Food security and Canada’s agricultural system challenged by COVID-19

B. James Deaton1 | Brady J. Deaton2

1McCain Family Chair in Food Security, Department of Food, Agricultural and Resource Economics, University of Guelph
2Chancellor Emeritus and Emeritus Professor of Agricultural Economics, Department of Agricultural Economics, University of Missouri

Correspondence
B. James Deaton, McCain Family Chair in Food Security, Department of Food, Agricultural and Resource Economics, University of Guelph.
Email: bdeaton@uoguelph.ca

Abstract
The effect of COVID-19 on Canadian food security is examined from two different perspectives. COVID-19 creates a unique “income shock” that is expected to increase the prevalence of household food insecurity. This food insecurity can be measured by utilizing the Canadian Community Health Survey (CCHS). More fundamentally, COVID-19 heightens household concern about the capacity of the Canadian food system to ensure food availability. Despite surges in demand and supply chain disruptions, we currently do not observe broad, rapid appreciation in food prices. This suggests that there is an adequate supply of food for the near term. There is less certainty over intermediate and longer time periods because so many factors are in flux, particularly the rate of increases in sicknesses and deaths across the country and globally. Data on these health factors and elements of the food supply chain are needed to predict beyond a short time frame. In this regard, we discuss three ongoing considerations—ease of capital flows, international exchange, and maintaining transportation—that will help ensure food availability in the longer run.

KEYWORDS
COVID-19, food security
1. INTRODUCTION

This paper examines the effect of the COVID-19 pandemic on Canadian food security. The loss of income to Canadian households and challenges to the food supply chain are our primary focus, as those are the only factors that we can readily speak to with any degree of confidence. The loss of income associated with COVID-19 is expected to increase measures of food insecurity as derived from the Household Food Security Survey Module (HFSSM) of the Canadian Community Health Survey (CCHS), conducted by Statistics Canada. Importantly, by this measure, the income shock associated with COVID-19 will likely increase the prevalence of households identified as food insecure.

Beyond the effects captured in the food security module, households across Canada are now concerned about the capacity of the food system to ensure food availability, both now and in the future, at relatively stable food prices. The private and public sectors working in tandem must address this more fundamental issue of food security, and it is our conviction, based on the ready response of supportive public policy at all levels of government, that this will occur. Consequently, our assessment is that food availability will be relatively stable over the coming months. Longer-term challenges to food security in reality and in the realm of public perception depend on a number of factors that cannot be fully anticipated. That said, we identify and briefly discuss three critical factors to monitor and analyze: international exchange, farm financial stability, and transportation.

COVID-19 is recognized as a health threat that poses a challenge to food security, from both an actual and a perceptual basis. Section 2 describes the expected effect of COVID-19 on household income and subsequent levels of food insecurity. In this context, the measure employed to determine food insecurity will be clarified, so that the substantive meaning is understood regarding the basis of our expectation that the prevalence and intensity of food insecurity may increase. Section 3 examines the threat that COVID-19 poses to more fundamental aspects of food security: society-wide expectations that food availability and food prices will be adequate to meet national needs and remain relatively stable.

2. COVID-19: FOOD INSECURITY

COVID-19 has had immediate consequences on household income and future expectations thereof, as public and private workplaces and businesses closed principally to enforce “social distancing.”1 Workers also left jobs for health concerns for themselves and their families. In one week in mid-March, as the events described above unfolded, there were over 500,000 applications for unemployment insurance, compared to 27,000 applications that same week in the previous year (Breen, 2020). The Canadian economy is expected to contract in the second quarter; some estimate by more than 20% (Deloitte, 2020). The U.S. economy is expected to contract by 24% (Goldman Sachs, 2020). This last measure is comparable to contractions associated with the Great Depression (Inman, 2020). The U.S. contraction (and strength of its eventual rebound) is a critical consideration for Canada, as Canadian Provinces do more north-south trade than east-west trade (Deloitte, 2020). The economic effects of COVID-19, like many income shocks, will have a depressing effect on the global economy for some time.

COVID-19 has some important characteristics that make its deleterious effects on employment and income generation unique and different from previous income shocks like the financial crisis of 2008. First, COVID-19 impairs the health and vitality of the work force, both directly, through illness, and indirectly, as some workers stay home to avoid carrying the virus back to their families and friends. Another unique aspect of COVID-19 is that the policies of social distancing significantly limit the range of public agency, university, organizational, and entrepreneurial responses that might accompany other recoveries and serve to stabilize household income—thereby reducing food insecurity.

Even before the pandemic, approximately 12.7% of Canadian households experienced some level of food insecurity according to results from the CCHS (Tarasuk & Mitchell, 2020). The First Nations Regional Health Survey (RHS), employing a similar survey approach to the CCHS, found that 50.8% of First Nations adults living in First Nations communities reported their households as food insecure (First Nations Information Governance Centre, 2018). Income is a key factor influencing both whether a household identifies as food insecure and self-reports on the intensity of food insecurity. To better understand the relationship between household income and food insecurity, and build an appreciation of the potential effect that COVID-19

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1 Social distancing refers to the practice of leaving space (often 2 m) between people so as to limit the spread of COVID-19. In addition, the number of people (not already living together) that can gather in one place at the same time is restricted, and those exposed to COVID-19 are expected to isolate themselves for a period of time (typically 2 weeks). Social distancing is more than a best practice; at the time of our writing, governments across Canada have implemented a host of specific rules regarding social distancing.
will have on food insecurity, we briefly describe the most common method of determining food insecurity as measured and reported in Canada. A similar food security module is used in the United States and administered by USDA.

The Household Food Security Survey Module (HFSSM) of the CCHS (Canadian Community Health Survey) conducted by Statistics Canada (Statistics Canada, 2019) is a standardized survey that poses up to 18 questions designed to probe the degree of food insecurity in the respondent’s household. For example, an initial question asks respondents to assess whether they worried if food would run out before they had money to buy more. Later questions in the survey identify more severe situations. For example, one question asks the respondent if they believe they lost weight due to a lack of money to buy food. Answering affirmative to the initial question only, for example, identifies a “marginal” degree of food insecurity, while answering affirmative to questions along the lines of the latter example indicates more “severe” food insecurity.2

Depending on the number of affirmative responses to the survey questions, households can be categorized as marginally food insecure, moderately food insecure, and severely food insecure. Using this classification scheme and CCHS results from 2017 and 2018, 12.7% of Canadian households were classified as “food insecure” (Tarasuk & Mitchell, 2020). Of these, 4% were defined as marginally food insecure, 5.7% were moderately food insecure, and 3% were considered to be severely food insecure. These categories imply considerable differences in what it means to be food insecure. Statistics Canada (2020) provides definitions of each of these categories as follows:

- **Marginally Food Insecure:** At times during the previous year, these households had indications of worry about running out of food and/or limited food selection due to a lack of money for food.
- **Moderately Food Insecure:** At times during the previous year, these households had indications of compromise in quality and/or quantity of food consumed.
- **Severely Food Insecure:** At times during the previous year, these households had indications of reduced food intake and disrupted eating patterns.

With respect to these measures of food insecurity, a couple of points merit consideration. First, food insecurity is associated with a lower income. That said, food insecurity is complex, and, unsurprisingly, there are observations of relatively high-income households that are food insecure and low-income households that are food secure. Nonetheless, Figure 1 reinforces an important association between household income and food insecurity. As incomes increase, the prevalence of food insecurity declines. In the context of First Nations, Deaton, Scholz, and Lipka (2019) find that individuals in the low-income category—$1–9,9993—are approximately 13 times as likely to be food insecure as individuals with an income of $90,000 or more. COVID-19’s negative influence on employment levels, subsequent incomes, and future economic growth is expected to increase the prevalence of food security by this measure.

A loss of household income is expected to influence the quantity of food consumed as well as the type of goods purchased. Generally, food is considered income inelastic so the percentage change in consumption levels are expected to be less than the percentage change in income. Additionally, the loss of income will lead households to increase their consumption of

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2 For a full discussion of the measure of food insecurity from the standpoint of marginal, moderate, and severe, see Tarasuk and Mitchell (2020).
3 Measured as total household income (before deductions) from all sources.
so-called “income inferior goods.” In the future, the change in consumption associated with income and price volatility caused by COVID-19 can be more rigorously analyzed using income and price elasticities.\footnote{As COVID-19 impacted expenditure data becomes available, the impact of COVID-19 on nutrition and health can be determined, with important implications for Canada’s agricultural, health, nutritional, and other public policies.}

As discussed above, the income shock triggered by COVID-19 is expected to increase the prevalence of household food insecurity. But an important additional consideration is how the distribution of food insecurity changes across the three categories: marginal, moderate, and severe. The severely food insecure category (presently 3% of Canadian households) is the most concerning. Given that COVID-19 is expected to lead to both losses as well as shifts in employment, the likely effect will be to skew the distribution of food insecurity towards the relatively more harmful experiences of “moderate” and “severe.” A recent study by Tarasuk, Fafard St-Germain, and Mitchell (2019) finds that every $1,000 increase in income (before tax) reduces the odds of marginal food insecurity by 2%, the odds of moderate food insecurity by 4%, and the odds of severe food insecurity by 5%. This indicates that moderate and severe food insecurity may be more sensitive to changes in income. Figure 2 demonstrates how the experience of food insecurity varies by sources of income (i.e., employment income versus unemployment, social assistance, workers compensation, etc.). Importantly, from the perspective of this discussion, a lack of employment income is associated with a higher prevalence of moderately and severely food insecure households.

The health considerations associated with COVID-19 add additional complications that may influence both the prevalence and intensity of household food insecurity. Additionally, COVID-19 might have debilitating health effects that persist after economic recovery. By contrast, the income shock associated with the financial crisis of 2008 was not accompanied by sickness or death. From a financial standpoint, the debilitating health effects or deaths associated with COVID-19 further endanger the capacity of the household to recover.

Ameliorative policy measures are being undertaken in rapid fashion by the government and non-governmental groups throughout Canada. These measures include government efforts to provide support for families—for example, mortgage support and increased child care benefit payments; assistance to people facing unemployment—for example, direct payments of $2,000 a month to eligible workers, improved access to employment insurance; and financial backing to business to support continued employment—for example, the Canadian emergency wage subsidy covers 75% of salaries for qualifying businesses (Government of Canada, 2020).

The government has expanded support to non-governmental groups addressing the challenge of food insecurity. Many of these groups have been at the fore of addressing food insecurity for some time. Food banks, for example, are presently challenged to maintain and expand their capacity to address food insecurity. Food banks are particularly important to the most food insecure households. Indeed, households that use food banks have been found to be relatively lower income and relatively more likely to be moderately or severely food insecure (Tarasuk, Fafard St-Germain, & Loopstra, 2019).

Any comparisons with past events must recognize the additional challenges that COVID-19’s health effects place on the response, and this is an important distinction from past income shocks. Food banks and home delivery to the elderly, for example, rely heavily on volunteers, many of whom fear the potential health effects of COVID-19. Social distancing and health concerns complicate all efforts to respond to the pandemic. This is particularly concerning because many support services, like food banks, administer services to those who experience food insecurity most severely.
Recent surges in demand (and hoarding behavior) reflect household responses to public health requests for people to stock up on food, in order to comply with social distancing, and reflect public fear that COVID-19 could limit food availability. Such demand surges might, at times, lead to temporary shortages on grocery store shelves. Observations of these shortages by consumers may also reinforce the notion that food availability was under immediate threat. However, these surges will likely be tempered by the fact that shelves will be restocked, and shoppers will not empty them at the same rate, having already stored up on the high demand items. If this be the case, then food shortages and/or a rapid upswing in food prices are unlikely in the short term. The relative stability of food prices in the later weeks of March is a signal that expectations regarding the demand and supply of food are relatively stable.\(^5\)

Over a longer-term period (i.e., 6 months—1 year) in which we could even experience a second wave of the virus, being able to prevent food shortages and a rapid upswing in prices are key to determining whether the necessary and sufficient supply of food (in terms of nutrition and quantity, respectively) are available and affordable at the point of consumer purchase. With this in mind, we identify and examine three factors that impact food shortages and price increases, specifically impacted by COVID-19, which could undermine the food supply chain. These are: (a) challenges to international exchange; (b) farm financial stability; and (c) transportation.

### 3.1 Challenges to international exchange

Though 70% of what is purchased in grocery stores is “produced”\(^6\) in Canada (Statistics Canada, 2007), continued exchange among countries remains paramount to ensuring diversity in both production and consumption. Key to this exchange is the health stability of the labor force, which includes temporary foreign labor. The importance of temporary foreign labor to Ontario’s fruit and vegetable production was underscored after Trudeau announced the closing of the borders to foreigners (with the exception of U.S. citizens) on March 16, 2020. This action alarmed key sectors because this foreign labor was viewed as essential to vegetable production. So, very quickly, the restrictions were relaxed and temporary foreign labor was given an exception (Hughes, 2020). Yet, as we write, there are reports of uncertainty about the availability of cross-border laborers, presumably because of logistic challenges and their own COVID-19 related health conditions (Grant, 2020).

With respect to the food industry, the importance of borders will differ depending on the particular industry. Some industries like animal production are less dependent on foreign inputs than others like sugar and confection processing. Should the border “thicken” in the longer-run, this effect will differ across industries and alter relative prices. Accordingly, the consumption basket for food will adapt, depending on cross-price elasticities among choices available, and while consumers will adapt, some nutritional consequences could occur as well.

Though our focus is on examining food security from a Canadian standpoint, we would parenthetically note that, from a global perspective, the rise of protectionist policies could ultimately entail deleterious export/import constraints—such as those now taking place in Kazakhstan and Viet Nam, and threatened by Russia. Protectionist policies may be particularly harmful, from a global perspective, to the world’s most severely food insecure populations (Glauber, Laborde, Martin, & Vos, 2020). Given the economic ties between the United States and Canada, the spread of protectionist policies is concerning and worthy of careful assessment and scrutiny.

Achieving a balance of trade and domestic production in food systems is an ongoing challenge determined by economic efficiency, consumer choices, and social and political preferences. Conditions that generate increased fear or uncertainty about food availability spark new debates about how best to achieve societal goals and meet food needs. This pandemic will continue to fuel such debate in Canada about the appropriate balance of domestic production and international trade. Some commentators have already raised concern about our current reliance on trade. Fraser (2020) argues that the dialogue regarding regional self-sufficiency “could spark a reinvestment in Canadian farms, food processors, and our rural economies that have been declining for decades” (Fraser, 2020). The relationship among the components of the rural economy of Canada deserves continuing attention, especially to determine the components relationship to a “robust balance of domestic production and global trade” (Fraser, 2020). Whether that robust system will lead to more or less regional self-sufficiency can be more fully evaluated after this crisis. At the moment, two issues are worth noting. Over the course of the past month, the food supply chain has adjusted relatively well to

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\(^5\) As of the writing of this article, Statistics Canada has not released its food price data for March, but it will be available here (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000403).

\(^6\) This figure may vary depending on methods of measurement and distinctions between what is “produced” and “processed,” but it clearly underlines the present centrality of our domestic food sector.
an extraordinarily challenging situation. It is not clear to us, at least as of the writing of this article, that a more regionally self-sufficient system would have adjusted more quickly to the challenge. Many of the challenges associated with social distancing would apply to a more “regionally self-sufficient” system as well. Second, “self-sufficient” regional agricultural systems, even in the best of times, are threatened by challenges like weather. In the extreme, regional self-sufficiency in production can become regional dependency in consumption in situations of drought or plague, severely restricting the quantity and quality of available goods.

3.2 | Farm financial stability

Some farm families will suffer along with others from sickness and loss of productivity from COVID-19 illness. More to the point of this section is concern about the capacity of capital to flow smoothly to farmers and to supportive businesses along the supply chain. This was addressed by efforts of the Bank of Canada to dampen interest rates and the federal government’s increased enhancement base to Farm Credit Canada, which provides more flexible extension of credit to farmers. Many farmers have multiple loans and policies that enable deferments of interest payments, and flex was provided to allow farmers to manage loans and financial burdens to ensure stability in production. Similar steps to strengthen small business concerns will offer further protection. These policies will likely require extension if the crisis persists for a longer period of time (i.e., beyond 6 months).

3.3 | Transportation

COVID-19 has the potential to influence the smooth function of transportation at nearly every step along the food supply chain. Illnesses related to COVID-19 could limit the availability of skilled personnel in the transportation sector all along the food supply chain. This complex supply chain includes inputs to the field, to storage, to processors and manufacturers, and to distributors and retailers. Remote and food insecure areas like Nunavut are particularly susceptible to transportation challenges. In these areas, the majority of food in grocery stores is flown into the communities. Indeed, Naylor, Deaton, and Ker (forthcoming) note that none of the 25 communities in Nunavut are connected by road and rely heavily on food flown in by air, at an average distance of 2,000 km. Given the high rates of food insecurity in these areas, maintaining air transportation is critical. The authors provide evidence that the primary program of addressing food security in these remote areas—that is, the Nutrition North Program—successfully lowers prices to households, but depends on air transportation.

4 | CONCLUSIONS

The effect of COVID-19 on food security is examined from two different perspectives. From the perspective of food insecurity as measured by the Canadian Community Health Survey, COVID-19 is a unique “income shock” that is expected to increase the prevalence of household food insecurity. Moreover, because this income shock is associated with unique detrimental health effects, COVID-19 has the potential to increase the proportion of households identified as “moderately” and “severely” food insecure.

Unfortunately, COVID-19 has threatened Canadian food security in more fundamental ways than the CCHS is designed to assess. Specifically, Canadians worry that COVID-19 might limit the capacity of our food supply chain to ensure adequate food availability. Despite short-term surges in demand and the challenges of ensuring worker safety, we expect that food availability will be stable over the course of the next 6 months. Nonetheless, temporary shortfalls in food supply and increased prices for certain foods might still occur. This cannot be determined due to the unprecedented nature of this global tragedy. What we do know is that the magnitude of the COVID-19 tragedy demands that it be studied in great detail in terms of key variables that impact food security, the comparative weight of variables impacting food security, and how amenable they are to policy interventions. Finally, we look with great expectation to the regional, and country, specific data and global meta data analysis that will certainly follow in the aftermath of COVID-19 to provide a more confident basis for responding to comparable tragedies in the future.

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