

Socioecological Determinants of Prediabetes and Type 2 Diabetes: Agenda for Action

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Since the latter half of the 20th century, increases in the rate of type 2 diabetes have closely followed increases in obesity in the United States. One-third of U.S. adults and 16–18% of young people are obese,¹ and 35% of adults \geq 20 years of age have prediabetes and therefore an increased risk for developing type 2 diabetes.²

Fortunately, research shows that type 2 diabetes may be prevented or delayed with lifestyle modifications resulting in a loss of 7% of body weight and \geq 150 minutes/week of moderate physical activity.³ The American Diabetes Association (ADA) “Standards of Medical Care in Diabetes—2014”⁴ also recommends nutrition therapy and physical activity as part of a treatment plan for individuals with diabetes.

As identified in the ADA scientific statement “Socioecological Determinants of Prediabetes and Type 2 Diabetes,”⁵ social and environmental factors also contribute to increased diabetes risk, diabetes complications, and morbidity. Considering this, it is important for health care professionals (HCPs) to recognize the intersection of these social and environmental factors when treating individuals with or at risk for type 2 diabetes. In addition, HCPs have many opportunities to serve as advocates for policy changes that could positively affect their local environment and complement the work they do in the clinical setting.

This article describes the built, food, school, and work environments that were identified in the ADA statement⁵ as affecting diabetes and obesity risks and proposes some policy solutions to address the socioecological determinants of diabetes risk.

Built Environment

The built environment refers to “environments that are modified by humans, including homes, schools, workplaces, highways, urban sprawl, and accessibility to amenities, leisure, and pollution.”⁶ Research indicates that socioeconomically disadvantaged groups, including racial and ethnic minorities, people in rural areas, and other diverse underrepresented populations, tend to live in communities where there is residential segregation; high unemployment; limited access to healthy food; inadequate housing, transportation, recreational facilities, education, and health care; high crime; and a lack of safe places to engage in physical activity.⁷ The direct impact of the built environment on diabetes risk is a relatively new area of study.⁵ However, improving aspects of the built environment such as walkability and opportunities for physical activity has been associated with increased physical activity and lower rates of obesity.⁸

Health impact assessments (HIAs) help local policymakers assess and mitigate the impact of development of the built environment on public health. HIAs, as defined by the National Research

Council, involve “a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population, and provides recommendations on monitoring and managing those effects.”⁹ HIAs can be conducted by neighborhood coalitions, city planning departments, nonprofit organizations, or local health departments. Although HIAs are often voluntary, some cities and municipalities support the consideration of health impact in decision-making, and a few explicitly require it.¹⁰ As more cities discover the utility of such efforts, advocates can encourage wider use of HIAs.

Another potential policy response takes advantage of existing facilities. The Robert Wood Johnson Foundation found that people living near recreational facilities and parks exercise 38% more than those without similar access to such facilities.¹¹ An emerging method of addressing this issue involves shared use agreements (SUAs), which increase residents’ opportunities for physical activity. SUAs are legal documents that allow schools to open their facilities for community use during non-school hours. The primary concerns of the schools are liability and responsibility for injury, theft, and vandalism, and SUAs seek to address these concerns by

sharing the costs and responsibilities of opening school property after school hours.¹² Some school districts, including those in San Francisco and Oakland, Calif., and throughout Florida have taken steps to increase access to local school facilities. With increased access to field space, playgrounds, and other recreational facilities, many urban children will have access to more opportunities for unstructured physical play, which can increase their level of physical activity and help to reduce their risks for obesity and diabetes. Advocates can encourage local schools, school districts, parent-teacher associations, and communities to adopt similar SUAs and can support legislative proposals that facilitate shared use.

Food Environment

The food environment refers to the availability, quality, and cost of food in a community, including proximity to grocery stores and fast-food restaurants. “Food deserts” are defined by the U.S. Department of Agriculture as “urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food. Instead of supermarkets and grocery stores, these communities may have no food access or are served only by fast-food restaurants and convenience stores that offer few healthy, affordable food options. The lack of access contributes to a poor diet and can lead to higher levels of obesity and other diet-related diseases, such as diabetes and heart disease.”¹³ The availability of fewer neighborhood resources for healthy food and physical activity has been linked to poorer diabetes outcomes,¹⁴ more insulin resistance,^{15,16} and the development of type 2 diabetes, as referenced in the ADA statement on socioecological determinants.⁵ Conversely, studies have found positive associations between access to healthy foods and better health behaviors and lower rates of obesity in a neighborhood.¹⁷

Increased, focused data collection allows policymakers to define food environment challenges in concrete terms and develop interventions. For example, in Chicago, data limitations inhibited proper ongoing assessment of food deserts, specifically the availability and locations of stores that sell fresh produce. One effort by the Food Equity Committee of the Chicago Center of Excellence for the Elimination of Disparities encouraged the Chicago Department of Public Health to expand questions posed by health inspectors, who regularly inspect grocery and liquor stores and mobile vendors. They included questions about the stores’ fresh produce and meat sales. These data will now be combined with other city health databases and other health- and obesity-related statistics to inform policymakers about the need to expand the number and variety of healthy food retail options in Chicago neighborhoods.¹⁸ Advocates can encourage similar data-collection efforts in their cities as a cost-effective way to identify food deserts and identify the need for policies to address them.

An innovative policy solution in New York City works with existing infrastructure to expand healthy food options. The Green Carts initiative builds on the city’s culture of food carts—with a twist. The city distributed 1,000 new permits for green carts to sell raw fruits and vegetables in New York City neighborhoods.¹⁹ There are currently > 500 active permits, offering proof that policy changes can both increase the availability of fruits and vegetables in low-resource neighborhoods and increase opportunities for residents in those neighborhoods to improve their diets.²⁰ Advocates can support state and local efforts to integrate fresh fruit and vegetable options in underserved communities.

Another effort to address the availability and affordability of

fresh fruits and vegetables involves programs to maximize Supplemental Nutrition Assistance Program (SNAP; formerly called “food stamps”) funds at farmers’ markets. For example, Boston’s Bounty Bucks program doubles a SNAP recipient’s purchasing power dollar for dollar by up to \$10 at farmers’ markets, and New York City’s Health Bucks gives consumers \$2 more to spend at farmers’ markets for every \$5 spent.^{21,22} Programs such as these make farmers’ markets more accessible for those who would otherwise be driven away by the often higher cost of farmers’ market produce. In 2012, 18 Boston-area markets participated in the Bounty Bucks program, and SNAP and Bounty Bucks sales accounted for \$170,000 of farmers’ market sales that year.²³ Advocates can encourage other cities and municipalities to fund similar initiatives, making healthy fruits and vegetables more accessible.

School Environment

The school environment directly influences the quantity and quality of food availability to children and adolescents and is an important determinant of access to physical education, as well as cultural norms regarding physical activity behaviors. Making environmental changes and conducting behavioral interventions in the school setting also allows for long-term adoption and sustainability of such interventions. Thus, schools have been the focus of many initiatives for health promotion and disease prevention.

Schools participating in the federal school lunch program must meet certain nutritional requirements for the meals they provide to students.²⁴ The Healthy Hunger-Free Kids Act of 2010 (HHFKA) complements the nutritional requirements for school lunches by strengthening the nutritional standards for foods sold in school vending machines, a

la carte lines, and school stores.²⁵ The HHFKA also requires schools to ensure that drinking water is available to students during lunch as an alternative to sugar-sweetened beverages.

In addition to ensuring that schools comply with these nutritional requirements, advocates can urge states to build on this momentum toward better nutrition by increasing nutrition education programs in schools. For example, studies have shown that garden-based or garden-enhanced nutrition education programs lead to increased consumption of fruits and vegetables, as well as increased nutrition knowledge.²⁶ Funding is available to implement school gardens through the Farm to School initiative.²⁷ However, a 2013 survey of ~13,000 public school districts participating in the Farm to School program showed that only 13% of the districts indicated that they had school gardens.²⁸

According to the results from the 2012 National Youth Fitness Survey, only about 25% of students aged 12–15 years are active for ≥ 1 hour/day.²⁹ Physical education programs not only help to improve students' fitness, but also improve academic performance and mental and physical health.³⁰ Yet, despite the known benefits of physical education, only 3.8% of elementary schools, 7.9% of middle schools, and 2.1% of high schools provide daily physical education or its equivalent for the entire school year.³¹

In a joint statement with the American Heart Association and the American Cancer Society Cancer Action Network, ADA recommends 150 minutes/week of quality physical education for elementary school students and 225 minutes/week for middle school and high school students.³² To help improve the physical health and academic performance of students, advocates can urge states to require school districts to imple-

ment a quality physical education curriculum.

Work Environment

According to the ADA statement on socioecological determinants,⁵ a high level of sedentary behavior is an independent risk factor for several health outcomes, including obesity, cardiovascular disease, and type 2 diabetes. People are working more hours and are working in primarily sedentary jobs. A 2008 study showed that older adolescents and adults up to the age of 60 years are sedentary for ~60% of the time they are awake.³³

As previously discussed, research has shown that individuals at high risk for type 2 diabetes may be able to prevent or delay the onset of diabetes with lifestyle modifications, including losing weight, eating a healthier diet, and increasing physical activity.³ The Centers for Disease Control and Prevention (CDC) has supported programs to enhance employee health through worksite initiatives that encourage employees to adopt healthier lifestyles and lower their risk of developing a chronic disease.³⁴ For example, with funding from the CDC, the Capital Metropolitan Transportation Authority (Capital Metro) in Austin, Tex., implemented the Steps to a Healthier Austin program.³⁵ Through the program, Capital Metro employees had access to wellness coaches and personal trainers, a 24-hour fitness center, healthier food options, and dietary counseling.³⁵ Since the implementation of the program, Capital Metro employees have engaged in more physical activity, have better eating habits, and have reduced absenteeism.³⁵ Worksite programs as simple as encouraging employees to use the stairs have been shown to increase physical activity.³⁶

Advocates can urge states to set an example for private employers by

encouraging and supporting government office efforts to implement voluntary worksite wellness programs that encourage and provide support for employees to adopt healthier lifestyles.³⁷

Conclusion

It is crucial for HCPs to acknowledge and address the socioecological determinants of prediabetes and type 2 diabetes, including those associated with the built, food, school, and work environments. Various community-level policies such as those described in this article have been shown to decrease obesity and increase physical activity and thus to help prevent prediabetes and type 2 diabetes.

HCPs, as patient advocates, are encouraged to join the ADA in its advocacy efforts to complement their clinical efforts to reduce diabetes incidence by improving the built, food, school, and work environments throughout the United States. Take the first step by signing up to be a diabetes advocate at www.diabetes.org/takeaction. You will receive advocacy updates and alerts providing information about pending issues, and assistance in creating and delivering timely messages to your elected officials.

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