

Retail food environments research: Promising future with more work to be done

Daniel Fuller, PhD,^{1,2} Rachel Engler-Stringer, PhD,^{2,3} Nazeem Muhajarine, PhD^{2,3}

ABSTRACT

As members of the scientific committee for the Food Environments in Canada conference, we reflect on the current state of food environments research in Canada. We are very encouraged that the field is growing and there have been many collaborative efforts to link researchers in Canada, including the 2015 Food Environments in Canada Symposium and Workshop. We believe there are 5 key challenges the field will need to collectively address: theory and causality; replication and extension; consideration of rural, northern and vulnerable populations; policy analysis; and intervention research. In addressing the challenges, we look forward to working together to conduct more sophisticated, complex and community-driven food environments research in the future.

KEY WORDS: Food; environment; research; exposure

La traduction du résumé se trouve à la fin de l'article.

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As members of the scientific committee for the Food Environments in Canada conference, we are delighted to reflect on the importance of this *Canadian Journal of Public Health* special supplementary issue. This special issue has provided an important opportunity for our field to reflect on our successes and discuss our challenges. As Minaker et al. point out, retail food environments research has expanded rapidly in Canada, only one paper having been published before 2005 and 66 between 2010 and 2015.¹ The increase in publications is a reflection of a concerted effort from researchers across Canada, but is not unique to Canada.² This special supplement covers a wide range of methodological approaches, populations and geographic foci. Taken together, we believe there are five broad challenges that need addressing for food environments research in Canada. Along with the challenges, we propose potential solutions.

CHALLENGE 1: THEORY AND CAUSALITY

Food environments researchers are taking theory and causality more seriously in their work. We believe that efforts should be made to link theory and causal mechanisms with data analysis. To date, studies include only implicit assumptions about both the theoretical justification and causal mechanisms. Relatedly, many implicit assumptions about the association between food environments and health involve statistically testable assumptions about effect modification. It is clear from the articles in this supplement that examining effect modification is increasingly of interest for researchers. Whether this is effect modification by age, sex, First Nations status, or rurality, there is a strong desire to explore hypothesized mechanisms that may explain observed associations. Additional mechanisms that must be explicitly theorized and statistically tested could include childhood exposure to foods, participation in traditional, alternative or cultural food practices, and social preferences for food taste.

CHALLENGE 1: SOLUTIONS

Researchers should explicitly state their theoretical framework and the specific hypothesized causal mechanisms under study. Continued examination of effect modification is warranted, with the caveat that the mechanisms and causal pathways that are postulated be explicitly described. To date, very few studies have included any examination of mediated or effect-modified mechanisms that link the food environment and its health effects on populations. Including mediation or effect modification in hypothesized pathways and analysis could prove fruitful. Pre-publication of study protocols and data analysis plans can support the presentation of theoretical and statistical testing of hypothesized mechanisms.³ Pre-publication can also avoid data-driven fishing expeditions.

CHALLENGE 2: EXPOSURE

The second major challenge is related to exposure conceptualization and measurement. Issues of defining exposure to food stores, whether through use of road network buffers from the centroid of a geographic location or GPS(global positioning systems)-based activity spaces are crucial to advance the field. Gilliland et al. (in this issue) use a promising method to define exposure that is based on GPS traces. Combining measures of exposure to food stores with improved measurement of whether healthy or unhealthy food is available in those stores is important. In addition, exposure to the consumer or in-store/in-restaurant food environment needs to be captured more accurately.

Author Affiliations

1. School of Public Health, University of Saskatchewan, Saskatoon, SK
2. Saskatchewan Population Health and Evaluation Research Unit
3. Department of Community Health and Epidemiology, University of Saskatchewan, Saskatoon, SK

Correspondence: Rachel Engler-Stringer, PhD, Dept of Community Health and Epidemiology, University of Saskatchewan, 104 Clinic Place, Saskatoon, SK S7N 2Z4, Tel: 306-966-7839, E-mail: Rachel.engler-stringer@usask.ca

Commonly used tools, such as the Nutrition Environment Measures Survey for Stores/Restaurants, have important limitations, which need to be acknowledged and improved upon.⁴

CHALLENGE 2: SOLUTIONS

Measurement of the food environment needs to move beyond simply counting different types of food retailers in a geographic area and equating healthy/unhealthy food sources with simple definitions of retail types. Similarly, definitions of environments using Euclidean buffer zones of a given distance from a food retailer or from a participant's residence should be avoided. The measurement of activity spaces using GPS is an improvement in measuring food environment exposure. The data and computational requirements are substantial when using GPS methods, but food environments researchers must develop collaborations and expertise in this area. We caution, however, that moving solely toward research using individual-level exposure measures based on GPS has the potential to limit our understanding of shared environmental exposure contexts (e.g., food deserts, food swamps and food mirages) and may add new challenges for causal inference.⁵ Furthermore, measurement of the environment in food stores using shelf space or other relative measures is another way to improve exposure measurement.⁶ Combining spatial access with food pricing and quality measures within stores will be an important advance, allowing a better understanding of the associations between food environments and health.⁷ Lebel et al., in this issue, describe the importance of this type of exposure measurement in rural areas.⁸

CHALLENGE 3: REPLICATION AND EXTENSION

Replication and extension of past research is a foundation of the scientific process. Replication has recently been highlighted as a key challenge for psychology and, we would argue, for food environments research.⁹ We interpret the calls for replication in two ways, to confirm the results of past work and to generalize results to new contexts. For example, Mercille et al. (in this issue) express concern that their study included only 248 of 862 census tracts in Montreal and may not be generalizable to Montreal, let alone other cities.¹⁰ Polsky et al. (in this issue) suggest their results should be replicated in rural or remote settings. Both authors are concerned with generalizability to new contexts.¹¹

CHALLENGE 3: SOLUTIONS

The primary solutions to addressing the replication challenge for food environments research in Canada are open data and data sharing among researchers. In particular, sharing geographic information systems with food environment exposure measures is crucial for the replication of past research. To improve measurement of food store "healthfulness", researchers need to develop open databases that limit reliance on proprietary commercial use data.¹² Also, a focus on replication and extension by improving the comparability of exposure measures used in published studies is important. A possible solution is to publish replications as online supplements and results from new exposure measures as the primary result in a manuscript.

CHALLENGE 4: CONSIDERATION OF RURAL AND NORTHERN AND VULNERABLE POPULATIONS

Equity is an important aspect of food environments research. It is clear that food affordability and access create extreme inequities in healthy food consumption in rural and northern areas and in vulnerable populations. As Skinner et al. discuss in this issue, limited work has examined food costing in the north.¹³ Economic barriers appear to be the major driver of differential access to healthy food among rural, northern and vulnerable populations, yet little research to date has been conducted in these settings and with these populations.

CHALLENGE 4: SOLUTIONS

Food environments research with rural, northern and other vulnerable populations must be community driven in order to ensure that historical and ongoing traumas are not repeated, and that any proposed interventions reflect the needs and desires of communities. The social and historical contexts of these communities must also be carefully considered in food environments research. For example, if the underlying issue is poverty, we must study and address poverty in relation to the food environment. We also must use theory and explicitly state our assumptions when extending or replicating urban-based food environment research to other settings, particularly among rural, remote or vulnerable populations.

CHALLENGE 5: POLICY ANALYSIS AND INTERVENTION RESEARCH

Policy analysis and intervention research are important challenges for studying food environments in two ways. First, as discussed by Mah et al. in this issue, conceptualizing and discussing potential policy options at various government levels can improve our understanding of the plausible impacts of food environment policies.¹⁴ Second, intervention research can empirically evaluate the implementation of real world policies. This is important in order for food environments researchers to contribute to the public discussion about food and health. It is also important because well-designed natural experiment studies may be one of our best chances to estimate causal effects.¹⁵ Combining quantitative and qualitative research can also be beneficial in helping identify mechanisms.

CHALLENGE 5: SOLUTIONS

Policy analysis and intervention research requires researchers having an "ear to the ground" in urban planning and food policy at federal, municipal and community levels. There is a need to develop strong partnerships with these sectors and maintain funding for policy evaluation research.

CONCLUSION

At the heart of this reflection is the idea that addressing these challenges will require continued collaboration between food environment researchers. We hope that our perspectives, informed by several years of researching food environments and food environment interventions, on the future directions that are needed in this research area can contribute to increasingly sophisticated approaches in our field. As Minaker et al. found in

this special issue, most of the Canadian research has been published in the last 5 years.¹ The field is growing and dynamic.

To us, this is consistent with the dynamism and engagement we saw when we brought 100 people from across Canada together for the Food Environments in Canada Symposium and Workshop in May 2015. Given how quickly this field has grown, we look forward to working together with you to conduct more sophisticated, complex and community-driven food environments research in the future.

REFERENCES

1. Minaker LM, Shuh A, Olstad DL, Engler-Stringer R, Black JL, Mah CL. Retail food environments research in Canada: A scoping review. *Can J Public Health* 2016;107 (Suppl 1):eS4–eS13. doi:10.17269/CJPH.107.5344.
2. Caspi CE, Sorensen G, Subramanian SV, Kawachi I. The local food environment and diet: A systematic review. *Health Place* 2012;18(5):1172–87. doi:10.1016/j.healthplace.2012.05.006.
3. Engler-Stringer R, Le H, Gerrard A, Muhajarine N. The community and consumer food environment and children's diet: A systematic review. *BMC Public Health* 2014;14(1):1. doi:10.1186/1471-2458-14-522.
4. Saelens BE, Glanz K, Sallis JF, Frank LD. Nutrition Environment Measures Study in Restaurants (NEMS-R): Development and evaluation. *Am J Prev Med* 2007;32(4):273–81. doi:10.1016/j.amepre.2006.12.022.
5. Roux AVD. The study of group-level factors in epidemiology: Rethinking variables, study designs, and analytical approaches. *Epidemiol Rev* 2004; 26(1):104–11. doi:10.1093/epirev/mxh006.
6. *Food Environment Assessment Manual*. Health Canada, In Press.
7. Le H, Engler-Stringer R, Muhajarine N. Walkable home neighbourhood food environment and children's overweight and obesity: Proximity, density or price? *Can J Public Health* 2016;107 (Suppl 1):eS42–eS47. doi:10.17269/CJPH.107.5347.
8. Lebel A, Noreau D, Tremblay L, Oberlé C, Girard-Gadreau M, Duguay M, Block JP. Identifying rural food deserts: Methodological considerations for food environment interventions. *Can J Public Health* 2016;107 (Suppl 1): eS21–eS26. doi:10.17269/CJPH.107.5353.
9. Open Science Collaboration. Estimating the reproducibility of psychological science. *Science* 2015;349(6251):aac4716. doi:10.1126/science.aac4716.
10. Mercille G, Richard L, Gauvin L, Kestens Y, Shatenstein B, Daniel M, Payette H. The food environment and diet quality of urban-dwelling older women and men: Assessing the moderating role of diet knowledge. *Can J Public Health* 2016; 107 (Suppl 1):eS34–eS41. doi:10.17269/CJPH.107.5309.
11. Polsky JY, Moineddin R, Glazier RH, Dunn JR, Booth GL. Relative and absolute availability of fast-food restaurants in relation to the development of diabetes: A population-based cohort study. *Can J Public Health* 2016;107 (Suppl 1):eS27–eS33. doi:10.17269/CJPH.107.5312.
12. Forsyth A, Lytle L, Van Riper D. Finding food: Issues and challenges in using Geographic Information Systems to measure food access. *J Transport Land Use* 2010;3(1):43–65. doi:10.5198/jtlu.v3i1.105.
13. Skinner K, Burnett K, Martin D, Williams P, Stothart C, LeBlanc J, et al. Challenges in assessing food environments in northern and remote communities in Canada. *Can J Public Health* 2016;107 (Suppl 1):eS60–eS63. doi:10.17269/CJPH.107.5324.
14. Mah C, Cook B, Rideout K, Minaker LM. Policy options for healthier retail food environments in city-regions. *Can J Public Health* 2016;107 (Suppl 1): eS64–eS67. doi:10.17269/CJPH.107.5343.
15. Petticrew M, Cummins S, Ferrell C, Findlay A, Higgins C, Hoy C, et al., Natural experiments: An underused tool for public health? *Public Health* 2005; 119(751–57):751. doi:10.1016/j.puhe.2004.11.008.

RÉSUMÉ

En tant que membres du comité scientifique de la conférence « Food Environments in Canada », nous réfléchissons à l'état actuel de la recherche sur les environnements alimentaires au pays. Nous sommes très encouragés par la croissance du domaine et par les nombreux efforts concertés pour établir des liens entre les chercheurs à l'échelle nationale, dont le colloque et l'atelier « Food Environments in Canada » de 2015. Nous croyons qu'il y a cinq grands défis à relever collectivement dans ce domaine : la théorie et la causalité; la répétition et la vulgarisation des résultats; la prise en compte des populations rurales, nordiques et vulnérables; l'analyse des politiques; et la recherche d'intervention. Pour aborder ces défis, nous envisageons avec intérêt de travailler ensemble à mener des études de recherche sur les environnements alimentaires plus élaborées, plus complexes et plus axées sur les communautés à l'avenir.

MOTS CLÉS : nourriture; environnement; recherche; exposition