Adults with type 2 diabetes and food insecurity

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Type 2 diabetes affects many Americans and other people worldwide and remains a major health concern. In 2017, approximately 462 million individuals were affected by Type 2 diabetes corresponding to 6.28% of the world’s population (4.4% of those aged 15–49 years, 15% of those aged 50–69, and 22% of those aged 70+), or with a prevalence rate of 6059 cases per 100,000 (Khan et al., 2020). It is now the ninth leading cause of death and the burden is rising globally. The total estimated cost of diagnosed diabetes in 2017 was $327 billion, including $237 billion in direct medical costs and $90 billion in reduced productivity (American Diabetes Association, (ADA) 2018). Currently, one out of four healthcare dollars in the United States is spent on diabetic care with average medical expense ranging around $16,750 per year. The amount is highly consequential as cost of healthcare spending continues to outpace the growth rate of gross domestic product. According to the ADA, indirect costs include increased absenteeism ($3.3 billion) and reduced productivity while at work ($26.9 billion), reduced productivity for those not in the labor force ($2.3 billion), inability to work because of disease-related disability ($37.5 billion), and lost productivity due to 277,000 premature deaths attributed to diabetes ($19.9 billion). As the numbers of people with diabetes go up, it is important to look at the contributing factors affecting the rising numbers. So far, there is growing number of studies in the literature have shown a link between food insecurity and Type 2 diabetes.

Food insecurity, a condition in which households lack access to adequate food because of limited money or other resources, and is a leading health and nutrition issue in the United States (Gundersen & Ziliak, 2015). Almost 14.3 percent of the United States households were food insecure in 2020 and 3.9 percent (5.1 million households) that had very low food security (*USDA ERS - Food Security and Nutrition Assistance*, 2022). These numbers are alarming and concerning considering the fact that food insecurity is attributable to many negative health consequences such as diabetes.

Food security is one of the social determinants of health that impacts the people’s health, well-being, and quality of life. Food insecurity is known risk factor for diabetes and evidences support a direct relationship between food security and mental, physical and social health. A recent data by ADA in 2021 showed that the prevalence of food insecurity was much higher among adults with diabetes compared with those without diabetes (16% vs. 9%). The data also showed that Medicaid enrollees with diabetes had a higher prevalence of food insecurity when compared with those with other types of insurance.

The lack of food security for people with diabetes can be attributed to low income, mobility and functional limitations, environmental and other factors. People living with food insecurity often have limited control over their living environments, which can affect their ability to access and prepare healthy food (Gucciardi et al., 2014). The importance of proper nutrition cannot be over emphasized in this patient group as uncontrolled diabetes can lead to poor health outcomes that will further distress the already over stretched system. Most cope by skipping meals, eating less, or replacing with low quality food which affects management of diabetes especially when insulin is used as part of the treatment plan. Therefore, improving food insecurity is likely to improve the risks of developing Type 2 diabetes as well as the management.

**2. Influence of SDOH on Type 2 diabetes**

Type 2 diabetes is a chronic disease associated with social determinants of health. The development of type 2 diabetes has been linked to income, education, community resources and food environments. In areas with low-quality food environments, healthy foods are often more expensive and are less accessible compared to high-calorie, nutrient-poor foods. Those who live in areas with low socioeconomic status have fewer resources to eat healthy on a daily basis.

Maddison et al., (2019) found that individuals living in areas with higher rates of poverty have increased risk for developing type 2 diabetes. Another study by Longobardi et al., 2022 also found that individuals who live in poor neighborhoods have higher incidence of type 2 diabetes. The study also found that a higher number of restaurants, fast food locations and convenience stores are associated with increased rates of type 2 diabetes. In a study by Sui et al., (2017), areas with more supermarkets had lower incidence of type 2 diabetes than those without access to supermarkets. Similarly, DeCamp and Wolff, (2018) also confirmed that individuals living in areas with a greater number of fast food restaurants are at increased risk for developing type 2 diabetes. When comparing income groups within neighborhoods, the same trend has been confirmed. More specifically, Poirier et al., (2019) found that adults in the lowest income group have higher risk for developing type 2 diabetes compared to individuals in the highest income group. Similarly, Martorell et al., (2017) found that those living in low-income areas have higher rates of diabetes and obesity compared to those living in middle and high income areas.

According to the study by Longobardi et al., 2022, there is also a connection between food insecurity and diabetes. Individuals who are food insecure are less likely eat fruits and vegetables as part of their daily diet. Furthermore, individuals who are food insecure are more likely to be obese due to their inability to afford healthy foods on a regular basis. These results reinforce the findings of (DeCamp and Wolff, 2018). Additionally, individuals who are food insecure are less likely to have regular access to fruits and vegetables, impacting their ability to maintain a healthy diet.

The lack of healthy food choices in communities where individuals are food insecure has been confirmed in various studies. Muntner et al., (2019) found that areas with lower food security have fewer grocery stores. In addition, areas with more fast food restaurants have higher rates of diabetes than other neighborhoods. Furthermore, the study by DeCamp and Wolff, (2018) found similar results; areas with more take-out restaurants have higher incidences of type 2 diabetes. Due to the distance between physical stores, individuals living in low-income areas have a greater distance to travel to grocery stores compared to those living in higher-income areas. This type of physical distance causes stress on specific physiological systems, such as the energy system and the immune system, which can ultimately lead to type 2 diabetes.

As previously discussed, education has been associated with decreased prevalence of type 2 diabetes. Araujo et al., (2018) found that those who have more formal education have lower rates of developing type 2 diabetes. Similarly, Poirier et al., (2019) also found a connection between education and increased risk for type 2 diabetes. Those who have higher levels of education are more likely to practice healthier eating habits and other lifestyle behaviors that reduce risk for type 2 diabetes.

In terms of community resources, a study by DeCamp and Wolff, (2018) found that areas with less community support and fewer social services are associated with higher incidence of type 2 diabetes. In addition, areas with fewer grocery stores had higher rates of type 2 diabetes. The study also found that areas with less maintenance and lack of physical resources are associated with high incidences of type 2 diabetes. The study found that the lack of a community garden is associated with higher incidence of type 2 diabetes in neighborhoods where individuals do not have access to healthy foods. Similarly, Poirier et al., (2019) found that those who live in less safe neighborhoods are more likely to develop type 2 diabetes. It is possible that crime and violence in certain areas contributes to psychological stress and feelings of fear that impact health behaviors, such as physical activity. High levels of stress cause the system to become hyperactive, resulting in the release of cortisol. High levels of cortisol have been linked to obesity and diabetes.

In addition, the study by DeCamp and Wolff, (2018) found that a low number of fast food restaurants are associated with decreased incidence of type 2 diabetes. This study also found that areas with a lack of supermarkets, grocery stores and healthy food choices have higher incidences of type 2 diabetes than neighborhoods with better access to healthier food. This suggests that those who live in areas with low socioeconomic status are at a greater risk for developing type 2 diabetes.

A study by Peguero et al., (2018) also found that individuals in neighborhoods with fewer public parks/green spaces had increased rates of obesity. This suggests that it is possible that the lack of access to green space contributes to stress and anxiety levels, which can contribute to obesity. Moreover, neighborhoods with fewer park/green spaces have a lower number of children and teenagers. This suggests that the lack of healthy lifestyle choices is passed down from generation to generation in low income areas. In addition, areas with fewer grocery stores have higher rates of type 2 diabetes compared to other areas. This study also found that more fast food restaurants which serve portions larger than 24 oz. are associated with higher rates of type 2 diabetes.

**3. Interventions to Impact SDOH on Adults with Type 2 Diabetes and food insecurity**

People with diabetes are more likely to have one or both of the risk factors for developing diabetes and heart disease: Extra weight and lack of exercise. People who have these risk factors may be more likely to develop SDOH so they need to be proactive in their treatment plan. Interventions can help individuals with SDOH achieve a healthier body weight and improve their physical activity levels. In many cases, people who have diabetes also experience food insecurity because they do not have enough money to buy the foods that they need or cannot afford healthy food. In this case, it may be useful in your treatment plan if you take an intervention that helps people manage their diabetes. The number of people who have diabetes, who are experiencing food insecurity, and who have a heart disease will continue to rise in the next few decades so it is important that you take the steps needed to prevent these risk factors from developing.

So with this in mind, let's look at some possible interventions.

**Diabetes Interventions**

There are many different ways to treat type 2 Diabetes. First, you can use insulin or other medications (like metformin) to manage your blood sugar levels. Second, you can lose weight by changing your diet and increasing your physical activity levels. Third, you can perform certain tests like superficial vascular ultrasound (SVA) or cardiac stress test (CST) to monitor blood sugar levels. Once you have diabetes, it is important that you learn all of the skills needed to control your diabetes and prevent any complications. You may need to schedule appointments regularly to check your blood pressure, cholesterol levels, and blood sugar levels.

There are several different types of exercise that can help you lose weight and manage your Diabetes. Walking and other low-impact exercises can help strengthen your muscles so that they can be active when performing various activities. Aerobic exercises such as biking or swimming will condition your heart so that it will be able to function better when under stress or exertion.

Medical interventions are a great way to manage insulin resistance, which is one of the main symptoms of Diabetes. However, this type of intervention often leads to insulin dependence. With insulin dependence, you will have to be much more aware of what you eat and how much you eat and snacks can be very important to manage your blood glucose levels.

**Food Insecurity Interventions**

There are many different interventions that can help people who have food insecurity. First, many food banks provide free food for people who are in need. Second, programs that give you access to healthy foods (like WIC or SNAP) may be available in your area if you are low-income and have dietary restrictions. Third, you may be able to get help with personal care items (like toiletries). Finally, some local organizations or churches may provide free food for people who are in need or even help you find a job.

**Healthy Food Interventions**

The first way that healthy foods can be better for you is because they will have less sugar and fat. Less sugar will lead to less weight gain and less fat will lead to lower cholesterol. Another benefit of eating more fruits and vegetables is that these foods will help fill your stomach so that you do not overeat (or snack) while watching television at night.

The second way that healthy foods can be better for you is because they will have less calories. You need to eat a certain number of calories each day to stay healthy and live a long, healthy life. If you are physically active, you need more energy than just the number of calories that are in the food that you eat on a daily basis. Healthy foods contain 98% to 129% more vitamins, minerals and other nutrients than unhealthy foods .

The third reason why eating healthier can be better for you is because there is no need to go out and buy unhealthy convenience foods anymore. The easiest way to find healthier options is by reading ingredient labels. The first 5 ingredients should all be considered essential food groups. If these ingredients are healthy and natural, then you know that you are choosing a healthy option.

There are several different ways to read ingredient labels on foods. The first thing you want to look at is the sugar content of the food. You need to stay below 45 grams of sugar per day if you have diabetes, but below 22 grams is ideal for any diabetic. Any products with "sugar" in the name contain more sugar than others and are not ideal for dieters. Sugar can be listed under a variety of names so it is important to read your labels carefully. One of the other ingredients to avoid is high fructose corn syrup. The best way to avoid this ingredient is by buying products that are organic or using the ingredients list that is on the box instead of the nutrition information panel.

The second thing you want to look at is fat content in a product. If a product provides less than 30% of its calories from fat, it will be classified as a lean product. Also, if a product has less than 10% trans fat and saturated fats, then it will be considered low in fat. You need to stay below 20 grams of total fat per day if you have diabetes but below 8 grams per day if you are obese. However, you do not need to have a specific amount of fat per day.

The last thing you want to look at is nutrients. You do not need to have specific amounts of vitamins, minerals or other nutrients in each day. However, if you are obese and/or have diabetes then it is important that your diet contains the correct amounts of these nutrients.

There are many different healthy foods that can be purchased at local supermarkets and grocery stores. Before you buy a product, read the nutrition label or ingredient list carefully. By reading the ingredients carefully and knowing what goes into the food, you will be able to choose healthy products that contain less sugar and fat.

There are many different ways that you can manage your Diabetes without having to use medicine or insulin like regular checkups with your primary care physician, learning how to control how much sugar you eat and when you eat your meals. By learning healthy eating habits and exercising regularly, you can begin to feel better, look better and live a longer, healthier life. The most important part of managing diabetes is learning how to manage it. Learning more about the disease and the complications associated with it will allow a person with diabetes to live a longer life with fewer complications from the disease.

**4. Future Directions**

Programs and interventions should be designed to address SDOH in adults with diabetes. These programs should be focused on the adoption of healthy diets, increased physical activity behaviors, and smoking cessation among adults with diabetes and food insecurity.

The effort by health care providers to identify and recommend effective programs resulting in a reduction in food insecurity are key to the long-term success of these efforts. This approach represents an intervention strategy that can improve the quality of life for individuals living with diabetes, reduce disease burden associated with unhealthy living patterns, and reduce overall health care costs as well as presenting opportunities for a variety of workforce training platforms.

The screening, identification, and treatment of health behavior problems in patients with diabetes, such as tobacco and alcohol use or unhealthy food consumption patterns, can facilitate improved glycemic control. Health promotion strategies that address and measure SDOH in adults with type 2 diabetes and food insecurity are essential to the achievement of the goals of diabetes control programs. Chronic diseases management programs that effectively identify SDOH-related risk factors, especially food insecurity and improper physical activity behaviors, can promote increased patient involvement in self-management activities to improve health care outcomes. Finally, interventions that increase physical activity behaviors (walking or cycling for pleasure or commuting) among adults with Type 2 Diabetes have been shown to improve glycemic control.

**Changing the Social Environment through Policy**

This study has not shown that SDOH causes food insecurity in adults with type 2 diabetes. However, it is still important to know how SDOH affects adults with type 2 diabetes because it can be changed through policy. One way of changing the social environment is by using policy changes. Policy makers have the ability to change what options people have, which could lead to food insecurity. For example, if someone is caring for a child and they do not have paid leave to take care of their child, they are more likely to experience food insecurity because they cannot make money and care for a child at the same time. However, if there were paid parental leave, then they could buy healthier food with the money they would receive while they take care of their child.

If SDOH can cause food insecurity in adults with type 2 diabetes, then policy makers need to find a way to address this issue. A way to address SDOH is by offering different types of activities that people can do that are free or low cost. For example, instead of only offering people free exercise classes with no other options, when the classes are over a policy maker could offer small businesses to the participants. This would allow them to continue exercising while they have a job and earn money towards food.

Another way in which policy makers can address SDOH is through regulating food prices. If prices were not so high, then it would be easier for people to be able to afford all the food they need. Policy makers could also offer food assistance programs that are already in place to individuals with low income. One way to offer food assistance programs is by adding a small contribution that comes from state revenue or by making the food stamps more benefits for those in need.

Another way of addressing SDOH is by increasing social capital. Social capital could be increased if there were more resources such as support groups at the gym or community centers for people who do not have family members that can help them stay motivated when exercising and eating healthy.

Policy makers also have the ability to address SDOH through changes to policies regarding welfare and health insurance. If there were an increase in Medicaid benefits or an increase in subsidies for health insurance, this would reduce the percentage of people who experience food insecurity by lowering their costs for health care. This would also put a focus on reducing SDOH because if someone is struggling financially and they get food stamps, they will be able to pay their rent and have money left to buy food. If someone has health insurance, then it is easier for them to pay for their medical bills as opposed to paying medical bills and not having enough money to buy food.

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Student Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Population and Problem:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Evaluation Criteria** | **Comments** |
| (points deducted for errors) |  |
| **Introduction (about 2 pages)**  - Problem and population are clearly identified and discussed.  - Highlight the importance of the problem and population.  - Background information on the problem and population included most recent statistics (years 2012-2022) and *research* literature (years 2012-2022).  **(25 points)** |  |
| **Influence of SDOH (about 3 pages)**  - Examine *research* literature that specifically examines social determinants of health (SDOH) and health outcomes related to problem and population (years 2012-2022).  - Minimum of 4 relevant *research* articles.  - You can report literature before year 2012 if you provide rationale for including older data.  **(25 points)** |  |
| **Interventions to Impact SDOH (about 3 pages)**  - Present and discuss interventions (minimum of 2) to address SDOH related to area of focus.  - Provide support/evidence for interventions.  **(25 points)** |  |
| **Future Directions (about 2 pages)**  - What conclusions can you make regarding the impact of SDOH on your selected area?  - Summarize your opinion on future directions of addressing and measuring SDOH and policy implications, if any.  - Provide an example from your professional practice where you have started to address SDOH or what you can do to raise awareness and address in the future.  **(25 points)** |  |
| **Writing Style**  - Adherence to APA (7th ed.) guidelines for writing and references.  - Paper free of grammatical errors.  - Adheres to page limitations (10 pages maximum for text. Title page, references, any appendices/tables not included in 10-page limit)  (points deducted for errors) |  |
| **Final Grade** |  |

Other Comments: