)	11.3 (4.9)	15.7 (14.7)	17.6 (13.4)	17 (13.4)	21.5 (17)	20.5 (13.4)
Range for overall score	7-17	2-41	5-32	8-17	3-44	2-43	5-35	4-44	11-30
Convenience Store[h]	12 (7.1)	9.3 (7.5)	11.2 (6.2)	11.3 (4.9)	10 (5.4)	13.4 (6.9)	11 (7.2)	8.7 (4.4)	11
Range for convenience store score[h]	7-17	2-17	5-22	8-17	3-18	7-28	5-19	4-15	-
Grocery Store[h]	-	41	25 (9.9)	-	44	32.7 (15.4)	35	40.8 (2.5)	30
Range for grocery store score[h]	-	-	18-32	-	-	15-43	-	38-44	-

[a] Convenience stores included corner stores, gas stations, dollar stores, and drug stores. [b] Grocery stores included supermarkets such as Walmart and Aldi or ethnic grocery stores such as Mexican grocery stores. [c] Other = Stores did not fall into either of the first two categories, such as meat shop. [d] SNAP = Supplemental Nutrition Assistance Program. [e] WIC = Special Supplemental Nutrition Program for Women, Infants, and Children Program (WIC). No stores accepted WIC but not SNAP. [f] NEMS= Nutrition Environment Measurement Survey; the total possible score for NEMS was 45 points. [g] SD = standard deviation. [h] No standard deviation or range was reported if the number of stores was ⩽ 1.

All towns had the following NEMS-defined healthy food items available in at least one store: low-fat/skim milk, canned fruit in natural juice or water, frozen vegetables in water, low-sodium canned vegetables, dried beans, diet soda, 100% juice, 100% whole wheat bread, baked chips, and healthier cereal (⩽ 7 g sugar per serving). Town 8 had four grocery stores with the least variation in their mean score (SD=2.5) as compared to town 6, with three grocery stores and the largest variation in their mean score (SD=15.4). Town 1 and town 4 had no grocery store, and lacked access to fresh fruit, fresh vegetables, lean ground beef, low-fat hot dogs, low-fat frozen dinners, and low-fat baked goods. All other towns had at least one grocery store where residents could access healthy food (Figures 1 – 5). The difference in the distribution of food items across counties was not statistically significant.

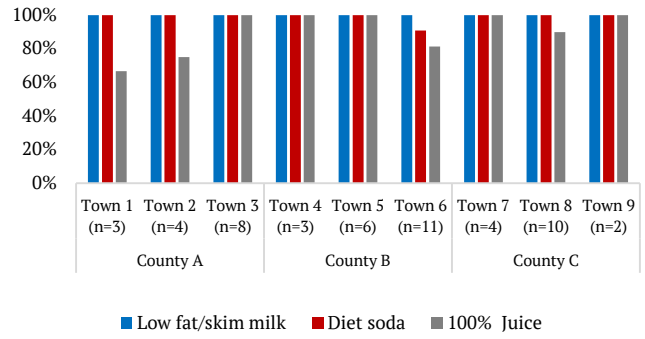

Figure 1. Availability of low fat/skim milk, diet soda and 100% juice among stores in three rural counties in Illinois (N=51)

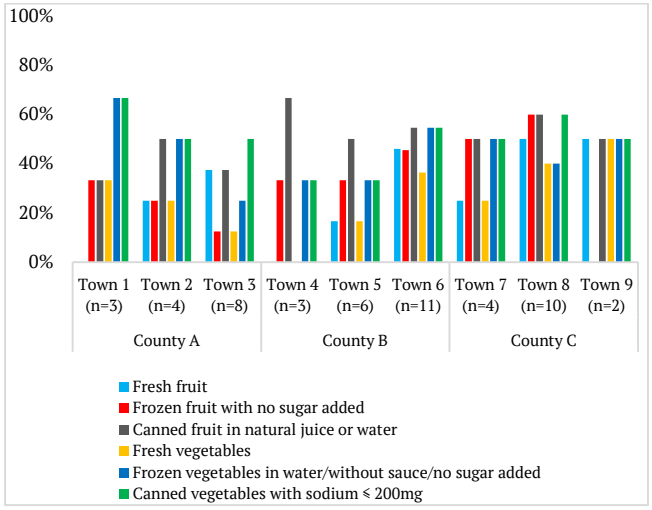

Figure 2. Availability of fresh fruit, frozen fruit, canned fruit, fresh vegetables, frozen vegetable, and canned vegetables among stores in three rural counties in Illinois (N=51)

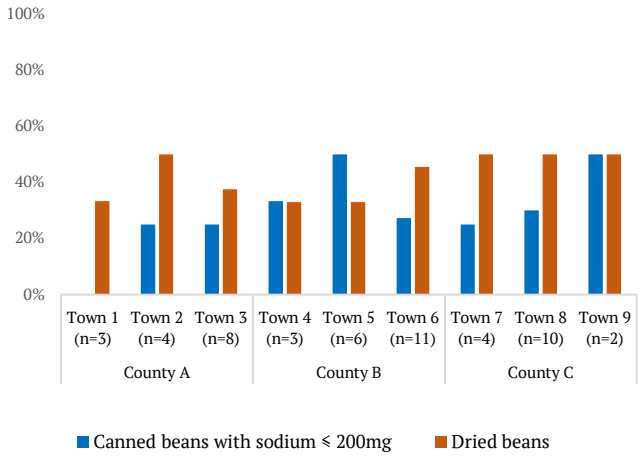

Figure 3. Availability of canned beans with sodium ≤ 200 mg and dried beans among stores in three rural counties in Illinois (N=51)

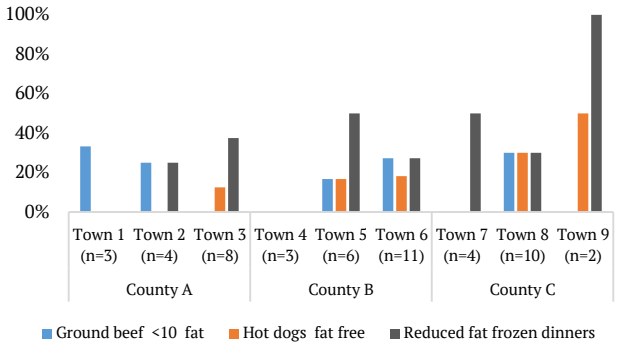

Figure 4. Availability of ground meat < 10g of fat, fat-free hot dogs, and reduced fat frozen dinners among stores in three rural counties in Illinois (N=51)

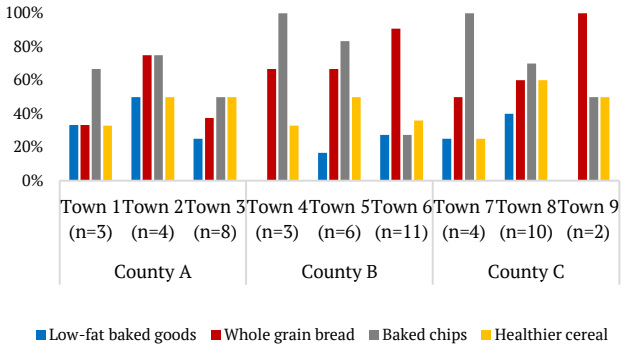

Figure 5. Availability of low-fat baked goods, whole grain bread, baked chips, and healthier cereal among stores in three rural counties in Illinois (N=51)

DISCUSSION

This study found significant differences in access to facilities for physical activity. Smaller towns scored the lowest in the overall TWA, while larger towns and those close to large towns scored the highest. Nevertheless, most of the variation in the overall scores can be attributed to access (or lack thereof) to a recreational center and water activities, which has been reported in other evaluations of rural Illinois (Dalstrom et al., 2021). We found low overall scores for town and school programs and policies for physical activity. This was primarily because: (1) they did not participate in walk/bike to school programs; (2) they were not participating in other safe routes to school programs; (3) some schools do not let community members use their physical activity resources; and (4) after-school bus options were limited. In addition, some amenities were difficult to identify/locate because the town's website did not provide the information and there was no centralized location to obtain information on amenities managed by the state, federal government, or nonprofits. Our TWA and PPA findings are consistent with existing research that has utilized RALA, which indicates the diversity of amenities available in rural communities (Dalstrom et al., 2021; Hege et al., 2017; McCormack et al., 2021).

This study found disparities in the nutrition environment where some towns had no grocery store and thus lower mean scores for NEMS. The presence of dollar stores in almost every town demonstrates it as an avenue of access for the rural population. However, the low NEMS scores indicate

widespread unhealthy food availability. It was found in the literature that rural towns are usually not supportive of healthful eating (Goodman et al., 2020). The NEMS mean score variation between grocery and convenience stores is also consistent with other rural studies (McCormack et al., 2021; Meendering et al., 2023). The higher NEMS score for grocery stores demonstrated a higher availability of healthy food than in convenience stores. This difference exists irrespective of geography (urban vs. rural) (McCormack et al., 2021; Meendering et al., 2023; (Shikany et al., 2018).

There was no consistent pattern between amenities for physical activity, nutritional food availability, and health outcomes. For instance, town 9 had access to one grocery store and had limited physical activity opportunities. Town 5 had higher scores for both types of environments. However, these two towns had similar diabetes and obesity rates irrespective of the difference in population size (town 9 was smaller than town 5). Towns 3 and 6 were similar in population size and health outcomes. However, town 6 had no school policies to promote physical activity but had higher scores for the town programs and NEMS for grocery stores than town 3. This illustrates the complex relationship between accessibility to physical activity amenities, the type of food availability, and health risk factors. Because availability and accessibility are not the only determinants of participation, further research considering the usage of these resources is needed.

This study attempted to understand the two aspects of the built environment (physical activity and nutrition access) together, which can be helpful in prioritizing future intervention strategies. However, using the NEMS and the RALA either separately or together was not completely sufficient for understanding the environmental challenges faced by rural residents or how residents navigate those challenges. Thus, to measure the determinants of chronic diseases in rural communities, further efforts are needed to create inclusive measurement tools that can provide better insight into complex contextual factors and promising implications of findings.

Decision makers can implement these findings to 1) prioritize high-need geographic regions in resource allocation, 2) create policies that support physical activity and convenience stores to stock healthy food items, 3) collaborate with non-traditional settings to promote healthy food availability through mini food centers and/or mobile pantries, 4) support local organizations to encourage community-driven sustainable solutions such as community gardens and farmers' markets. For instance, our study found a lack of school policies that promote physical activity despite evidence showing that school-based physical activity policies can be very effective (Gelius et al., 2020). Therefore, rural communities could focus on identifying policy gaps and developing school-based policies that align with the needs and physical activity environment of their community. In addition, Dollar General, which is an American chain of discount stores that offers different products including packaged food, has become a dominant retailer in rural areas (Feng et al., 2023). Recently, they have started an initiative known as Dollar General (DG) market. Under this initiative, the retailer increases access to healthy food by adding fresh produce to selected sites (Dollar General Newsroom, 2024). Based on the findings from this study, policymakers representing rural populations could negotiate with the DG retailer or provide them with incentives to encourage them to prioritize rural sites in their DG market initiative.

The strength of the present study is a comprehensive assessment of both physical activity and nutritional environments which provides a broader understanding of the risk factors related to obesity. This is one among a few studies we are aware of where dollar stores were also included in the assessment. This study also has limitations. The availability of healthy food can be different from affordability, which is partly measured by the price of the food items. Not including price data is a limitation of this study. Due to variations in the type of stores, it may not be useful to compare their availability score as they have different goals (i.e., selling everyday items at convenience stores vs. providing a wide variety of food products at grocery stores). Also, the adapted NEMS tool used in this study might not be appropriate for stores (such as dollar stores) other than traditional convenience stores and grocery stores. The assessment visit schedule can also influence the quality of data, as NEMS only allows reporting for items that are available/stocked during that visit. The store list also included those stores for which the purpose is not to sell groceries but that still have a business license registration under 'grocery' due to selling a few food items. Therefore, including those convenience stores might have influenced our scores, making them less comparable to researchers who did not include them. In addition, as is the case with all research of this type, we only assessed the physical activity amenities within towns and did not explore whether they were used or what residents did at those locations. We also did not gather residents' input on what they do to be physically active and where they go, so it is possible that some amenities were not included in the assessment. Finally, it is possible that in some cases where we found no statistically significant differences, this could have been because of small sample sizes (type 2 errors).

CONCLUSION

This research demonstrates that even within a small geographic area, there is a wide range of environments likely to influence diet-related health issues. We found that every town we studied was lacking in at least one category of health-promoting facility. The health department can utilize these findings to prioritize its resources. It is important to note that the environment alone does not determine whether a town is a healthy place to live. Future studies are needed to understand the residents' behaviors regarding physical activity and healthy eating, especially for the towns with higher scores for both the environments and higher obesity rates.

AUTHOR CONTRIBUTIONS

RK: Conceptualization, Formal analysis, Investigation, Methodology, Software, Supervision, Writing - original draft, Writing - review & editing. EO: Interpretation of data, Writing – original draft, Writing – review & editing. MD: Conceptualization, Formal analysis, Investigation, Methodology, Writing - original draft, Writing - review & editing.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

ACKNOWLEDGEMENTS

We would like to thank Ms. Tasneem Fatima, a former Research Associate at the University of Illinois College of Medicine Rockford, for her assistance in the data analysis of this report. We also want to thank Laura Dinderman, Manager of Special Grants and Projects at the Ogle County Health Department, for her assistance in identifying town resources and demographics.

FUNDING

Ogle County Health Department (Illinois) received funding from the Centers for Disease Control and Prevention, National Center for Chronic Disease and Health Promotion, Closing the Gap with Social Determinants of Health Accelerator Plans. 2022-2023 (CDC-RFA-DP22-22). There was no involvement of study sponsors in the study design; collection, analysis, and interpretation of data; the writing of the manuscript; or the decision to submit the manuscript for publication.

Received: December 16, 2024; **Revised:** February 18, 2025; **Accepted:** March 27, 2025; **Published:** March 31, 2025.

REFERENCES

Bhaskaran, K., Douglas, I., Forbes, H., dos-Santos-Silva, I., Leon, D. A., & Smeeth, L. (2014). Body-mass index and risk of 22 specific cancers: A population-based cohort study of 5·24 million UK adults. *Lancet (London, England)*, *384*(9945), 755–765. https://doi.org/10.1016/S0140-6736(14)60892-8

Cavanaugh, E., Mallya, G., Brensinger, C., Tierney, A., & Glanz, K. (2013). Nutrition environments in corner stores in Philadelphia. *Preventive Medicine*, *56*(2), 149–151. https://doi.org/10.1016/j.ypmed.2012.12.007

Centers for Disease Control and Prevention. (n.d.). *PLACES: Local Data for Better Health*. Retrieved April 5, 2024, from https://www.cdc.gov/places

Cohen, S. A., Greaney, M. L., & Sabik, N. J. (2018). Assessment of dietary patterns, physical activity and obesity from a national survey: Rural-urban health disparities in older adults. *PloS One*, *13*(12), e0208268. https://doi.org/10.1371/journal.pone.0208268

Dalstrom, M., Guth, B., Lizer, C., Zimmermann, K., & Khare, M. (2021). Supporting a rural wellness intervention through assessing and mapping rural physical activity environments. *Preventive Medicine Reports*, *24*, 101567. https://doi.org/10.1016/j.pmedr.2021.101567

Dollar General Positions Itself as Serious Competitor to Traditional Grocers. (2024). Progressive Grocer. https://progressivegrocer.com/dollar-general-positions-itself-serious-competitor-traditional-grocers

Drewnowski, A., Buszkiewicz, J., Aggarwal, A., Rose, C., Gupta, S., & Bradshaw, A. (2020). Obesity and the built environment: A re-appraisal. *Obesity (Silver Spring, Md.)*, *28*(1), 22–30. https://doi.org/10.1002/oby.22672

Feng, J., Glass, T. A., Curriero, F. C., Stewart, W. F., & Schwartz, B. S. (2010). The built environment and obesity: A systematic review of the epidemiologic evidence. *Health & Place*, *16*(2), 175–190. https://doi.org/10.1016/j.healthplace.2009.09.008

Feng, W., Page, E. T., & Cash, S. B. (2023). Dollar Stores and Food Access for Rural Households in the United States, 2008–2020. *American Journal of Public Health*, *113*(3), 331–336. https://doi.org/10.2105/AJPH.2022.307193

Gelius, P., Messing, S., Goodwin, L., Schow, D., & Abu-Omar, K. (2020). What are effective policies for promoting physical activity? A systematic review of reviews. *Preventive Medicine Reports*, *18*, 101095. https://doi.org/10.1016/j.pmedr.2020.101095

Glanz, K., Fultz, A. K., Sallis, J. F., Clawson, M., McLaughlin, K. C., Green, S., & Saelens, B. E. (2023). Use of the Nutrition Environment Measures Survey: A Systematic Review. *American Journal of Preventive Medicine*, *65*(1), 131–142. https://doi.org/10.1016/j.amepre.2023.02.008

Glanz, K., Sallis, J. F., Saelens, B. E., & Frank, L. D. (2007). Nutrition Environment Measures Survey in Stores (NEMS-S): Development and Evaluation. *American Journal of Preventive Medicine*, *32*(4), 282–289. https://doi.org/10.1016/j.amepre.2006.12.019

Goodman, M., Thomson, J., & Landry, A. (2020). Food Environment in the Lower Mississippi Delta: Food Deserts, Food Swamps and Hot Spots. *International Journal of Environmental Research and Public Health*, *17*(10), Article 10. https://doi.org/10.3390/ijerph17103354

Hansen, A. Y., Umstattd Meyer, M. R., Lenardson, J. D., & Hartley, D. (2015). Built Environments and Active Living in Rural and Remote Areas: A Review of the Literature. *Current Obesity Reports*, *4*(4), 484–493. https://doi.org/10.1007/s13679-015-0180-9

Hartley, D., Yousefian, A., Umstattd, R., Hallam, J. S., Economos, C. D., Hyatt, R. R., & Hennessy, E. (2009, June). *Rural Active Living Assessment Tools: Codebook & Scoring*. https://activelivingresearch.org/sites/activelivingresearch.org/files/RALA_Codebook_Final.pdf

Hege, A., Christiana, R. W., Battista, R., & Parkhurst, H. (2017). Active living in rural Appalachia: Using the rural active living assessment (RALA) tools to explore environmental barriers. *Preventive Medicine Reports*, *8*, 261–266. https://doi.org/10.1016/j.pmedr.2017.11.007

Larson, N. I., Story, M. T., & Nelson, M. C. (2009). Neighborhood Environments: Disparities in Access to Healthy Foods in the U.S. *American Journal of Preventive Medicine*, *36*(1), 74-81.e10. https://doi.org/10.1016/j.amepre.2008.09.025

Lee, R. E., Booth, K. M., Reese-Smith, J. Y., Regan, G., & Howard, H. H. (2005). The Physical Activity Resource Assessment (PARA) instrument: Evaluating features, amenities and incivilities of physical activity resources in urban neighborhoods. *International Journal of Behavioral Nutrition and Physical Activity*, *2*(1), 13. https://doi.org/10.1186/1479-5868-2-13

Lundeen, E. A., Park, S., Pan, L., O'Toole, T., Matthews, K., & Blanck, H. (2018). Obesity Prevalence Among Adults Living in Metropolitan and Nonmetropolitan Counties—United States, 2016. *MMWR. Morbidity and Mortality Weekly Report*, *67*, 653–658. https://doi.org/10.15585/mmwr.mm6723a1

McCormack, L. A., Meendering, J. R., Burdette, L., Prosch, N., Moore, L., & Stluka, S. (2021). Quantifying the Food and Physical Activity Environments in Rural, High Obesity Communities. *International Journal of Environmental Research and Public Health*, *18*(24), 13344. https://doi.org/10.3390/ijerph182413344

Meendering, J. R., McCormack, L., Moore, L., & Stluka, S. (2023). Facilitating Nutrition and Physical Activity-Focused Policy, Systems, and Environmental Change in Rural Areas: A Methodological Approach Using Community Wellness Coalitions and Cooperative Extension. *Health Promotion Practice*, *24*(1_suppl), 68S-79S. https://doi.org/10.1177/15248399221144976

Mitchell, D. C., Lawrence, F. R., Hartman, T. J., & Curran, J. M. (2009). Consumption of Dry Beans, Peas, and Lentils Could Improve Diet Quality in the US Population. *Journal of the American Dietetic Association*, *109*(5), 909–913. https://doi.org/10.1016/j.jada.2009.02.029

National Heart, Lung, and Blood Institute. (2013). *Managing Overweight and Obesity in Adults: Systematic Evidence Review From the Obesity Expert Panel, 2013*. https://www.nhlbi.nih.gov/sites/default/files/media/docs/obesity-evidence-review.pdf

Pelletier, C. A., White, N., Duchesne, A., & Sluggett, L. (2021). Barriers to physical activity for adults in rural and urban Canada: A cross-sectional comparison. *SSM - Population Health*, *16*, 100964. https://doi.org/10.1016/j.ssmph.2021.100964

Shikany, J. M., Carson, T. L., Hardy, C. M., Li, Y., Sterling, S.,

Hardy, S., Walker, C. M., & Baskin, M. L. (2018). Assessment of the nutrition environment in rural counties in the Deep South. *Journal of Nutritional Science*, *7*, e27. https://doi.org/10.1017/jns.2018.18

Swinburn, B., Egger, G., & Raza, F. (1999). Dissecting Obesogenic Environments: The Development and Application of a Framework for Identifying and Prioritizing Environmental Interventions for Obesity. *Preventive Medicine*, *29*(6), 563–570. https://doi.org/10.1006/pmed.1999.0585

Trivedi, T., Liu, J., Probst, J. C., Merchant, A., Jones, S., & Martin, A. B. (2015). Obesity and obesity-related behaviors among rural and urban adults in the USA. *Rural and Remote Health*, *15*(4). https://doi.org/10.22605/RRH3267

U.S. Department of Agriculture. (2024, January 22). *Rural-Urban Continuum Codes*. Economic Research Service. https://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx

Yousefian, A., Hennessy, E., Umstattd, M. R., Economos, C. D., Hallam, J. S., Hyatt, R. R., & Hartley, D. (2010). Development of the rural active living assessment tools: Measuring rural environments. *Preventive Medicine*, *50*, S86–S92. https://doi.org/10.1016/j.ypmed.2009.08.018