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# Annotated Bibliography: Impact of Social Determinants of Health on Emerging Diabetes Interventions

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This annotated bibliography is designed for health care providers interested in interventions to address health disparities, and focuses on three specific categories: food security, neighborhood characteristics, and the use of community health workers (CHWs).

Further information on these social determinants of health (SDOH), as well as other determinants such as education, economic stability, community and social context, and access to health care, are summarized in a comprehensive review by the American Diabetes Association's SDOH and diabetes writing committee.[1]


**Food Security**

**Neighborhood Characteristics**


**Community Health Workers**

## Interventions to Address Food Security and Access to Healthy Options


Interventions addressing food security have included food vouchers for farmers markets, diabetes self-management education and support, diabetes food boxes from food banks, and food-provision programs. While most showed some evidence of healthier eating and better diabetes outcomes, most studies have been small with only modest benefits.[2] Three recent studies addressing food security are presented below.

***Hess A, Passaretti M, Coolbaugh S. Fresh food farmacy. Am J Health Promot. 2019 Jun;33(5):830-832. doi: 10.1177/0890117119845711d.***

A pilot program from Geisinger Health System, which serves residents of central, south-central, and northeastern Pennsylvania and southern New Jersey, partnered with the Central Pennsylvania Food Bank to create the Fresh Food Farmacy, a diabetes education and referral program. It focused on addressing individual needs and food insecurity to improve type 2 diabetes outcomes. Pilot program results showed reduced HbA1C levels, LDL cholesterol, triglycerides, blood pressure, and body mass index in program participants. Ongoing evaluation will assess for additional cost savings and improved patient accountability.

***Berkowitz SA, Delahanty LM, Terranova J, et al. Medically tailored meal delivery for diabetes patients with food insecurity: a randomized cross-over trial. J Gen Intern Med. 2019 Mar;34(3):396-404. doi: 10.1007/s11606-018-4716-z. Epub 2018 Nov 12.***

A randomized cross-over clinical trial (n=44) conducted from June 2015 to July 2017, was used to determine the feasibility and short-term impact of a program delivering medically tailored meals to individuals with type 2 diabetes, food insecurity, and hyperglycemia compared to participants receiving usual care and the Choose My Plate healthy eating guide. Participants reported better dietary quality as measured by the Healthy Eating Index 2010 during the meal delivery program as compared to during the usual care arm of the study. Vegetable, fruit, and whole grain intake increased while intake of alcohol, added sugar, and fat decreased. As secondary outcomes, participants reported less food insecurity and hypoglycemia while receiving the meal deliveries.

***Seligman HK, Smith M, Rosenmoss S, et al. Comprehensive diabetes self-management support from food banks: a randomized controlled trial. Am J Public Health. 2018 Sep;108(9):1227-1234. doi: 10.2105/AJPH.2018.304528. Epub 2018 Jul 19.***

A randomized controlled trial (n=568) conducted in adults and affiliated with Feeding America food banks in Oakland, Detroit, and Houston assessed the feasibility of a multicomponent diabetes intervention program. It consisted of blood glucose testing, primary care referrals, diabetes self-management education with one-on-one check-ins with educators, and twice-monthly diabetes-appropriate food packages on improving glycemic control compared to wait-listed controls. Significant improvements in food security, food stability, and fruit and vegetable intake were observed for intervention participants. There was no significant difference in outcomes related to diabetes self-management or glycemic control. Lack of improvement in glycemic control could be attributed to the limited scope of the intervention. More vulnerable populations may be reached by expanding chronic disease support into community-based organizations integrated with healthcare systems.

## Neighborhood and Physical Environment Interventions

The impact of neighborhood characteristics on diabetes can differ by community. Overall, segregation, lack of green space, poor walkability, food insecurity, low social support, and high noise and pollution levels are associated with higher rates of diabetes.[3,4] The following study demonstrates how housing vouchers for neighborhoods with less people living in poverty can improve diabetes outcomes.

***U.S. Department of Housing and Urban Development, Orr L, Feins J, Jacob R, et al. Moving to Opportunity: Interim Impacts Evaluation. https://scholar.harvard.edu/files/lkatz/files/moving_to_opportunity_interim_impacts_evaluation.pdf. Updated March 27, 2012. Accessed May 1, 2021.***

The Moving to Opportunity for Fair Housing Demonstration was an initiative led by the U.S. Department of Housing and Urban Development from 1994 to 1998. Low-income families in the study (n=4,608 families, 63% Black and 31% Hispanic) were randomly provided housing vouchers to move from high poverty neighborhoods in Baltimore, Boston, Chicago, Los Angeles, and New York into lower poverty neighborhoods to determine whether living in better neighborhoods could improve their physical and mental health, economic self-sufficiency, risky and criminal behavior, and educational outcomes.

Participants were assigned to experimental, Section 8, or control groups. The experimental group only could use vouchers in neighborhoods where less than 10% of the population was poor and had the assistance of local counseling agencies; the Section 8 group only could use vouchers according to the Section 8 program at that time and had no special assistance; and the control group was not offered vouchers and continued to live in public housing or receive other project-based housing assistance. Families who were offered vouchers were significantly more likely to move to and continue living in lower poverty neighborhoods than the control group. Positive outcomes included lower rates of obesity and diabetes, and reduced psychological distress in the group receiving vouchers.

## Community Health Worker Interventions

Many studies that focus on interventions with CHWs are done with low-income and minority populations, and integrate clinical care with community partner support. Culturally tailored patient education, home visits, and care coordination are three key features of most interventions. In a systematic review of CHW interventions, CHW programs lasting at least 12 months resulted in a modest reduction in A1C, as compared to usual care.[5] Outlined below are five examples of interventions.


***Crespo R, Christiansen M, Tieman K, Wittberg R. An emerging model for community health worker-based chronic care management for patients with high health care costs in rural Appalachia. Prev Chronic Dis. 2020 Feb 13;17:E13. doi: 10.5888/pcd17.190316.***

A CHW-based chronic care management model was created in rural Appalachia to help high-risk patients with diabetes. These patients were enrolled on a team that would make a care plan, review cases, and follow up with the primary care provider. The group included a mid-level provider, a nurse, and CHWs. Patients whose HbA1C improved during the study period had a mean decrease of 2.4 percentage points. Sixty-three percent (282 of 446) of the total cohort decreased their HbA1C which has the potential to decrease hospitalizations and costs.

***Carrasquillo O, Lebron C, Alonzo Y, et al. Effect of a community health worker intervention among Latinos with poorly controlled type 2 diabetes: the Miami Healthy Heart Initiative Randomized Clinical Trial. JAMA Intern Med. 2017 Jul 1;177(7):948-954. doi: 10.1001/jamainternmed.2017.0926.***

This study included 300 Latino adults diagnosed with type 2 diabetes and who had A1C of 8% or greater. Patients were randomized to enhanced usual care or a 12-month CHW intervention. Participants in standard care followed-up with their primary care provider, and resources available in their clinics were provided. Diabetes education was mailed every three months with a follow-up phone call to make sure they received the new material. The second group received usual care plus CHW intervention with home visits and phone calls. Participants in the intervention group were invited to education and exercise groups. Patients were provided navigation assistance, health coaching, and assistance with nonmedical services addressing SDOH. When both groups were compared, the intervention group had lowered HbA1C by 0.51%.

***Nelson K, Taylor L, Silverman J, et al. Randomized controlled trial of a community health worker self-management support intervention among low-income adults with diabetes, Seattle, Washington, 2010-2014. Prev Chronic Dis. 2017 Feb 9;14:E15. doi: 10.5888/pcd14.160344.***

This study evaluated whether low-intensity CHW intervention (defined as four visits and one optional visit) would improve health outcomes in low-income adults (43% Hispanic and 26% Blacks) with uncontrolled type 2 diabetes with A1C 8% or higher. Patients were randomized to usual care or a CHW intervention; 287 were enrolled, and only 262 completed the 12-month follow-up. Participants had four mandatory visits after enrollment and an optional visit at ten months. During every visit, CHWs used a structured interview and an encounter form where health goals were documented, and discussed strategies to achieve objectives. No significant difference in HbA1C value was noted between groups, possibly because a more intensive CHW intervention was needed.

***Turner BJ, Liang Y, Ramachandran A, Poursani R. Telephone or visit-based community health worker care management for uncontrolled diabetes mellitus: a longitudinal study. J Community Health 45, 1123–1131 (2020). https://doi.org/10.1007/s10900-020-00849-1.***

In this three-year pilot project to improve diabetes outcomes, 523 patients from a low-income Hispanic-majority community with HbA1C > 9% were contacted by CHWs either by telephone or face-to-face during a clinic visit. Patients meeting with a CHW during a clinic visit with no calls, and those meeting during two clinic visits or more, with or without calls, were more likely to reach diabetes control, and more rapidly, than were patients only receiving calls. Face-to-face visits were more effective than just calls. This research is supported by other studies that also found telephone calls from CHWs or nurses to be less effective in controlling diabetes.

***Kane EP, Collinsworth AW, Schmidt KL, et al. Improving diabetes care and outcomes with community health workers. Fam Pract. 2016 Oct;33(5):523-8. doi: 10.1093/fampra/cmw055. Epub 2016 Jul 14.***

The Diabetes Equity Project (DEP) evaluated its impact on patients' clinical outcomes, diabetes knowledge, self-management skills, and quality of life. It is a clinic-based diabetes self-management and education support program led by CHWs that was designed to reduce observed disparities in diabetes care and outcomes in medically underserved, predominantly Hispanic communities. Between September 2009 and June 2013, 1,235 patients enrolled in the DEP, and 882 (72%) completed at least two visits with the CHWs. Diabetes Equity Project patients experienced significant improvements in clinical and patient-reported outcomes (HbA1C, HbA1C > 8 (high-risk patients), blood pressure, diabetes knowledge assessment, perceived competence in managing diabetes, and diabetes quality of life).

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## Partners


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