The Impact of Economic Conditions on Healthy Dietary Intake: Evidence From Fluctuations in Canadian Unemployment Rates

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ABSTRACT
Objective: This study examined the impact of economic conditions on fruit and vegetable consumption using multiple waves of the Canadian Community Health Survey.
Design: By using metropolitan-area variation in the unemployment rate as a proxy for economic conditions, various measures of fruit and vegetable consumption were regressed on this unemployment rate, using a 2-way fixed effect estimation strategy.
Main Outcome Measures: The following measures of fruit and vegetable consumption were considered: (1) total number of times per day respondents ate fruits and vegetables and (2) servings of fruit of vegetable consumption (<5 times/d, 5–10 times/d, and >10 times/d).
Analysis: Regression models with location and time-fixed effects were estimated to explore the impact of the unemployment rate with the measures of fruit and vegetable consumption. Pearson’s chi-square tests were used to examine subgroup differences by gender.
Results: Findings suggested that increases in the unemployment rate (ie, worse economic conditions) reduced fruit and vegetable consumption, and this result was robust across gender and education levels.
Conclusions and Implications: These findings contribute to a small but important body of literature that focuses specifically on the relationship between economic conditions and fruit and vegetable consumption.
Key Words: fruit and vegetable consumption, economic conditions, Canada, nutrition, diet (J Nutr Educ Behav. 2017;49:632-638.)
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INTRODUCTION
About one-third of morbidity and mortality in high-income countries can be attributed to modifiable health-related behaviors such as smoking, use of alcohol and illicit drugs, lack of exercise, and poor diet.1 Health behaviors represent an important determinant of premature death as well as certain chronic conditions such as diabetes, cardiovascular disease, and hypertension. These modifiable health-related behaviors can have an impact on the health of individuals, and although these choices are made on an individual level, they can affect public health. Fruit and vegetable consumption can help prevent major diseases such as cardiovascular diseases and certain cancers.2 Moreover, happiness and psychological well-being rise in an approximately dose-response way with the number of daily portions of fruit and vegetables, which suggests possible effects on mental health as well.3
A large body of literature examined the effects of economic conditions in developed countries on health and health behaviors.4 Studies using US data5-12 and some from Europe13-15 focused predominantly on the association of economic conditions with health behaviors. These studies tended to show that when the economy is not doing well, health-compromising behaviors decrease and health-promoting ones increase: People behave healthier during bad times, although more recent studies found evidence of a reverse relationship.11 Existing studies focused on behaviors such as alcohol use,7-9,13,15 smoking, physical activity,10 and illicit drug use.14 Other studies examined the association of general health and mental health with economic fluctuations,16 because both predict mortality. These studies found that in general, both general health and mental health become worse with economic

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Conflict of Interest Disclosure: The authors’ conflict of interest disclosures can be found online with this article on www.jneb.org.
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downturns. Much less common are studies that examined the relationship between the unemployment rate (a proxy for economic conditions) and dietary choices,\(^5,12\) which are an important determinant of short- and longer-term health.

Only 2 existing studies addressed this question, likely owing to a lack of appropriate data. Ruhm\(^7\) used Behavioral Risk Factor Surveillance System data, collected in the US, and found no statistically significant relationship between economic conditions and dietary behavior. More recently, Dave and Kelly\(^12\) used the Behavioral Risk Factor Surveillance System data over a slightly different period and found that consumption of fresh produce decreased whereas consumption of unhealthy foods such as snacks and fast foods increased during economic downturns.

Although the unemployment rate was used as a proxy for economic conditions in most existing studies, it is not the rate itself that affects health or health behaviors; rather, the associated changes in factors, such as time use, income, and economic stress, are thought to affect health and health behaviors.\(^17\) Diet can be affected through at least two channels during local economic fluctuations: the opportunity cost of time and the changes in income, both real and expected.\(^4\) During economic downturns, individuals may have more time to devote to preparing nutritious meals at home, which is a labor-intensive activity. If so, consumption of fruits and vegetables may increase, because homemade meals typically require preparation and tend to feature fresh produce.\(^18\)

Although time allocation is a plausible mechanism, it is impossible to control for time use with nearly all available data; hence it is useful to examine economic fluctuations, because they will lead to plausibly exogenous changes in time use. Thus, if the effect of the opportunity cost of time dominates, it is expected that fruit and vegetable consumption will increase during recessions and decrease when economic conditions improve.

However, individuals may also be constrained by changes in income, and the real and expected effects of income, derived from work. Income constraints owing to possible job loss were found to affect individuals’ health and health behaviors.\(^13\) Lower income means that individuals had less money to allocate to fruits and vegetables, and instead may have substituted cheaper food sources such as starches including pasta. Indeed, research on the sensitivity and responsiveness of fruit and vegetables consumption found that fruit and vegetable consumption was sensitive to changes in income.\(^19,20\) Behavioral changes can also occur when no reduction in income has been realized, just anticipated, because households changed their expenditure patterns in expectation of possible future income changes.\(^21\) This is 1 reason why it is useful to examine changes in economic conditions, apart from the impact of changes in real income. If an income-based explanation dominates, it is expected that fruit and vegetable consumption will decrease during recessions and increase when economic conditions improve. However, these explanations are provided as general mechanisms to understand how changes in economic conditions might affect fruit and vegetable consumption. They are not mutually exclusive, and like all existing work, this study cannot neatly disentangle their impacts. Finally, whereas some studies in this literature controlled for individual-level employment status, others did not.

This study contributes to this particular underdeveloped literature in the following way. It examined the association of economic conditions with the fruit and vegetable consumption of working-age Canadians during 2000–2013, using the Canadian Community Health Survey (CCHS). The empirical strategy used within-area variation in unemployment rates at the Canadian Census Metropolitan Area (CMA) level to measure the impact of changes under local economic conditions.

**METHODS**

This study did not require approval from the Institutional Review Board at McMaster University because the data were collected by Statistics Canada and fall under the provision of Article 2.2 of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans which guides research with human participants in Canada.\(^22\) This study used detailed micro-level observational data with approved access granted by Statistics Canada to the authors for use at the McMaster University Research Data Centre.

The CCHS

The CCHS is a repeated cross-sectional survey conducted by Statistics Canada that collects information related to health status, health care use, and health determinants (including information on fruit and vegetable consumption) for the Canadian population.\(^23\) Collection of data for the first 3 cycles of the CCHS was designed as a 2-year data collection cycle that started in 2000. Starting in 2007, the data collection design changed to collect data every year, with annual releases, to improve the survey’s efficiency and flexibility.\(^23\) The CCHS data are collected for individuals aged $\geq 12$ years living in private dwellings in the 115 health regions covering all provinces and territories.\(^24\) Individuals living on Indian Reserves and on Crown Lands, institutional residents, full-time members of Canadian Forces, and residents of certain remote regions are excluded from the sampling frame.\(^24\) Overall, the CCHS covers approximately 98% of the Canadian population aged $\geq 12$ years.\(^24\)

**Measuring Economic Conditions**

Following the existing literature,\(^25,26\) this study used monthly unemployment rates at the CMA level to proxy for local economic conditions. The CMA is likely the appropriate level of aggregation because it captures an area that corresponds roughly to a local labor market. A CMA is defined as a large urban area consisting of $\geq 1$ neighboring municipalities (also
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