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INTRODUCTION

Food Insecurity during the Time of COVID-19: Vulnerability, Health Conditions, and Taking Action

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Since the report of the first cases of a "viral pneumonia" in Wuhan, China in late 2019, the global spread of what would be identified as SARS-Co V-2 or COVID-19 has been rapid and virulent. As of August 2021, there were 214.8 million COVID-19 cases and nearly 4.5 million associated deaths (Johns Hopkins Coronavirus Resource Center 2021b). While some countries have made strides in containing the spread of the virus through quarantining, social distancing, and mandatory mask-wearing, many others have not. For example, there were 28 million cases and over 400,000 deaths in the U.S. at the end of January 2021 (Johns Hopkins Coronavirus Resource Center 2021a). As of August 2021, there are now 38 million confirmed cases and over 633,000 deaths in the U.S. (Johns Hopkins Coronavirus Resource Center 2021b). Although there are now vaccines to immunize millions, their rollout and availability have been problematic, even in countries with highly developed healthcare and public health systems. In the U.S. where the vaccine has been available since December 2020, only 52% of the population is fully immunized but this figure varies depending on the age group (e.g., older adults are more likely to be vaccinated) and where people live (e.g., higher rates of vaccination in the northeast). Vaccine hesitancy and skepticism have led to a lower vaccination rate of 108 doses per 100 people (Our World in Data 2021).

Notwithstanding the speed of the development of these vaccines, the challenges of scaling up production on a global basis means that vaccine herd immunity will not happen any time soon (Weixal 2021). In an attempt to increase equity of access to COVID-19 vaccines, the WHO, Gavi, and CEPI have partnered to create COVAX, a public-private coalition of governmental organization and philanthropists dedicated to vaccine donation and price negotiation for lower-income countries (Gavi, The Vaccine Alliance 2021a). While some countries, such as Ghana, Zambia, and the Democratic Republic of Congo have only recently begun to receive COVAX-donated vaccine doses, wealthier and more populous nations

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have begun to call for the need of a third dose (Gavi, The Vaccine Alliance 2021b). This raises further questions of equity in the availability of vaccines for the global population (World Health Organization 2021).

In addition to the direct impact of COVID-19 on global health, the pandemic has had a devastating impact on many aspects of daily life including the economy, education, politics, and social relationships. More specifically, it has affected agricultural production and food supply chains resulting in rising prices of food commodities (Baffes and Wu 2020). Together with a worldwide economic downturn, the COVID-19 pandemic has led to a skyrocketing increase in food insecurity, or the "limited or uncertain availability of nutritionally adequate and safe food or uncertain ability to acquire foods in socially acceptable ways" (Bickel et al. 2000).

Chronic food insecurity has been linked to infectious diseases including viral infections such as a HIV/AIDS as a result of compromised immune function, gender inequality, and high-risk behaviors, for instance, transactional sex (Himmelgreen et al. 2009). More recently, attention has been given to the relationship between food insecurity and diet-related chronic diseases such as type 2 diabetes, cardiovascular disease, obesity, and hypertension (Himmelgreen et al. 2020). In this case, food insecurity can affect dietary quality leading to the over-consumption of lower cost foods high in fat, sugar, and refined carbohydrates. Finally, while the mechanisms are still not well-understood, there is a growing literature showing an association between food insecurity, behavioral health and poor mental health (e.g., Bradford et al. 2020; Mendenhall 2016; Piperata et al. 2016).

An estimated 690 million people were food insecure in 2019, and this number has increased by between 83 million and 132 million since the advent of the COVID-19 pandemic. By the end of 2020 an estimated 811 million people were undernourished or food insecure (UNICEF 2020, 2021). In the U.S., there were an estimated 50 million food-insecure Americans by the end of 2020, up sharply from 35 million a year earlier (Ciciora 2020). It is predicted that 42 million Americans will face food insecurity in 2021, including 13 million children (Feeding American 2021). The risk of child hunger in the U.S. has increased from 1 in 6 to 1 in 4 since the start of the pandemic and in the face of a steep rise in unemployment and the growing number of children living in poverty (Bureau of Labor Statistics 2020; Feeding America 2019; Paslakis, Dimitropoulos, and Katzman 2020).

That COVID-19 and food insecurity go hand-in-hand is not surprising as the pandemic has unveiled the larger social inequities in the global economy and political systems that ultimately affect health and wellbeing. This is particularly true for vulnerable groups (e.g., essential workers, ethnic minorities, people with preexisting health conditions). The economic impact of COVID-19 ensures food insecurity among the most vulnerable (Mottaleb et al. 2020) and amplifies their risk for poor health.

The aim of this special issue in *Ecology of Food and Nutrition* is to begin a discussion on the role that COVID-19 and food insecurity have together in exacerbating poor health outcomes and to offer some suggestions for mitigating these effects now and in the future in preparation for future pandemics. The idea for this special issue came about in response to the University of South Florida's request for proposals for its COVID-19 Rapid Response Grant Program during the summer of 2020. Scholars and researchers from the Colleges of Arts and Sciences, Behavioral and Community Sciences, Public Health, College of Nursing, and College of Education joined forces in preparing proposals. One key area that emerged during discussion was the long-standing problem of food insecurity during the pandemic. While many of the papers in this special issue address U.S.-based populations, they cover universal topics such as vulnerable populations, specific disease conditions, lifestyle changes, and the role of community engagement in addressing food insecurity, for example. Finally, this special issue underscores that food security and food sovereignty must be addressed together in order to solve the problem of food insecurity and improve global health.

In this special issue we examine the role that COVID-19 has on food insecurity and the downstream health consequences. There are five papers in total focusing on different vulnerable populations, health conditions, and ways of mitigating food insecurity through social action and food justice. Two papers focus on different vulnerable populations. In Rodriguez, Soca Lozano, Redwine, Rodriguez & Stern's paper entitled, "*Food Insecurity and the Hispanic Population During the COVID 19 Pandemic*," the focus is on the Hispanic population in the US and Puerto Rico. The paper pays particular attention to the recent impact of Covid-19 on food insecurity in this vulnerable group. College students are another vulnerable group that experience food insecurity. Debate, Himmelgreen, Gupton, & Heuer consider the issues of students' well-being, food insecurity and the impact of the pandemic on their lives in their article entitled, "*Food Insecurity, Well-being, and Academic Success among College Students: Implications for Post -COVID-19 Pandemic Programming*." These authors use data gathered from a recent large-scale survey to support their assertions. Two papers in this issue consider different health conditions impacted by food insecurity and Covid-19. Sleep, one of the main pillars of health, has been disrupted by the Covid-19 pandemic. In their article entitled, "*Disentangling the Relationship Between Food Insecurity and Poor Sleep Health*," Lee, Deason, Rancourt and Gray explore the impact of Covid-19, and its concomitant role in increasing food insecurity on sleep behaviors, a critical component of health and well-being. Another article, authored by Crowder, Beckie & Stern discuss in the context of the Covid-19 pandemic, the rise in food insecurity and its relationship with the increase in chronic diseases, particularly due to the high burden of obesity and cardiovascular risk factors among vulnerable populations. In their paper entitled, "*Food Insecurity and Chronic*

Cardiovascular Disease: Implications During the COVID-19 Pandemic," Crowder et al also consider the role of expanded screening for food insecurity as critical in preventing chronic diseases. Finally, one paper in this issue considers ways of mitigating food insecurity, specifically through social action and food justice. Specifically, in their article entitled, "*Religion and Food Insecurity in the Time of COVID-19: Food Sovereignty for a Healthier Future*," Schanbacher and Gray explore the role religious institutions might play in engaging community efforts, and thereby mitigating food insecurity, particularly during the current Covid-19 pandemic. Finally, all the papers in this special issue consider future directions, both broadly and specifically related to their topic.

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Disclosure statement

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