

Food Deserts Limited Healthy Foods in the Land of Plenty

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Cardiovascular disease (CVD), including heart disease and stroke, is the leading cause of death in the United States, producing an immense health and economic burden. An estimated 92.1 million US adults are diagnosed with at least one type of CVD, and a projected 43.9% of US adults will have some form of CVD by 2030.¹ One of the primary reasons for the continued high burden of CVD is the persistent and even increasing degrees of obesity, type 2 diabetes mellitus, and hypertension. To a large extent, these major risk factors are driven by poor nutrition from an increase in the consumption of processed foods high in sodium, refined carbohydrates, and saturated fat. Unfortunately, all US populations do not have the same levels of access to healthy foods, especially in certain socially and economically disadvantaged neighborhoods. Contributors of CVD inequalities include race, ethnicity, social support, culture and language, access to care, and residential environment. These social determinants of health influence overall health and CVD outcomes.²

See Article by Kelli et al

Food deserts are characterized as areas that lack access to affordable fruits, vegetables, whole grains, low-fat milk, and other foods that make up the full range of a healthy diet, and traditionally described as urban areas in which residents cannot easily reach fresh food options. These neighborhoods are usually comprised of lower income populations, whose residents must rely on unhealthier processed foods from convenience stores, gas stations, and fast-food restaurants, rather than supermarkets and grocery stores, which may provide healthy food choices.

In this issue of *Circulation: Cardiovascular Quality and Outcomes*, Kelli et al³ analyze the impact of poor access to healthy food in Atlanta, GA area. The authors evaluated multiple metabolic factors, in addition to demographic characteristics, which may be related to diminished healthy food availability. One important aspect of this study is its measurement of novel biomarkers, including high-sensitivity C-reactive protein for chronic inflammation, and glutathione

and cystine levels for estimating oxidative stress. The authors also assessed peripheral pulse wave velocities to evaluate arterial stiffness. Despite being surrogate markers, there is a rich literature that justifies the use of these tools to assess CVD risk for patients.⁴⁻⁷ Their findings conclude that individuals living in a food desert had a higher prevalence of cardiovascular risk factors, inflammation, oxidative stress, and arterial stiffness. Furthermore, the authors suggest these findings were largely driven by socioeconomic factors. Beyond mere access to healthy foods, this study indicates that CVD risk scores are higher in individuals living in low-income neighborhoods or those with lower personal finances.

With the present study in mind, should we no longer consider living in food deserts as a CVD risk factor? One of the shortcomings of the overinterpretation of these results is the fairly small sample size, with only 1421 volunteers being evaluated before attrition. Moreover, these data were obtained from a single community. Even more importantly, the members of this community make the findings difficult to extrapolate to the general US black community because 63.7% of participants were college graduates, and 47.9% had annual household income >\$75 000. In consideration of these facts, the population studied was relatively well educated and had a mean income above average for US households. The findings may not represent typical low-income neighborhoods, where food deserts are a more pressing concern.

Racial disadvantages are particularly important to highlight. Race may contribute to the perpetuation of food deserts with black neighborhoods reportedly having more fast-food restaurants, fewer supermarkets with healthy options, and being less conducive to outdoor physical activity. These factors reflect a recent 2017 US federal report on healthcare disparities revealing ongoing significant gaps in CVD prevalence and risks, with a 30% higher mortality for blacks than for the overall US population and nearly double the stroke mortality.⁸ Health disparities in CVD are persistent, largely preventable, and unacceptable. Black men and women are more likely to die of CVD and stroke than their white counterparts, despite the existence of low-cost, highly effective preventive treatment, and these disparities account for the largest proportion of inequality in life expectancy between whites and blacks. Despite organizational and social barriers to reducing CVD, primordial prevention of elevated risk factors in key race and ethnicity groups would substantially impact the future incidence of CVD, and elimination of food deserts may assist in achieving that goal.

Despite observations confirming the relationship to social determinants of health to CVD, corrective programs have been proven elusive. A recent study attempted to document means to reduce the disparities in access to healthy food by

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increasing subsidies targeting SNAP (supplemental nutrition assistance program) participants.⁹ Modest universal reductions in fruit and vegetable prices (10% subsidy) seemed to reduce CVD mortality, and furthermore, a 30% fruit and vegetable subsidy offered to SNAP participants seemed most promising in reducing disparities.⁹

Neighborhood effects can go beyond food deserts also. A large burden of CVDs can be prevented through lifestyle changes, such as tobacco avoidance, engaging in physical activity, and maintaining a healthy weight. In addition, communities may help with controlling chronic conditions, such as elevated blood pressure, diabetes mellitus, and elevated lipid levels. Certain neighborhoods are not conducive for outdoor activities and hence do not promote health. Perhaps, one of the reasons that certain populations, including people with low educational attainment, may have increased risk for CVD is indeed the lack of access to healthy foods, but these other factors may contribute as well.

One neighborhood effect that could help maintain a healthy diet on a smaller budget is the growing promulgation of urban community gardens may be beneficial to the lower income residents. These urban gardens are multifunctional, providing residents with a space where they can grow fresh produce and experience relaxation and physical activity. Therefore, in disadvantaged urban neighborhoods, these gardens could potentially contribute to food security.¹⁰

Overall, the prevalence of children and adults meeting the dietary goals improved between, 2003 to 2004 and 2011 to 2012. The prevalence of ideal levels of diet (American Heart Association diet score >80) increased from 0.2% to 0.6% in children and from 0.7% to 1.5% in adults. The prevalence of intermediate levels of diet (American Heart Association diet score 40–79) increased from 30.6% to 44.7% in children and from 49.0% to 57.5% in adults.¹ This was partly attributable to decreased sweetened beverage intake in the communities and small, nonsignificant trends in improved fruits and vegetables. The future trends are positive but far from being at goal.

Therefore, although the present publication is provocative and highlights the relationship between food deserts and CVD risk, further study is needed to clearly document the risk of living in a food desert. The authors bolster this relationship by revealing that the subjects in food deserts had a higher prevalence of hypertension and smoking, higher body mass index, fasting glucose, and 10-year risk for CVD. A more disadvantaged population may have revealed an even stronger association of CVD risk and access to healthy food. The implication for public policy is to fund programs to promulgate easily reproducible methods to assist disadvantaged populations in accessing and consuming healthy foods. In addition, further research is needed to focus not only on CVD risk but also hard outcomes and perhaps mortality. Although the present study cannot conclusively validate the hypothesis that living in food deserts leads to increased cardiovascular events and death, this is an essential area for research. Finally, continued utilization of geo mapping (visualizing data from various geocultural contexts or locations) will help identify and target those neighborhoods that need improvement in healthy food access.

Disclosures

Dr Ferdinand is a consultant for Amgen, Sanofi, Boehringer-Ingelheim, Quantum Genomics, and Novartis. The other author reports no conflicts.

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