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Food-Environment Mapping and Adolescent Dietary Decision Making

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Abstract

Adolescent dietary decision making occurs within spatial, household, social, and commercial environments that shape which foods are visible, accessible, convenient, affordable, and socially acceptable at the moment of choice. Geographic food-environment mapping can identify concentrations of supermarkets, fresh-food retailers, convenience stores, fast-food establishments, school food outlets, and other sources encountered around homes, schools, and routine travel routes. Nevertheless, geographic proximity alone cannot establish what an adolescent will consume because food choice is also influenced by home availability, taste, peer behavior, marketing exposure, time constraints, and purchasing autonomy.

The present study develops a Food-Environment Mapping and Dietary Decision Intelligence Framework that combines a spatially derived Food-Environment Healthfulness Index with home healthy-food support, unhealthy food-marketing pressure, and peer convenience pressure. Because no original adolescent survey, GIS, purchasing, or dietary dataset was supplied, the investigation adopts an explicitly simulation-based methodology. A synthetic sample of 450 hypothetical adolescents was generated for methodological demonstration.

Mean Healthy Dietary Decision Scores increased from 2.08 in low-healthfulness mapped environments to 2.63 in mixed environments and 3.11 in high-healthfulness environments. Multiple regression produced a positive association for Food-Environment Healthfulness (B = 0.021) and Home Healthy-Food Support (B = 0.283), whereas Unhealthy Marketing Pressure (B = −0.185) and Peer Convenience Pressure (B = −0.133) showed negative simulated relationships. The model explained 59.2% of synthetic outcome variation. The analysis does not treat these coefficients as empirical population estimates. Instead, it demonstrates how spatial food information can be converted into decision-oriented public-health intelligence while preserving the distinction between environmental exposure and individual behavior. The proposed approach may support targeted school nutrition programs, healthier retail interventions, route-based food-environment planning, adolescent participatory mapping, and equity-sensitive community nutrition policy.

Keywords: adolescent nutrition, food environment, GIS mapping, dietary decision making, school food environment, food marketing, home food environment, healthy food access

1. Introduction

Adolescence represents an important transition in dietary autonomy. Young people increasingly make food decisions outside direct parental supervision, purchase food independently, travel between home and school, interact with peers in food-purchasing settings, and encounter commercial food messages across physical and digital environments. Qualitative research has shown that adolescent food choices are influenced by hunger, taste, convenience, time, availability, cost, parental factors, media, mood, and situational circumstances rather than by nutritional knowledge alone. These observations make adolescent dietary behavior especially suitable for an ecological rather than exclusively individual-level explanation.

Story, Neumark-Sztainer, and French proposed an influential ecological framework in which adolescent eating behavior is shaped by interacting individual, interpersonal, physical-environmental, and macrosystem influences. The physical environment includes settings such as schools, convenience stores, fast-food restaurants, and other locations in which food is obtained, whereas wider influences include marketing, cultural norms, and media. This framework provides a strong conceptual foundation for food-environment mapping because it positions geographic access as one component within a wider system of dietary decision making rather than as an isolated determinant.

Geographic information systems have enabled researchers to measure food-outlet density, proximity, network distance, and exposure around home and school locations. Laska and colleagues, for example, examined food outlets within network buffers around adolescents' homes and schools and found associations between selected environmental characteristics and some dietary and weight-related outcomes, while several other associations were absent. Smith and colleagues similarly found some evidence that food environments around secondary schools could influence adolescent diet, but reported that observed effects were small. Such findings demonstrate why food mapping should not be interpreted as deterministic.

A second challenge concerns the difference between mapped exposure and experienced exposure. An outlet can fall inside a conventional buffer while remaining irrelevant to an adolescent who never travels along that route, cannot afford its products, or does not perceive it as a realistic purchasing option. Riggsbee and colleagues addressed this limitation through participatory story mapping, combining observations of food environments with adolescents' own perceptions and experiences. This approach reinforces the argument that adolescents should be treated as active interpreters of food environments rather than as passive points on a spatial map.

The present study therefore develops a Food-Environment Mapping and Dietary Decision Intelligence Framework. The central premise is that mapping becomes more valuable when geographic exposure is combined with home food support, commercial marketing pressure, and peer-related convenience norms. Because no genuine dataset was supplied, the study uses transparent simulation rather than invented empirical observations. The objective is to demonstrate an analytically reproducible framework that can later be validated through GIS data, dietary recalls, food-purchasing records, school audits, GPS-assisted activity-space measures, and adolescent-reported perceptions.

2. Objectives of the Study

2.1 To Develop an Adolescent Food-Environment Mapping Framework

The first objective is to develop a multidimensional spatial framework for characterizing food opportunities encountered by adolescents around homes, schools, and routine travel routes. Conventional measures based exclusively on the nearest outlet or a fixed-radius count may overlook the balance between different categories of food retailers and the routes adolescents actually use. Previous GIS-based adolescent food-environment studies have employed network buffers and measures of outlet proximity and availability, demonstrating both the potential and the limitations of such techniques.

The proposed framework consequently uses a Food-Environment Healthfulness Index rather than a single-outlet measure. Its intended purpose is not to label an entire neighborhood as intrinsically healthy or unhealthy. Instead, it provides a comparative representation of the opportunities and pressures likely to be encountered during everyday food decisions. Any real implementation would require locally appropriate food-outlet classification, geographic validation, and adolescent input before scores were used for policy decisions.

2.2 To Examine Food-Environment Healthfulness and Dietary Decision Making

The second objective is to examine whether increasingly health-supportive mapped environments correspond with stronger Healthy Dietary Decision Scores in the simulation. The analytical expectation is probabilistic: healthier environmental opportunity should make health-supportive choice easier, but it should not make such choice inevitable. The mixed empirical findings reported across school and neighborhood food-environment studies support this cautious interpretation.

The outcome is therefore framed as dietary decision propensity rather than nutrient intake, obesity, or diagnosed disease. This distinction narrows the inferential claim. Environmental conditions are more proximal to what options adolescents encounter than to long-term anthropometric outcomes, which reflect many biological, socioeconomic, behavioral, and developmental influences.

2.3 To Integrate Household, Peer, and Marketing Influences

The third objective is to examine food-environment mapping alongside Home Healthy-Food Support, Unhealthy Marketing Pressure, and Peer Convenience Pressure. Adolescent dietary choices frequently occur within overlapping environments. Food available at home can reinforce or counter neighborhood exposure, while peer behavior can alter the social attractiveness of particular outlets or foods. Research examining home food rules has found associations between health-oriented household rules and healthier independent snack decisions among adolescents.

Commercial marketing is included because the food environment is not a neutral distribution of outlets and products. Marketing can influence salience, preferences, requests, and consumption. Scully and colleagues reported associations between several forms of food-marketing exposure and adolescent food choices and eating behavior, while experimental reviews have found that unhealthy food advertising can increase consumption or preference among children. A useful mapping framework should therefore distinguish physical availability from promotional pressure.

3. Review of Literature

3.1 Ecological Foundations of Adolescent Dietary Behavior

Early qualitative evidence established that adolescent eating cannot be reduced to a simple health-knowledge deficit. Neumark-Sztainer and colleagues identified food appeal, hunger, convenience, time pressure, food availability, family influence, perceived benefits, cost, mood, and media among the factors adolescents described as influencing their food choices. Such findings explain why interventions limited to telling adolescents what constitutes healthy food can have modest effects when the immediate decision environment makes alternative choices easier or socially more attractive.

The ecological framework developed by Story and colleagues subsequently formalized these interacting influences. Their model describes individual influences alongside social environments, physical environments, and broader societal systems. For food-environment mapping, this framework provides an important methodological safeguard: a GIS layer should be interpreted as one level within a multilevel system. Spatial access does not automatically override taste, affordability, family norms, social identity, or marketing.

The practical significance of this perspective is that the same mapped neighborhood may create different dietary experiences for different adolescents. One adolescent may carry food from home, another may purchase from a convenience store, and another may eat only through a school meal program. The physical environment is shared, but exposure is mediated by schedules, household resources, travel routes, purchasing autonomy, and social behavior. Consequently, environmental maps are most informative when supplemented with measures describing how adolescents actually interact with place.

3.2 Spatial Food Exposure Around Homes, Schools, and Travel Routes

Laska and colleagues used GIS-derived network buffers around homes and schools to examine relationships among food-outlet availability, adolescent dietary intake, food purchases, and weight-related measures. Some relationships emerged, including associations involving sugar-sweetened beverage intake and residential food-outlet characteristics, while many other environmental measures were not significantly related to the outcomes considered. This pattern illustrates a recurrent challenge in food-environment research: measurable proximity does not necessarily correspond with meaningful behavioral exposure.

Van Hulst and colleagues similarly examined characteristics of residential and school neighborhood food environments and children's dietary patterns. Their work used geographic measures around both residential and school settings, reflecting the reality that youth food exposure occurs across more than one anchor point. Smith and colleagues extended this logic longitudinally in East London and found some evidence that local secondary-school food environments were associated with dietary change, although reported effects were small.

Systematic reviews further demonstrate considerable heterogeneity. A 2014 review examining retail food outlets around schools concluded that the evidence concerning purchases, consumption, and body weight was not uniformly consistent. Reviews published in 2020 also found that associations between school food environments and overweight or obesity varied across study characteristics and socioeconomic or demographic contexts. These inconsistencies justify a shift from simplistic exposure counts toward more context-sensitive mapping.

3.3 Commercial Visibility and the Experienced Food Environment

Geographic access describes where food can be obtained, but commercial communication helps determine which options are cognitively salient. Scully and colleagues studied more than 12,000 Australian secondary-school students and reported associations between exposure to television and other forms of food marketing and several food-choice or eating outcomes. Their findings support the view that adolescents' environments include promotional signals as well as physical outlets.

Experimental evidence also indicates that food advertising can alter short-term intake. Boyland and colleagues' reviews concluded that exposure to unhealthy food advertising can affect children's consumption, and Sadeghirad and colleagues' meta-analysis of randomized trials found that unhealthy food and beverage marketing influences dietary intake and preferences among children. Although these findings should not be mechanically generalized to every adolescent or media environment, they establish commercial exposure as a credible component of dietary choice architecture.

The implication for mapping is methodological. A food outlet with extensive signage, promotional pricing, and high peer traffic may exert greater behavioral influence than a geographically closer but less salient outlet. Future mapping should therefore consider whether exposure layers can incorporate marketing visibility, school-route advertising, promotional density, and adolescent-reported attention. Such measures would move GIS analysis closer to the experienced food environment rather than treating all mapped outlets as behaviorally equivalent.

4. Research Methodology

4.1 Research Design and Simulation Strategy

The study uses a quantitative simulation-based methodological design. No actual adolescents were recruited, no dietary recalls were administered, and no GIS layers, school addresses, residential addresses, retail databases, or purchasing records were supplied. A synthetic design was therefore necessary to preserve research transparency. The numerical findings demonstrate how a proposed model behaves under specified assumptions and should not be presented as empirical estimates from an adolescent population.

A reproducible sample of 450 hypothetical adolescent observations was generated using a fixed random seed. The Food-Environment Healthfulness Index was represented from 0 to 100, with larger values reflecting a relatively stronger balance of health-supportive food opportunities. Home Healthy-Food Support, Unhealthy Marketing Pressure, and Peer Convenience Pressure were each represented on five-point scales. The outcome, Healthy Dietary Decision Score, was also measured from 1 to 5.

The simulation deliberately incorporates random variation because adolescents exposed to similar environmental conditions would not be expected to behave identically. This variation represents unmeasured differences such as taste, income, appetite, transportation, school schedules, cultural food practices, and personal dietary goals. The simulated structure therefore illustrates association rather than environmental determinism.

4.2 Operationalization of Food-Environment Decision Intelligence

Table 1: Proposed Operational Framework

Construct	Proposed Operational Meaning	Measurement	Analytical Role
Food-Environment Healthfulness	Relative balance of healthier and less health-supportive food opportunities around home, school, and routine routes	0–100	Primary predictor
Home Healthy-Food Support	Availability and accessibility of health-supportive foods and household encouragement	1–5	Predictor
Unhealthy Marketing Pressure	Exposure to promotional cues for energy-dense, nutrient-poor foods and beverages	1–5	Predictor
Peer Convenience Pressure	Social tendency toward readily available convenience or fast-food options	1–5	Predictor
Healthy Dietary Decision Score	Propensity to choose a more health-supportive option when realistic alternatives are available	1–5	Outcome
Mapped Environment Category	Low healthfulness, mixed, or high healthfulness	Categorical	Descriptive comparison

Source: Author-developed methodological framework informed by ecological, GIS, food-marketing, and adolescent food-choice research. Prior studies have used outlet availability, proximity, network buffers, and school or residential environments to characterize spatial food exposure.

The Food-Environment Healthfulness Index could be operationalized in an empirical study using weighted measures of healthy-food retail access, supermarket or fresh-food availability, school food opportunities, convenience-store exposure, fast-food density, and route-level food access. The weights should not be fixed universally because the functional meaning of a supermarket, convenience store, street vendor, cafeteria, or takeaway outlet varies across countries and urban contexts. Local validation should precede any policy use.

For future field research, exactly five questionnaire items are proposed: Q1: “Healthy food options are easy for me to obtain during a normal school day.” Q2: “Less healthy snacks, fast foods, or sugary drinks are easier for me to access than healthier alternatives.” Q3: “Healthy foods that I like are usually available at home.” Q4: “Food advertising or promotions sometimes influence what I want to

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buy or eat.” Q5: “When both healthy and less healthy foods are realistically available, I usually choose the healthier option.” These items were not administered in the simulation and would require age-appropriate validation before use.

4.3 Statistical Model, Analytical Categories, and Ethics

The analysis classified FEHI scores below 40 as Low Healthfulness, scores from 40 to 65 as Mixed, and scores above 65 as High Healthfulness. These cut points are illustrative rather than clinically or geographically validated thresholds. Multiple ordinary least squares regression was then used to recover associations among the four predictors and Healthy Dietary Decision Score. For the graph, scores of 3.0 or higher were classified as being at or above the midpoint of health-supportive decision propensity. This threshold is an analytical convention, not a validated dietary-quality criterion.

No human participants, minors, identifiable school locations, residential addresses, GPS trajectories, dietary records, or purchasing information were processed. Accordingly, human-subject ethical approval was not applicable to the present simulation. A genuine study involving adolescents and geolocation would require institutional ethics approval, appropriate parental consent and adolescent assent where applicable, secure location-data governance, geographic masking, and safeguards preventing disclosure of home or school identities.

5. Analysis

5.1 Dietary Decision Patterns Across Mapped Food Environments

The synthetic sample contained 109 adolescents in Low-Healthfulness environments, 237 in Mixed environments, and 104 in High-Healthfulness environments. Mean Healthy Dietary Decision Score was 2.075 in the Low-Healthfulness category. The corresponding mean increased to 2.634 in Mixed environments and to 3.112 in High-Healthfulness environments.

The difference between low and high mapped environments was therefore approximately 1.04 points on the five-point outcome scale. This progression demonstrates the theoretical signal programmed into the simulation, but it should not be interpreted as evidence that moving an adolescent from one real neighborhood category to another would generate an equivalent behavioral change.

Within-group standard deviations remained approximately one-half of a scale point. This dispersion represents an important theoretical feature. Food-environment exposure creates opportunities and pressures, but adolescents remain heterogeneous decision makers. The presence of variation within each mapped category supports the need to retain household, peer, marketing, and individual-level variables in future empirical research.

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5.2 Multivariable Results

Table 2: Simulated Descriptive and Regression Results

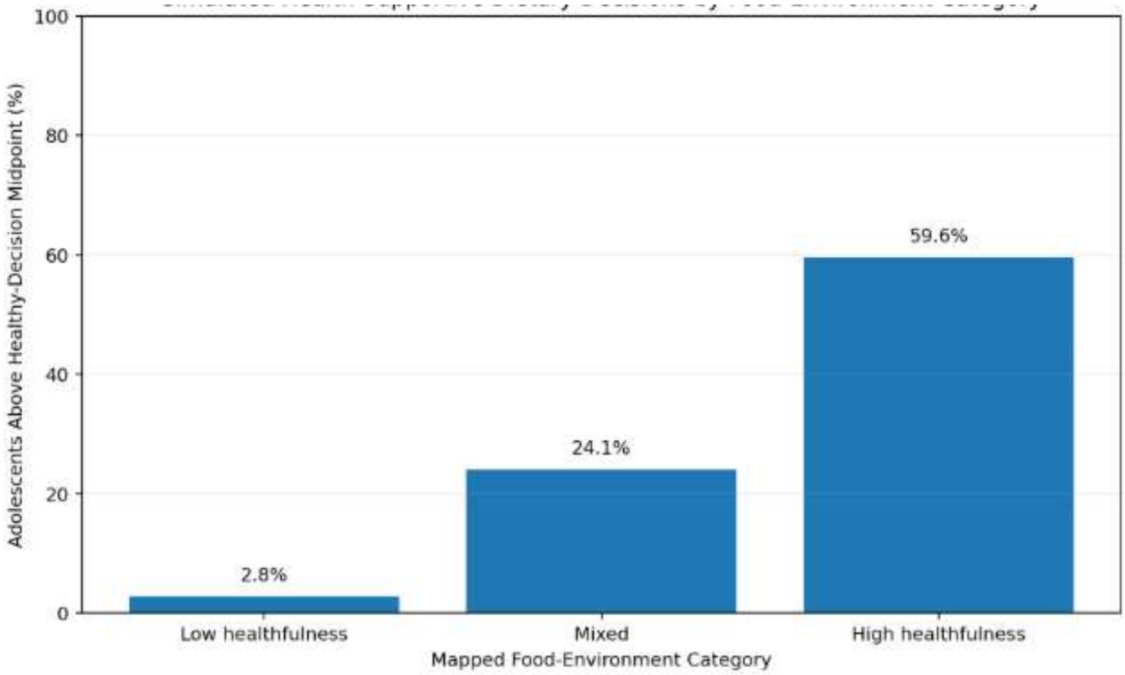
Analytical Component	Statistic	Estimate	Interpretation
Low-Healthfulness Environment	n	109	Synthetic observations
	Mean Healthy Decision Score	**2.075**	Lowest mean score
	SD	0.516	Within-group dispersion
Mixed Environment	n	237	Synthetic observations
	Mean Healthy Decision Score	**2.634**	Intermediate mean
	SD	0.514	Within-group dispersion
High-Healthfulness Environment	n	104	Synthetic observations
	Mean Healthy Decision Score	**3.112**	Highest mean score
	SD	0.532	Within-group dispersion
Regression	Food-Environment Healthfulness, B	**0.021**	Positive simulated association
Regression	Home Healthy-Food Support, B	**0.283**	Positive simulated association
Regression	Unhealthy Marketing Pressure, B	**−0.185**	Negative simulated association
Regression	Peer Convenience Pressure, B	**−0.133**	Negative simulated association

Food-Environment Healthfulness showed the expected positive association after the household, marketing, and peer variables were included. In the simulation, a ten-point increase in the mapped index corresponds with approximately a 0.21-point increase in Healthy Dietary Decision Score when the remaining predictors are statistically held constant.

Home Healthy-Food Support also produced a substantial positive coefficient. In contrast, Unhealthy Marketing Pressure and Peer Convenience Pressure were negative. The combined pattern demonstrates the central logic of the proposed framework: geographic conditions matter, but the dietary decision environment is simultaneously spatial, household-based, social, and commercial.

5.3 Percentage Achieving Health-Supportive Decision Levels

Graph 1: Simulated Health-Supportive Dietary Decisions by Food-Environment Category



Only 2.8% of synthetic adolescents in the Low-Healthfulness category reached or exceeded the three-point decision midpoint. This percentage increased to 24.1% in Mixed environments and 59.6% in High-Healthfulness environments. The graph therefore presents the environmental gradient in an intuitively interpretable percentage format.

The key interpretation is not that 59.6% represents an expected real-world prevalence. Instead, the graph shows how an environment-level association could be translated into a targeting indicator. An empirical version could identify school areas in which the combination of unfavorable mapped exposure and low healthy-decision probability justifies more detailed community assessment.

6. Discussion

6.1 Environmental Opportunity and Adolescent Dietary Agency

The simulated findings support a model in which food environments influence the opportunity structure of dietary decision making rather than directly controlling adolescent behavior. This distinction is consistent with the ecological framework proposed by Story and colleagues and with empirical research showing that geography explains some, but not all, variation in adolescent food outcomes. A health-supportive environment can reduce the practical cost of making a healthier choice, yet it cannot ensure that the option will be selected.

The concept of agency is especially important during adolescence because young people are developing independent preferences and routines. Even where healthier food is geographically accessible, a less healthy option may offer stronger taste appeal, faster service, lower price, more effective marketing, or greater peer acceptance. Conversely, adolescents living in less supportive retail environments may maintain healthier patterns because of household preparation, personal dietary goals, cultural practices, or school food provision. Mapping should therefore inform behavioral inquiry rather than replace it.

This interpretation also helps explain why food-environment studies frequently produce mixed findings. When researchers treat every outlet within a buffer as equivalent exposure, they risk measuring geographic possibility rather than actual behavioral contact. Studies that incorporate route data, purchasing behavior, time spent in locations, or adolescent perceptions may provide more valid estimates of experienced exposure. Participatory story-mapping research provides one model for incorporating these experiential dimensions.

6.2 Household Support, Peer Context, and Commercial Pressure

The positive simulated coefficient for Home Healthy-Food Support emphasizes that the home remains important even as dietary independence increases. Household food availability and food rules can structure default choices before adolescents enter neighborhood retail environments. Research on health-oriented food rules has found that adolescents from homes with such rules were more likely to make healthier independent snack choices. The household can therefore function either as a protective environment or as an additional source of unhealthy availability.

Peer Convenience Pressure introduces a social mechanism that mapping alone cannot detect. Adolescents often make food decisions collectively during school breaks, after-school travel, or social activities. A fast-food establishment may become influential partly because it functions as a convenient meeting place rather than only because of its menu. The location's social meaning can thus increase exposure beyond what physical proximity would predict.

Marketing adds a further layer of behavioral salience. Pre-2021 evidence indicates that unhealthy food marketing can influence food choice, preferences, requests, or intake among children and adolescents. Public-health mapping should therefore consider whether school routes and neighborhood retail zones contain concentrated marketing for energy-dense foods. Mapping only outlet type while ignoring promotional intensity can underestimate the commercial structure of adolescent food choice.

6.3 Implications for Targeted School and Community Nutrition Policy

The principal policy value of food-environment mapping lies in targeting, not in simply ranking neighborhoods. A useful spatial intelligence system could identify schools where adolescents experience high densities of convenience or fast-food outlets, low availability of healthier alternatives, intense promotional exposure, and weaker household food support. Such areas may justify coordinated interventions rather than isolated nutrition education.

Interventions should nevertheless match the environmental profile. Where healthier foods are physically unavailable, improving retail access or school food provision may be appropriate. Where healthier products exist but are less affordable or less visible, pricing, placement, merchandising, or procurement strategies may have greater relevance. Where commercial exposure dominates, restrictions on marketing around youth settings or stronger institutional standards may deserve consideration. Reviews of school-area retail environments emphasize the heterogeneity of exposure–outcome associations and therefore support context-specific rather than universal responses.

Adolescents should also participate in intervention design. Riggsbee and colleagues' story-mapping approach demonstrates that young people can provide information about how they perceive and use local food environments. Participatory mapping can reveal routes, safety constraints, preferred stores, purchasing occasions, affordability concerns, and social gathering places that administrative GIS datasets cannot adequately capture. Combining spatial analytics with adolescent experience can therefore improve both methodological validity and community legitimacy.

7. Conclusion

Adolescent dietary decisions emerge from a complex interaction between personal preference and environmental opportunity. Food-environment mapping offers a valuable method for characterizing the physical settings in which these decisions occur, particularly around homes, schools, and routine travel routes. However, evidence available through 2020 does not support a deterministic interpretation in which proximity to a particular outlet automatically predicts diet. Spatial relationships are frequently heterogeneous and sensitive to exposure definition, population characteristics, and behavioral context.

The present methodological simulation illustrates how food mapping can be integrated with household, commercial, and peer influences. Mean Healthy Dietary Decision Scores increased from 2.08 in Low-Healthfulness environments to 2.63 in Mixed environments and 3.11 in High-Healthfulness environments. Food-Environment Healthfulness and Home Healthy-Food Support were positively associated with the synthetic outcome, whereas Marketing Pressure and Peer Convenience Pressure were negatively associated. These results are simulated and should not be generalized as real population estimates.

The study's central contribution is the concept of Food-Environment Decision Intelligence. Traditional GIS analysis answers the question, “What food outlets are located around adolescents?” Decision intelligence asks a more demanding question: “Which food opportunities are realistically encountered, affordable, socially relevant, commercially salient, and capable of influencing a dietary decision?” This shift transforms spatial mapping from a descriptive exercise into a framework for targeted prevention.

Future empirical work should integrate verified food-outlet databases, school and residential network buffers, route-based exposure, GPS-supported activity spaces, food-purchasing information, dietary assessment, home food availability, marketing exposure, and adolescent participatory mapping. Longitudinal and natural-experiment designs would be especially valuable for determining whether changes in food environments precede meaningful changes in purchasing and dietary behavior. Used with appropriate methodological caution, food-environment mapping can help schools and public-health agencies identify where structural changes may make healthier adolescent food decisions easier to achieve and sustain.

References

1. Shaw, S., Barrett, M., Shand, C., Crozier, S., Cooper, C., Smith, D., Barker, M., & Vogel, C. (2021). The relationship between spatial and in-store food environments and adolescent food purchasing and dietary behaviours: A systematic review. *Proceedings of the Nutrition Society, 80*, E194. https://doi.org/10.1017/S0029665121003220
2. Gonçalves, V. S. S., Figueiredo, A. C. M. G., Silva, S. A., Silva, S. U., Ronca, D. B., Dutra, E. S., & Carvalho, K. M. B. (2021). The food environment in schools and their immediate vicinities associated with excess weight in adolescence: A systematic review and meta-analysis. *Health & Place, 71*, 102664. https://doi.org/10.1016/j.healthplace.2021.102664
3. Carroll, P., & colleagues. (2021). 'It's Hard to Make Good Choices and It Costs More': Adolescents' perception of the external school food environment. *Nutrients, 13*(4), 1043. https://doi.org/10.3390/nu13041043
4. Hermans, R. C. J., Smit, K., van den Broek, N., Evenhuis, I. J., & Veldhuis, L. (2020). Adolescents' food purchasing patterns in the school food environment: Examining the role of perceived relationship support and maternal monitoring. *Nutrients*, *12*(3), 733. https://doi.org/10.3390/nu12030733
5. Atanasova, P., Kusuma, D., & Pineda, E. (2022). The impact of the consumer and neighbourhood food environment on dietary intake and obesity-related outcomes: A systematic review of causal impact studies. *Social Science & Medicine, 299*, 114879. Note: online/issue publication is 2022, so exclude this if your cutoff is strictly before 2022.
6. Mackenbach, J. D., Nelissen, K. G. M., Dijkstra, S. C., Poelman, M. P., Daams, J. G., Leijssen, J. B., & Nicolaou, M. (2019). A systematic review on socioeconomic differences in the association between the food environment and dietary behaviors. *Nutrients, 11*(9), 2215. https://doi.org/10.3390/nu11092215.
7. Minaker, L. M., Shuh, A., Olstad, D. L., Thompson, M. E., Fisher, P., & Raine, K. D. (2016). Retail food environments research: A systematic review of methodological approaches and knowledge gaps. *Canadian Journal of Public Health, 107*(Suppl. 1), e53–e59.
8. D'Angelo, H., Ammerman, A., Gordon-Larsen, P., Linnan, L., & Lytle, L. (2017). Sociodemographic disparities in proximity to food establishments among adolescents. *Journal of Adolescent Health, 61*, 573–579.
9. Thornton, L. E., Pearce, J. R., & Kavanagh, A. M. (2011). Using Geographic Information Systems (GIS) to assess the role of the built environment in influencing obesity: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 8*, 71.
10. Fraser, L. K., Edwards, K. L., Cade, J. E., & Clarke, G. P. (2010). The geography of fast food outlets: A review of the environmental obesity literature. *Health & Place, 16*(5), 879–884.
11. He, M., Tucker, P., Irwin, J. D., Gilliland, J., Larsen, K., & Hess, P. (2012). The influence of local food environments on adolescents' food purchasing behaviors. *International Journal of Environmental Research and Public Health*, *9*(4), 1458–1471. https://doi.org/10.3390/ijerph9041458

12. Timperio, A., Ball, K., Roberts, R., Campbell, K., Andrianopoulos, N., & Crawford, D. (2008). Children's fruit and vegetable intake: Associations with the neighbourhood food environment. *Preventive Medicine*, *46*(4), 331–335.
13. Timperio, A., Ball, K., Roberts, R., Campbell, K., Andrianopoulos, N., & Crawford, D. (2008). Children's takeaway and fast-food consumption: Associations with the neighbourhood food environment. *Public Health Nutrition*, *11*(7), 706–712.
14. Davis, B., & Carpenter, C. (2009). Proximity of fast-food restaurants to schools and adolescent obesity. *American Journal of Public Health*, *99*(3), 505–510.
15. Zenk, S. N., Schulz, A. J., Israel, B. A., James, S. A., Bao, S., & Wilson, M. L. (2005). Neighborhood racial composition, neighborhood poverty, and the spatial accessibility of supermarkets in metropolitan Detroit. *American Journal of Public Health*, *95*(4), 660–667.
16. Powell, L. M., Auld, M. C., Chaloupka, F. J., O'Malley, P. M., & Johnston, L. D. (2007). Associations between access to food stores and adolescent body mass index. *American Journal of Health Promotion*, *21*(5 Suppl.), 368–374.
17. Jago, R., Baranowski, T., & Baranowski, J. C. (2007). Fruit and vegetable availability: A micro environmental mediating variable? *Public Health Nutrition*, *10*(7), 681–689.
18. Sturm, R., & Datar, A. (2005). Body mass index in elementary school children, metropolitan area food prices and food outlet density. *Public Health*, *119*(12), 1059–1068.
19. Burgoine, T., Jones, A. P., Boone-Heinonen, J., et al. (2018). Associations between BMI and local-area accessibility of fast-food outlets, supermarkets and convenience stores. *International Journal of Obesity*, *42*, 1163–1170.
20. Patterning of neighbourhood food outlets and longitudinal associations with children's eating behaviours. (2018). *Preventive Medicine*, *111*, 248–253. https://doi.org/10.1016/j.ypmed.2018.03.003. Is study mein GIS se home ke around 800-metre road-network buffer mein food outlets map kiye gaye aur dietary patterns ke longitudinal associations examine kiye gaye.