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## Homelessness and Diabetes: A Review to Provide Education to Homeless Individuals and Organizations

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**HOMELESSNESS AND DIABETES: A REVIEW TO PROVIDE EDUCATION TO  
HOMELESS INDIVIDUALS AND ORGANIZATIONS**

**A MASTER'S THESIS SUBMITTED TO THE GRADUATE FACULTY  
GRADUATE SCHOOL BETHEL UNIVERSITY**

**BY**

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**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF  
MASTERS OF SCIENCE IN PHYSICIAN ASSISTANT**

**NOVEMBER 15, 2021**

## ABSTRACT

Diabetes is a disease that is prevalent in both the United States, and within the homeless population. This project outlines what T2DM is, its prevalence in the homeless population, and then barriers to treatment that the homeless face. Educational material and information regarding diabetes is severely lacking in the homeless population. There are many organizations that exist to aid homeless individuals in the Minneapolis/Saint Paul area. This project is specifically working with an organization called Helping Homeless Minnesota. By researching information on T2DM, homelessness, and educational materials available, resources have been created for Helping Homeless MN. The resources are meant to be utilized by the staff and the homeless they assist to prevent complications of T2DM. The resources created for this project include a Powerpoint presentation for Helping Homeless MN and a brochure for the homeless individuals served by Helping Homeless MN. The presentation and brochure describe T2DM, complications, food options, and resources available in the Minneapolis/Saint Paul area. Helping Homeless MN also received a recorded presentation and PDF of the presentation to educate their future volunteers. Feedback regarding the impact and usefulness of this project was not shared with the researchers. Limitations include communication barriers with Helping Homeless MN and COVID-19. Future research could build this project and expand its scope. By tailoring the resources the project could be expanded to many other homeless organizations in many areas.

## **ACKNOWLEDGMENTS**

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## Chapter 1: Introduction

### Introduction

Disease prevention, diagnosis, and treatment are all integral parts of disease management. A concern arises regarding the homeless population as the components listed may go unnoticed. Prevention and proper management are especially important in the management of chronic diseases such as diabetes (White, 2015). Improper chronic disease management can result in complications and early death if not properly managed in the early stages (White, 2015).

The rates of diabetes have been steadily rising since 1998 when only 9.8% of the United States population had diabetes compared to 12.4% in 2012 (Menke et al., 2015). As of 2020, the increasing rate of diabetes has now reached 13% of the United States population with a diagnosis of diabetes (*National Diabetes Statistics Report*, 2020). The rate of diabetes is slightly less in Minnesota with the rate of diagnosed and undiagnosed diabetes is 9.9% (CDC, 2018). The continuous rise in people with diabetes is disproportionate to those with an income falling in the lowest tertile (Menke et al., 2015). In the homeless population, the prevalence of diabetes has been estimated at 17.8% (Menke et al., 2015). The high rates of diabetes in homeless individuals is disastrous for the homeless population, who often do not have the resources to treat the disease properly.

Social differences and communication barriers in understanding leads to a lack of utilization of long term healthcare by many homeless individuals (Davis et al., 2016). One specific barrier is social practices that differ from the provider, and such a barrier leads to a lack of understanding between the patient and provider. Along with the social barriers, the financial strain of disease management may lead the homeless population to avoid healthcare altogether (Davis et al., 2016). Managing diabetes often requires many supplies and medications that may

be costly. While some homeless may qualify for Medicaid, there are still added costs that may not be covered by insurance (Galvani et al., 2020). Almost 60% of the homeless population with insurance still cannot afford basic preventative healthcare, much less disease management (Winetrobe et al., 2016). While some homeless individuals have some sort of insurance, many have no insurance at all (Winetrobe et al., 2016). Compared to the general population, insurance rates are significantly lower for homeless individuals (Winetrobe et al., 2016). Those without insurance often struggle to afford diabetes medications, and as a result, are not able to properly manage diabetes.

With much of the homeless population lacking access to proper healthcare, thus those who also have diabetes, lack the knowledge and education to properly manage their disease. Without regular healthcare appointments, the homeless population is likely unable to receive education on diabetes management. The lack of regular appointments means the only time for the homeless to receive education is while being treated for complications. Even in hospitals, the education rate of diabetic related complications is lacking. It was found that only 37% of patients hospitalized for diabetic foot ulcers received any sort of education or counseling on diabetic management (Schechter et al., 2020).

This study aims to educate the homeless population on current medical resources available to them, proper care of wounds, and diabetic friendly foods. By properly educating the homeless population, it is hoped that diabetic related complications decrease and preventive healthcare becomes more common and accessible. The following chapter details the background information on diabetes and homelessness, barriers faced by the diabetic and homeless population, along with common definitions and terms for the community service research project.

## **Background**

Thirteen percent of the population in the US is diabetic (*National Diabetes Statistics Report*, 2020). Diabetes can lead to major health complications and comorbidities (Sheetz & King, 2002). Around 553,742 homeless people are in the US (Henry et al., 2016, as cited in Brooks et al., 2018) and of those individuals over 7,977 are in Minnesota (“Minnesota homelessness statistics,” n.d.). However, the quantity of homeless individuals who are diagnosed with diabetes is around eight percent in the United States and research suggests this prevalence is similar to the non-homeless population (Bernstein et al., 2015). There are many more cases of undiagnosed diabetes in the homeless population compared to the general population (Menke et al., 2015). The data on undiagnosed diabetes brings concern because of the complications that come with uncontrolled diabetes (Henwood et al., 2017) such as diabetic neuropathy (Sheetz & King, 2002), retinopathy (Sheetz & King, 2002), foot problems (To et al., 2016), and dental problems (VanMalsen et al., 2019). Diabetic complications are more difficult to manage for the homeless population due to lack of access to the many specialists needed for proper treatment of such complications.

Resources available for providing affordable medical care for diabetic homeless individuals include Medicare and Medicaid, homeless shelters, food resources and free clinics (Lamparter et al., 2020). The lifestyle of homelessness makes it difficult to seek medical care (Davis et al., 2016) and possibly increase emergency department encounters (Berkowitz et al., 2018). Treatment of diabetes is hard to tackle in the uncontrolled environment of homelessness, especially once the symptoms and long-term complications arise. Specifically, insulin is hard to keep without consistent access to refrigeration, which is not a prioritized resource when an individual needs food and housing as well (Lim et al., 2019).

Research has been conducted on the homeless population to understand the prevalence of comorbidities and the amount of education provided to these individuals (Schechter et al., 2020). Few studies were found that explore the amount of education provided to diabetic homeless individuals. Research has compared education provided in hospitals by staff to homeless individuals (Miyawaki et al., 2020) versus education in diabetic peer led groups (Fayfman et al., 2020). However, homeless organizations may not be up to date on current research to assist diabetic homeless individuals and/or provide preventative efforts to stop the progression of diabetes through peer led groups. Homeless services provide food, clothing, shelter, and a place for homeless individuals to stay. However, with rising rates of diabetes, the food that is provided at homeless shelters should be diabetic friendly, to help instead of perpetuating the impact that this disease has (Lim et al., 2019). In addition, homeless shelters and services should be properly trained in how to best assist in wound care. Homeless diabetic patients have a lack of resources (White, 2015) decreasing the chance for blood sugar to be monitored. Blood sugar monitoring, medication, and other diabetic supplies and treatment influence the high costs of diabetes.

Resources are available for homeless individuals in the United States (“Resources”, 2017) and specifically Minnesota (“Homeless information: Minnesota,” n.d.) but with lack of finances, staff, and a continual demand for services, the homeless services may burn out. Though the problem of diabetes in general and in the homeless population seems daunting, through practical education of homeless organizations serving this population, the diabetic homeless individuals who use these services will benefit.

### **Problem Statement**

Diabetes is a chronic condition that is highly prevalent among the homeless population in the United States (Menke et al., 2015). Due to the serious complications that can occur from

diabetes and the limited resources the homeless have, diabetic educational materials are needed for both homeless organizations and individuals. Currently, there is a lack of access to preventative medicine, diabetes treatments, resources for healthy lifestyle modifications, and nutritional information for the homeless population. A succinct resource that contains currently available resources, as well as a summary of diabetic guidelines, would address the lack of available knowledge to the homeless population. This project aims to address and help alleviate the impact of diabetes by providing information on preventative medicine, healthy diet, and outside resources available to both homeless organizations and diabetic individuals.

### **Purpose**

The purpose of this community service research project is to address diabetes in the homeless population and the lack of educational resources available. This community research project aims to use a presentation format for training of shelter staff, as well as a brochure that may be utilized by individuals experiencing homelessness. We wish to fill the gap in knowledge and address the disparities that are felt by homeless individuals experiencing diabetes, including blood sugar control, lifestyle management options, nutrition resources, and supportive health resources.

### **Significance of the Problem**

Currently, the United States' healthcare system is not universal (Chaudhary et al., 2018). The United States also has a significant homeless population, who do not have the financial resources to pay for medical care (Winetrobe et al., 2016). The inability of an individual to afford medical care can exacerbate the progression, and complications, of diabetes. It is important for providers to understand the diverse backgrounds and an array of barriers that homeless individuals face. This project will help address areas of education that are lacking in the

homeless population. Both the presentation and brochure can serve as a resource for the volunteers at Helping Homeless MN to be both educated on disparities, as well as a guide of how to help those experiencing diabetes and homelessness. In addition, the education of homeless individuals and shelters can help fill in gaps of knowledge, as well as help provide access to available resources for management, nutrition, wound care, and other options for free or affordable treatment and preventative measures.

### **Limitations of the Study**

It is not homogenous as to where homeless individuals may live because individuals may live in shelters, homeless camps, and on the streets. Shelters have different staffing availability, as well as different systems and structures. Thus, the presentation has to be broad and not specific to a population group. The brochure aspect of this project is written in common English at a fifth grade level. However, it is difficult to gear it towards homeless individuals when the researchers do not have the perspective homeless individuals have. It is difficult to know what areas to address in the brochure and to know what topics need more or less provided information. Through research, our group will aim to address the needs of the homeless population to the best of our ability.

No financial resources were required to complete this project. The powerpoint presentation and brochure point out free resources in terms of seeking care, affordable supplies and nutritional support resources. However, ultimately Type 2 Diabetes (T2DM) will require medications and management devices, including test strips, that oftentimes have a cost component, even with the provided resources. Thus our study is limited by our current healthcare system, as well as the number of nonprofit and charitable organizations that provide access to

resources, such as long term medication and management strategies for those experiencing diabetes.

This project is being conducted during the SARS-CoV-2 pandemic. The staffing is thus reduced in many shelters. Hands on resources, such as wound care nurses delivering wound care to homeless individuals, is restricted during the duration of the pandemic. Our group is not able to provide as much hands-on assistance and direct interaction with both staff and those living in the homeless shelters, from COVID restrictions. The brochure and powerpoint presentation are great resources to provide to the shelters, but our group is limited in how we may directly assist in the utilization of the resources, due to restrictions of the pandemic.

### **Definitions of Terms**

Blood glucose: Amount of glucose in the blood in mg/dL.

Diabetes Mellitus Type 1: An autoimmune disorder where the body's own immune system destroys the beta cells in the pancreas. Often a childhood illness and requires exogenous administration of insulin (Pietropaolo, 2020).

Diabetes Mellitus Type 2: Pathology when the pancreas does not make enough insulin to manage blood sugar adequately, or the body becomes increasingly resistant to insulin (McCulloch & Robertson, 2019).

Glucometer: A device used to monitor blood sugar level at a given time point, in an individual's blood. A management and control strategy for treatment of diabetes.

Homelessness: A person without housing (Elder & Tubb, 2014).

Insulin: An endocrine hormone made by the beta cells of the pancreas that allows utilization of blood glucose by the body's cells.

mg/dL: Milligrams per deciliter

Wound care: Care provided for wounds, ulcers and long term sores that aims to accelerate the healing process and prevent long term infections.

## **Conclusion**

The high prevalence of diabetes in the homeless population is a problem, and there are gaps in current educational resources for the diabetic homeless population. Lack of education on resources, management strategies, and access to healthcare is at the root of the problem, and needs to be addressed. This project seeks to understand the current research and provide applicable knowledge to homeless services to educate the staff on how to best assist homeless individuals. In addition, the project will be used to educate the diabetic homeless patient with a pamphlet containing resources regarding housing, food, education, medical care, and diabetic supplies in an informative and easily understood manner, to meet the individual's current needs. This project's goal is to provide a bridge between the literature and organizations serving the homeless as well as the homeless individuals themselves.

Chapter two will begin to expand on the physiology of diabetes and the end organ damage that can manifest from it. In addition, this next chapter will share the prevalence of homelessness in the United States, as well as current housing, healthcare, and food resources available. The chapter will display both research conducted in the homeless population and healthcare disparities. Chapter two will also present current resources available and the gaps within these resources.

## Chapter 2: Literature Review

### Introduction

While almost impossible to truly measure, it is estimated that more than 630,000 people in the United States (US) are homeless on any given day, and between 2.5 and 3.5 million spend at least one day homeless in a given year (Bernstein et al., 2015). The homeless population faces many unique obstacles and has many barriers to proper healthcare, including not having access to a healthy diet, having insurance issues, or a lack of education. Lack of access to healthy food and lifestyle habits are believed to contribute to the development of T2DM in homeless individuals (Lim et al., 2019). The accumulation of all these factors can lead to an increase in many diseases, but one disease that disproportionately targets the homeless population is diabetes. Diabetes is on the rise, and homelessness is furthering the destruction this disease leaves behind. It was found that homeless women were hospitalized for diabetes ten times as much as the general population, 2.1% risk of hospitalization vs 0.2% risk of hospitalization respectively (Beijer & Andréasson, 2009). Homeless men were over twice as likely, 1.8% risk of hospitalization vs 0.7% risk of hospitalization of the general public (Beijer & Andréasson, 2009). Diabetes will continue to plague this already at-risk population unless methods of decreasing the prevalence or severity of diabetes are discussed.

### Background

Diabetes is an endocrine disorder in which the body either does not produce insulin or the body has a lack of receptor response to insulin. Insulin is a hormone that signals the body to upregulate glucose uptake in the muscle, adipose, and liver cells (Mantzoros & Serdy, 2020). There are two types of diabetes, Type 1 diabetes mellitus (T1DM) and Type 2 diabetes mellitus (T2DM). T1DM is an autoimmune disorder that most often occurs at a younger age. T1DM's

pathology results from the body's own immune system making antibodies against pancreatic beta cells, resulting in their destruction (Pietropaolo, 2020). T1DM is often diagnosed once the symptoms of hyperglycemia occur, but there are also immune markers that can catch the disease before it becomes symptomatic (Pietropaolo, 2020).

T2DM has two different pathological mechanisms, of which there is decreased insulin production and decreased sensitivity to the insulin produced (McCulloch & Robertson, 2019). T2DM occurs later in life and can be due to genetic factors, environmental factors, or both. Since there are many risk factors to this complicated disease process, there is still much that is widely unknown about T2DM (McCulloch & Robertson, 2019). T2DM makes up the vast majority of diabetes in the US and around the world. An estimated 95% of people with diabetes have T2DM worldwide (Kolb & Martin, 2017).

The environmental risk factors for T2DM are heavily researched and relatively well known. Like many other diseases, a high fat diet, obesity, and sedentary lifestyle are some of the main risk factors for the development of T2DM (Kolb & Martin, 2017). A mechanism directly linking a high fat diet and T2DM was identified in 2005 in a study led by Ohtsubo (Ohtsubo et al., 2005). In this study, they looked at the effects of a specific enzyme called GlcNAcT-IVa glycosyltransferase (GT4) because the amount of GT4 directly impacts the amount of a receptor called GLUT 2, which is in charge of uptake of glucose from the blood. They found that in mice, a high fat diet decreased the amount of GT4 present, which in turn decreased the expression of GLUT 2, which increased the amount of glucose left in the blood, which in turn can lead to the development of diabetes (Ohtsubo et al., 2005). It is widely accepted a low fat diet, filled with fruits and vegetables is best in the avoidance or management of T2DM. High energy dense foods like meat or refined carbohydrates may increase rates of diabetes (Kolb & Martin, 2017).

A diet consisting of high energy dense foods may also lead to obesity, which is one of the most decisive risk factors for T2DM. From the years 2011-2019 it was self reported over 20% of the US population was obese while in MN 30-35% population was obese (“Overweight and obesity: Adult obesity map,” 2020). Both the diabetes epidemic and obesity epidemic have been growing at staggering rates, so it did not take long for this link to be made. It is even suggested that obesity is the “most important culprit” of insulin resistance, which is one of the mechanisms of type two diabetes (Chobot et al., 2018, p. 1).

### ***Diabetic Complications***

Any imbalance within the human body may lead to various long and short term effects. The acute risks associated with diabetes often occur when a patient experiences hypoglycemia, too low of blood glucose, or diabetic ketoacidosis (DKA), which is due to high blood glucose. Hypoglycemia leads to a wide variety of symptoms and varies based on the extent of the hypoglycemia and varies from person to person. Hypoglycemia causes a stress response in the body and excess epinephrine is released (White, 2015). Hypoglycemia leads to tremors, tachycardia, heart palpitations, sweating, and irritability (White, 2015). While these symptoms are concerning, the neurological symptoms are the most concerning when regarding hypoglycemia. When there is not enough glucose for the brain to function correctly, sleepiness, confusion, seizures, loss of consciousness, coma, and death are soon to follow if not treated (White, 2015). Chronic hypoglycemia leads to cognitive dysfunction, dementia, vision loss due to retina cell death, cerebrovascular disease, and even myocardial infarctions (Kalra et al., 2013).

Low blood sugar is not the only issue that arises with the improper management of diabetes. Acute rise of glucose in the blood can lead to two diseases, diabetic ketoacidosis (DKA) and hyperosmolar hypoglycemic state (HHS), which are extremely high blood sugars

with or without the production of ketones respectively. This is more likely to happen in older patients above 65 years old, noncompliant patients, cocaine users, or those taking glucocorticoids (Hirsch & Emmett, 2020). Symptoms primarily appear with polyuria, polydipsia, and weight loss. If the hyperglycemia is not treated promptly, neurological symptoms including altered mental status, focal weakness, lethargy, and eventually, a coma will appear (Hirsch & Emmett, 2020).

Chronic hyperglycemia leads to substantial damage to all the vasculature of the body. It damages the vasculature through two mechanisms, the first of which being called the polyol pathway. In this pathway, the glucose is taken up into the cells of the blood vessel and converted into sorbitol. This sorbitol cannot be used by the cell and will eventually build up. As the sorbitol builds up, it changes the cell's osmotic gradient, causing an influx of water and is hypothesized to cause cell death (Sheetz & King, 2002). The other mechanism of damage is the production of advanced glycation end products (AGEs). These AGEs are formed when excess glucose in the blood causes abnormal covalent crosslinking or modifications of proteins. This damages the vasculature in two ways. First, they may alter the structure of vital proteins to the vasculature, such as collagen or intracellular proteins. Secondly, there are select transmembrane receptors for the AGEs. Activation of these receptors leads to cellular dysfunction and/or death of the cell (Sheetz & King, 2002). This damage affects the microvasculature first and will slowly occlude these vessels. As occlusion progresses, it damages many tissues and most commonly causes retinopathy, neuropathy, non-healing ulcers, and nephropathy (Sheetz & King, 2002).

Like microvessels, the large arteries are also damaged by diabetes by increasing the risk of developing coronary artery disease (CAD) (Cho et al., 2019). CAD is the leading cause of death worldwide, and hemoglobin A1c (HbA1c) has a direct relationship with developing CAD.

A study with over 5000 participants found that the risk of acquiring CAD increases from 39% to 59% with a diagnosis of diabetes (Cho et al., 2019). Not surprisingly, diabetes also increases the risk of complete obstruction of the artery with a prevalence of 15% vs the general population prevalence of 6.6% (Cho et al., 2019).

An additional complication of T2DM is neuropathy. Neuropathy is the loss of sensation due to microvascular damage to the blood vessels, nerves, and tissue from the high serum volume of glucose in the blood (Weintrob & Sexton, 2021). An individual who develops neuropathy in their extremities is susceptible to not sensing changes related to temperature or pain because of damage to the area (Weintrob & Sexton, 2021). There are two different forms of neuropathy (Weintrob & Sexton, 2021). The first is a lack of autonomic intervention which manifests as a patient experiencing dry skin with fissures due to loss of moisture from the sweat glands (Weintrob & Sexton, 2021). The second form of neuropathy occurs when the motor innervation of the foot is altered, leading to a foot being positioned incorrectly, thus areas of the foot are forced to withstand pressure it was not designed to hold (Weintrob & Sexton, 2021). Both neuropathy manifestations put a patient with diabetes at risk for calluses, infections, and ulcerations (“Complications: Foot Complications,” 2021). In addition, callous and ulcers can form if the patient has abnormalities anywhere on their feet (Katalanos, 2013). Previous episodes of infection and inadequate hygiene put a patient at higher risk for developing an ulcer (“Complications: Foot complications”, 2021). Specifically, the feet of a person with T2DM may become cracked easier from the lack of moisture, increasing the chance for bacteria to enter and cause infection, thus starting an ulcer (Weintrob & Sexton, 2021). Inability to evaluate and loss of sensation of the bottoms of the feet, may put an individual at risk for unnoticed foot lesions and ulcers (Everett & Mathioudakis, 2018).

In addition to neuropathy, a person with T2DM is at increased risk of damaged arteries causing decreased circulation and function of the body's natural immune/healing mechanism (Weintrob & Sexton, 2021). A patient experiencing T2DM often has higher than normal baseline glucose levels, which disrupts the body's natural defense of fighting pathogens (Weintrob & Sexton, 2021). The combination of neuropathy and peripheral artery disease in a diabetic patient leads to an increased risk of developing a foot ulcer (Everett & Mathioudakis, 2018). An infected ulcer may manifest into surrounding soft tissue and possibly into the bone, causing osteomyelitis (Weintrob & Sexton, 2021). If the infection manifests deep enough amputation may be needed (Katalanos, 2013). An individual with diabetes for a long period of time has an increased chance of developing an ulcer, and thus a higher risk of amputation (Katalanos, 2013).

### ***Diabetes Complications Treatment***

Treatment of foot ulcers is multifactorial. Treatment of the wound itself involves debridement of dead skin tissue to promote healing and selection of a dressing that allows a moist environment that controls for exudate and the entrance of outside infectious organisms (Everett & Mathioudakis, 2018). Pressure should be offloaded from the ulcer to allow for proper healing (Everett & Mathioudakis, 2018). This can be particularly difficult for an individual that relies on walking for transportation (Everett & Mathioudakis, 2018). In addition, vascular assessment of the individual should screen for PAD in an individual and glycemic control should be addressed for a better wound healing environment (Everett & Mathioudakis, 2018). If purulence or inflammation of the borders beyond one cm is noted, cultures should be obtained, and the individual should be given antibiotics (Everett & Mathioudakis, 2018). Close follow up and diabetes management should be addressed to assure proper healing, and prevent future ulcer development (Everett & Mathioudakis, 2018). In individuals that are homeless, lack of access to

proper medical care can prevent proper management of foot ulcers and lesions (Everett & Mathioudakis, 2018). With up to two thirds of homeless individuals expressing a foot health concern of some kind, preventative measures, such as providing proper shoes, education on monitoring foot lesions and proper foot hygiene could help prevent infectious foot ulcers and amputations (Everett & Mathioudakis, 2018).

Preventative measures are an important aspect to stop the progression or development of foot lesions before they progress to ulcers. Simple actions can be taken, such as proper shoes, clean socks and foot hygiene. Homeless individuals often do not have access to clean socks and shoes, and often the shoes they do have are of optimal support or the wrong size (Socks Are a Critical Component of Our Health, 2019). One study showed that only 61% of homeless individuals changed their socks daily and 72% had the resources to clean their feet daily (Chen, Mitchell & Tran, 2014). Thus, access and education on proper shoes and socks are pivotal in the progression of foot lesions to ulcers. In addition, minor foot lesions and sores that do occur should be cleansed in order to prevent infection and progression into ulcers (Socks Are a Critical Component of Our Health, 2019). Simple measures, such as foot checks, daily washing of feet, lotion, keeping feet dry and antibacterial ointment can help stop progression of minor lesions to ulcers (To, Brothers & Van Zoost, 2016). It can be difficult to look at the bottom of one's foot, therefore, the use of a handheld mirror could aid in viewing the ulcer, if the individual does not have another person to view the bottom of their feet (To, Brothers & Van Zoost, 2016). Education of all of these simple acts to the homeless community are important influential actions that would prevent the development of ulcers that would require more intensive treatment and possible amputation.

Diabetes rates have been on the rise since 1998 when 9.8% of the US population had diabetes (Menke et al., 2015). It is estimated that 12.4% of the adult population suffered from diabetes in 2012, which is an increase from 9.8% in 1988 (Menke et al., 2015). Expectedly, this trend has continued, and in 2020 the Center for Disease Control and Prevention (CDC) estimated that 34.1 million or 13% of the United States adult population has diabetes (*National Diabetes Statistics Report*, 2020). Though medicine is ever changing, the prevalence of undiagnosed diabetes has been the same since 1988 (5.9% vs 5.6%). It was also found that 17.8% of those with an income falling in the lowest tertile have either diagnosed or undiagnosed diabetes (Menke et al., 2015).

The costs associated with diabetes treatment as well as management is very expensive. A 2017 article states the average cost of treatment alone is \$16,725 per year (Galvani et al., 2020). The first drug often prescribed to patients in T2DM is Metformin (Brooks et al., 2018). If patients need to start using insulin, the costs are substantially higher (Galvani et al., 2020). Metformin is considered to be a cheap option for diabetes control, however without insurance is still a relatively costly medication (Galvani et al., 2020). In addition, as of 2017 the average price of a single bottle of insulin in the US is 300 dollars, and many people may need more than one bottle a month (Galvani et al., 2020).

### **Homelessness**

Homelessness is a term used to describe an individual without permanent housing (Elder & Tubb, 2014). A report shared 553,742 homeless individuals reside in the US (Henry et al., 2016, as cited in Brooks et al., 2018) and another report stated 7,977 homeless live in Minnesota (“Minnesota homelessness statistics,” n.d.). Though these statistics may fluctuate over time, the prevalence of homelessness remains. The age of homelessness, on average, appears to be over

the age of 50 (Culhane et al., 2013), which brings concern as older homeless individuals are more likely to have comorbidities (Brown et al., 2016). Higher rates of illness and slower cognitive ability has also been noted in homeless individuals over the age of 50 (Brown et al., 2016).

Homelessness does not discriminate against age as homelessness is found in adolescents (Rahman et al., 2015). Minors might not directly stand out as being homeless because the majority of these adolescents attend school (Rahman et al., 2015). This would make it difficult for a bystander to distinguish a child who was homeless unless one had a close connection to this child by being a teacher, classmate, or family member. Homeless youth have other disparities, such as mental health problems that interfere with life (Milburn et al., 2019). Milburn et al. (2019), shared homeless children who experience trauma and/or poor family structure experience a higher rate of mental health problems with the possibility of feeling victimized (Rahman et al., 2015). To assist homeless adolescents, the federal government has programs allowing students in this demographic to be educated despite living circumstances (Rahman et al., 2015). However, Rahman et al. expressed some students who feel supported by teachers still report mental illness (2015).

### *Diabetes in the Homeless Population*

Diabetes is another health care concern in the homeless population. The true prevalence of diagnosed diabetes in the homeless is widely unknown and some estimates have it as low as 8.0%, which is not significantly different from the general population (Bernstein et al., 2015). The level of undiagnosed diabetes is estimated to be significantly higher than that of the general public due to the lack of preventative healthcare in the homeless population (Bernstein et al., 2015). A report suggested the total prevalence was closer to 17.8%, which is especially

concerning when considering the homeless population with diabetes having a lack of resources and access to proper healthcare (Menke et al. 2015).

As mentioned, a complication of diabetes is foot ulcers, and the prevalence of foot related conditions is found to range between 9% and 65% (To et al., 2016). The rate of foot wounds, fungal infections, pain, and improperly fitted shoes are higher amongst homeless individuals compared to housed individuals across multiple previously conducted studies (Everett & Mathioudakis, 2018). It is estimated that 19-34% of individuals with diabetes will suffer from an infected foot ulcer, and possible reason this prevalence is higher in homeless populations due to lack of proper shoes, healthcare access and increased time spent on their feet (Everett & Mathioudakis, 2018). A recent study interviewed 40 homeless individuals with T2DM, and looked at the association between housing access and diabetes management (Keene et al., 2018). The study found that lack of a permanent residence makes it difficult to develop a routine, and thus results in poor management of T2DM (Keene et al., 2018).

In addition to diabetes and the complications it presents, other mental illnesses and cardiovascular comorbidities have been found to be prevalent (Henwood et al., 2017). Another study shared that mental health problems and substance abuse appear to be higher amongst the homeless population (Lippert & Lee, 2015). Mental health conditions are associated with higher rates of obesity, depression, and incidentally T2DM (Lippert & Lee, 2015). Obesity is a result of eating habits (Lim et al., 2019) and the prevalence of obesity in the homeless population is not drastically different from the non-homeless population (Koh et al., 2012). A one year report completed in 2008 shared 30% of the homeless population were considered obese (Koh et al., 2012).

### *Healthcare Accessibility in the Homeless Population*

With the living conditions and health concerns experienced by the homeless population, another topic of concern is access to medical care by homeless individuals. Frequent use of ambulatory services involved with emergency medicine has been noted within the community, as increased use of ambulatory services for acute and chronic concerns has been reported (Lamparter, et al., 2020). Oftentimes once homeless individuals do seek care, it is associated with an emergent event due to complications of progression of diabetes complications, or acute symptoms (Berkowitz et al., 2018). A 2018 study showed that unstable housing was associated with an increased risk for both emergency visits and hospitalizations from diabetes related issues (Berkowitz et al., 2018).

The emergency department is designed to treat a patient's immediate needs, leading to a specialized approach to medicine, as the patient is unable to take care of the underlying issue (Figueiredo et al., 2016). Yet, the question arises, if these services are being used wisely as homeless and low socioeconomic individuals were among the people to go to an emergency department with a non-dangerous dental issue reported (VanMalsen et al., 2019). Regarding how the clinic and hospital visits pay for clinic and hospital visits, the homeless may be covered by Medicare and Medicaid (Lamparter et al., 2020). However, the health care system may be financially burdened as high medical costs arose from a small portion of the homeless population with mental health situations (Zaretzky et al., 2017). In addition to emergent events, with unstable living conditions and diabetic management, homeless individuals with diabetes may not have the means to properly care for diabetes thus, complications may arise. These unstable living conditions may impact the individuals ability to manage or prevent diabetes. Access to proper funds or refrigeration to store healthy foods may limit the accessibility to healthier options that

could manage the disease better. Though not as bountiful there are still healthy options for those without proper funds or refrigeration. Some of the best options for homeless individuals are low sodium canned foods such as beans, soup, vegetables, chicken and tuna. Some other good options include fruit without added syrup, shelf stable tofu, instant rice, bread, bulk grains and even powdered milk (R. Kirchner, personal communication, Mar. 25 2021).

### **Barriers to Treatment**

Barriers for the homeless community are lack of housing, clothing, proper nutrition, and health care (White, 2015). Individuals that are homeless have a multitude of stressors they face on a daily basis. Diabetes management adds additional stress, due to a demand in daily lifestyle interventions, as well as financial burdens from lack of insurance and high healthcare costs, on the individual (Lim et al., 2019). In addition, the rate of mental illness, chronic health conditions-aside from diabetes, and drug abuse is higher than household individuals (Davis et al., 2017).

It is important to consider the many stressors that are associated with homelessness that individuals face on a daily basis. The stress of obtaining resources for daily survival (food, hygiene, housing, etc), often outweighs the need to seek medical care for chronic diseases (Lim et al., 2019). Another factor to consider is the food provided by many shelters is not usually aligned with a low carbohydrate diet that is recommended for good glycemic control of T2DM (Lim et al., 2019). If individuals purchase their own food, healthy options are often more expensive, and in inner cities harder to obtain, and thus less healthy options are often chosen over healthy options (Smith et al., 2010). Poor diet choices can accentuate the development of obesity, cardiovascular disease, and other predisposing chronic conditions that are associated with the onset of T2DM (Lim et al., 2019).

T2DM treatment varies from individual to individual, but the majority of people will require some sort of medication to keep their blood sugars under control, in addition to diet and exercise management (Brooks et al, 2018). Medications and management devices, such as blood glucose monitoring devices, test strips and insulin are all very expensive, especially if an individual is uninsured. Health insurance coverage is lower in the homeless population in comparison to the general population (Winetrobe et al., 2016). Medicaid is the most commonly utilized insurance in the young adult homeless population (Winetrobe et al., 2016). Even with insurance, there is still a financial burden, and 59% of homeless young adults with insurance still report not attending preventative appointments due to inability to afford the costs (Winetrobe et al., 2016). Diabetes medications and insulin prices have increased exponentially over the last 10 years, leaving uninsured individuals unable to afford medications at all (Riddle & Herman, 2018). The financial burden of medications and lifestyle modifications are not the only limitations a homeless individual faces in diabetes management.

Aside from the economic and physical factors that act as barriers to proper diabetes management, the social barrier between the provider and the patient can play a large role (Davis et al., 2016). Homeless individuals may not establish care with a provider long term, and thus do not establish a primary provider of whom to manage their condition with long term (Davis et al., 2016). The lack of a relationship with a provider makes it difficult to manage T2DM, because the disease requires longitudinal management, and an extensive follow up to make modifications to care in order to optimize management. The provider-patient relationship is often complicated in homeless populations, due to the lack of perspective of providers to the lifestyle factors that homeless individuals face (Davis et al., 2016). Homeless individuals are often unable to attend regular clinic appointments, and even with clinic attendance, providers are often not able to

connect with the individual due to a lack of perspective of the provider (Davis et al., 2016).

Health care providers should have a mindful approach when providing education to an obese homeless individual (Peart & de Leon Siantz, 2017). Studies have found that peer led education can provide both education and empowerment to individuals in comparison to education from a provider alone, which leads to better management and outcomes (Davis et al., 2016).

### **Current Resources**

There is currently a multitude of resources available for aid in the location of housing, nutritional, social, and financial resources (table 1). These resources help with some of the basic needs of those experiencing homelessness. However, there is a lack of resources that are focused on people with diabetes. Diabetes is complex in that it does not just require medication for treatment, but monitoring of blood sugar levels and lifestyle factors to prevent complications from elevated blood sugars (Berkowitz et al., 2018). Diabetic supplies, such as test strips and glucose monitors add yet another layer of cost to diabetes management, but are crucial for adequate control. In individuals struggling to afford housing or food, medication, and lifestyle modifications may not be an immediate priority. The following table summarizes some examples of various resources available for homeless individuals both locally and nationally. Sources are divided into general, family and children, and housing resources based on their specific missions and services they provide.

**Table 1**

#### ***Resources for Homeless Individuals Locally and Nationally***

<b>General resources</b>	<b>National or local source</b>
Catholic Charities USA: This organization provides many	National resource with

<p>resources to homeless individuals, including nutritional, housing and health services. They have a specific program titled “The Integration of Housing and Healthcare Services”. This program aims to reduce chronic homelessness, decrease hospital readmission rates of homeless persons and connect individuals to primary care and behavioral health services (“Healthy housing,” 2020).</p>	<p>individual state chapters</p> <p>Phone number: 03-549-1390</p>
<p>Union Gospel Mission: Twin Cities: This organization provides a multitude of resources for homeless individuals for addiction crises, job training, education, basic food and shelter, basic access to medical care, and basic dental care. This organization has roots in the Christian faith, and has a mission to provide Christian values and education to its residents (“Union Gospel,” 2020).</p>	<p>Local Minnesota resource</p> <p>Phone number: 651-228-1800</p>
<p><b>Family/Children resources</b></p>	
<p>Safe Families for Children: Safe Families for Children provides a temporary supportive home and or environment for children of families experiencing a current crisis (“Safe families,” 2020).</p>	<p>National resource with individual state chapters</p> <p>Phone number: 651-762-2777</p>
<p>Together for Good: Together for Good works to provide resources on practical and relational needs in time of crisis to families. They help those in distress from homelessness have</p>	<p>Local Minnesota resource</p> <p>Phone number: 651-440-4058</p>

<p>support, and thus protect children from traumatic experiences (“Together for,” 2020).</p>	
<p><b>Housing Resources</b></p>	
<p>People Serving People: People Serving people has a mission to provide emergency housing to those experiencing homelessness. They have a multitude of programs including early childhood education, financial literacy education, counseling, family activities, technology resources, and K-12 educational opportunities. This program’s main focus is to provide housing, while also providing resources to get individuals back on their feet (“Programs &amp; services,” 2020).</p>	<p>Local Minnesota resource</p> <p>Phone number: (612) 332-4500</p>
<p>Stepping Stone Emergency Housing: Stepping Stone Emergency Housing works to provide housing in times of individual hardship. In addition, they have a personalized program that provides financial education, job interview skills and weekly medical appointments to get individuals to be self-sufficient and beyond homelessness (“STEPPING Stone,” 2020).</p>	<p>Local Minnesota resource</p> <p>Phone number: (763) 323-7006</p>
<p><b>Food Resources</b></p>	
<p>NoKidHungry: Meals for kids, Text “food” or “comida” to 877-877 for places to receive meals nearby (“Find free,” n.d.).</p>	<p>National resource</p>

Second Harvest Heartland: Help with SNAP eligibility and enrollment; 651-484-5117 (“Supplemental nutrition,” n.d).	National resource
FreeFood.org: A website that provides a list of organizations and locations providing free food to individuals in Saint Paul and Minneapolis, MN (“Minneapolis, MN”, n.d.) & (Saint Paul,” n.d.).	Local Minnesota resource
Hunger Solutions: Minnesota Food Help Hotline (“Minnesota food,” n.d.).	Local Minnesota resource  Phone number: 1-888-711-1151 Available: Monday- Friday 8:30-4:30
<b>Healthcare</b>	
Free Clinics/ reduced cost clinics website: Free Clinics.com provides a detailed list of different clinics within Minneapolis and Saint Paul, MN (“Free and,” n.d.).	Local Minnesota resource
<b>Medications</b>	
340B programs: Specific facilities nationally approved to provide medical resources to patients (“340B drug,” 2020).	National resource

<p>Good Rx: A national resource where you place the name of the medication you desire and find the different facilities based on your current location offering the medication with the listed price (“Stop paying,” 2021).</p>	<p>National resource</p>
<p><b>Transportation</b></p>	
<p>Free rides: Buses in Minneapolis with “Free Ride” offer rides to individuals from “5 a.m. to 1 a.m.” in a northern route of “downtown Minneapolis” (“Free ride,” n.d.).</p>	<p>Local Minnesota resource</p>
<p>Metro transit passes: Charitable organizations helping homeless individuals are provided a discount of 50% on the tokens purchased (typically around 50) (“Non profit,” n.d.).</p>	<p>Local Minnesota resource</p>
<p>Nice Ride: Providing the ability for individuals living in areas of low-income to have access to bikes and scooters as transportation in the Minneapolis area (“Introducing nice,” n.d.).</p>	<p>Local Minnesota resource</p>
<p>Open Your Heart: A rideshare program in the MN area (“Rideshare transportation project,” n.d.).</p>	<p>Local Minnesota resource</p>

## Education

There is a lack of research observing the effect education has on homeless individuals with diabetes. Research has been completed to quantify the education provided to non-homeless with diabetes. In an article assessing non-homeless, diabetic participants with foot ulcers, 37% of

the participants received education when hospitalized with a condition related to diabetes (Schechter et al., 2020). Lavery et al. (2010) looked at a similar population and shared that 2/300 participants received “formal education” related to diabetes after being medically treated. Lavery et al. did not answer what education was provided or reasons why the patients did not receive education, yet it did share the amount of education provided may be based on the location of the clinic (2010). However, these statistics strongly suggest a low amount of education has been provided to diabetic patients.

Education may aid in delaying or preventing the long term complications of diabetes altogether. Education could be completed in a number of ways. An article compared homeless and non-homeless populations going to teaching and nonteaching hospitals and observed the amount of readmissions within 30 days (Miyawaki et al., 2020). The hospital provided education to the staff who in turn educated the patient (Miyawaki et al., 2020). The homeless individuals who went to teaching hospitals were less likely to be readmitted when compared to non teaching hospitals (Miyawaki et al., 2020).

In addition to hospitals educating staff, another approach to diabetic education includes peer led support groups (Fayfman et al., 2020). In this study, diabetic patients who had a history of foot ulcers or amputations were interviewed and shared isolation was a barrier leading to noncompliance; however, the peer led support groups provided a community for these individuals (Fayfman et al., 2020). One study described peer led groups, provided diabetic support and knowledge to diabetic participants with a past or present state of homelessness (Davis et al., 2016). It was found these individuals became empowered and gained understanding after attending the groups (Davis et al., 2016). An interesting finding from this study was 15% of participants had an understanding of HgbA1C (Davis et al., 2016). Indicating the majority of

participants did not know a medical term often used to describe and understand diabetes. The lack of knowledge impacts the predictable progression of uncontrolled diabetes.

### **Conclusion**

Diabetes is a problem plaguing the homeless community due to the wide variety of barriers to proper care including lack of preventative care, dietary constraints, and lack of education. Additional research is needed to determine the true prevalence of diabetes in the homeless population and identify those who are in need of help managing the disease. From the research presented, resources are available, but barriers related to health and finances may limit the use of these resources. Homeless organizations are the hands and feet to provide basic needs to this group of people, yet with the constant demand for resources, these organizations may not have current research with best practices to help diabetic homeless individuals. The next chapter will describe the powerpoint presentation used to present to the homeless organization with a pamphlet provided to homeless diabetic individuals.

## Chapter 3: Methodology

### Introduction

The rate of diabetes is on the rise and an estimated 13% of the US population will suffer from the disease at some point in their life (National Diabetes Statistics Report, 2020). The prevalence of diabetes within the homeless population does not appear to be larger than the non-homeless population (Bernstein et al., 2015); however, a former source suggested the prevalence to be as high as 17.8% (Menke et al., 2015). The rate of homelessness in Minnesota is also increasing, and in 2019 one out of every 262 people were homeless (“Stats on Homelessness in MN”, n.d). After researching the prevalence of diabetes in the homeless, educational resources also appear to be lacking. Educational material is not readily available, and in a hospital setting, only 37% of people received any education after suffering from a diabetic related complication (Schechter et al., 2020).

The purpose of this project is to provide educational material on diabetes to both the homeless population in Minnesota and those who assist them. This project aims to educate the homeless population on current resources available for them, proper care of wounds, diabetic friendly foods, and lifestyle choices. By properly educating the homeless population, it is hoped diabetic related complications will decrease and preventive healthcare becomes more accessible.

### Rationale for Project

The homeless population suffers from diabetes at a rate much higher than the general public (Menke et al., 2015). Due to the lack of resources available, managing diabetes has proven difficult, thus potentially leading those afflicted to avoid healthcare altogether (Davis et al., 2016). Healthcare resources and educational materials are available to help this population, but often they go unknown and underutilized. Education on lifestyle and disease management

appears crucial as it is estimated 60% of homeless individuals, even those with state insurance, cannot afford basic healthcare, much less the medications and supplies needed to properly control their diabetes (Winetrobe et al., 2016). Though education is essential in limiting the complications of diabetes, it was found to be severely lacking (Schechter et al., 2020).

The goal of this project is to help address this lack of education by providing the homeless population served by Helping Homeless MN with educational material on various aspects of diabetes management. The project will also help highlight the possible underutilized local resources available to the homeless. The aim of this project is to decrease the amount of diabetes related complications in the homeless population, through education on proper disease management.

### **Population**

Helping Homeless MN is a volunteer based organization providing food, supplies, and education to the homeless individuals throughout Minneapolis and St.Paul. Through the years, this organization has noticed an increase in complications relating to diabetes. Previously this organization was partnered with various schools and programs that were able to do diabetic education and foot care, but has lost this connection due to COVID-19 and was seeking out more educational material.

Diabetes is an endocrine disorder in which the body either does not produce enough insulin to control blood glucose levels, or there is a lack of receptor response to insulin (Mantzoros & Serdy, 2020). Diabetes mellitus may be present in any age group, but is most common as age increases due to T2DM affecting 95% of the diabetic population and it occurs later in life (Kolb & Martin, 2017). This project aims to serve the diabetic homeless population

of all ages in Minnesota serviced by the organization Helping Homeless MN, and the volunteers of this organization.

### **Project Plan and Implementation**

After communication with Helping Homeless MN, the need for resources to serve the homeless with T2DM and complications became apparent. Other homeless organizations in Minneapolis, Minnesota (MN) were contacted but did not remain in communication. To assist Helping Homeless MN research from Google Scholar, UpToDate, and PubMed will be observed from 2002-2021 to assess what T2DM is, how to recognize signs and symptoms, and possible complications from this disease. This research will be organized in a powerpoint presentation, to be utilized by staff affiliated with Helping Homeless MN for informative and/or training purposes. The powerpoint presentation will begin with the physiology, presenting signs and symptoms, and complications of T2DM at a fifth grade reading level. Next, the current demographics of T2DM in the US and the homeless population will be shared. Following this information, blood glucose testing, diet education, possible medication, and self care for foot ulcers will be included. The powerpoint presentation will conclude with links to available resources available for homeless individuals or family members, such as: shelters (housing and food), free clinics, housing, and transportation resources. This training will not contain medical advice from providers, as it is not completed by licensed practitioners, but will allow the staff and volunteers of Helping Homeless MN to know presenting signs of T2DM, complications, and where to direct homeless individuals with T2DM. A recorded presentation of the powerpoint will be created and sent to Helping Homeless MN.

A brochure, written at a fifth grade reading level, containing a description of T2DM, complications of the disease including foot ulcers, and a list of healthcare resources within the

Minneapolis/Saint Paul area will be shared with the organization. The brochure will feature a list of healthcare resources accessible for homeless individuals willing to provide wound care treatment, bandages, shoes, and/or insulin at a reduced cost. In addition, food and shelter resources within the Minneapolis/Saint Paul area will be included on the brochure. The brochure will contain a list of transportation resources for people to access these resources including local bus, car, and bike transportation opportunities available. This brochure will be provided to the organization in a PDF format for reference and printable access. The goal is for the organization to distribute the brochure to the homeless individuals whom Helping Homeless MN provides meals and resources to empower a diabetic homeless individual with resources available.

### **Project Tools**

This project has two informative distribution forms for Helping Homeless MN. The first is a pre-recorded powerpoint presentation consisting of various sets of slides. The first set of slides will focus on explaining T2DM physiology and manifestations at a fifth grade reading level for staff with no medical background to understand. The next slides will describe informative demographics regarding the distribution and prevalence of T2DM in the United States and homeless population. The following slides include information on how those with T2DM can prevent complications: assessing blood sugar, diet education, and taking medications (insulin, metformin). The barrier of lack of insurance will be addressed. Instructions on suggested food choices and foot wound prevention and care will be addressed. The concluding slides consist of links to resources in the twin cities metro area that provide medical care and supplies at a reduced cost, such as the Minnesota Department of Health Access to Insulin program and clinics which provide care to those uninsured. In addition, ride programs, such as

metro mobility, rideshare programs and Nice Ride for all are included to help individuals find transportation to clinics for medical care.

The Second resource is a PDF brochure created to be distributed via Helping Homeless MN to homeless individuals who reside in encampments or to staff who wish to use the tangible resource as a reference. The brochure consists of a succinct version of the information in the powerpoint presentation, but in a written format, to be distributed. The PDF is made available to Helping Homeless to print off for their staff, or to distribute to individuals at encampments with T2DM. The focus of the explained approach is for Helping Homeless MN to have a resource addressing their concern for homeless individuals with T2DM and related complications.

### **Need of the Organization**

Helping Homeless MN is an organization providing resources to homeless individuals in Minneapolis, MN. With the prevalence of diabetes among the homeless population and diabetic complication concerns, this organization is eager to learn and understand how to best assist this community. By providing education on what T2DM is, possible complications, and practical ways to assist those who have T2DM, this organization will be able to effectively serve T2DM homeless individuals in Minneapolis, MN.

### **Potential Project Barriers**

This community service project has some potential barriers limiting the overall effectiveness. The first being, identifying those with diabetes who may benefit from the material. Though a pre-recorded educational powerpoint presentation and PDF brochure will be given to Helping Homeless MN staff and volunteers to distribute, not all the staff may be educated. To help ensure the organization is educated, a digital PDF copy of the educational powerpoint presentation will be given to the organization. Helping Homeless MN would be able to use the

powerpoint presentation as a resource for training new staff and volunteers. Secondly, some homeless individuals with T2DM within the homeless encampments served by Helping Homeless MN may not receive the brochure or may not be able to understand it. Though the resource may not be presented to every homeless individual with T2DM, a PDF form of the brochure will be provided to Helping Homeless MN so more can be distributed if needed. The problem of literacy is difficult to mitigate, but through the powerpoint presentation aimed at educating the staff, it is hoped that the education can be passed directly from the staff to the population in an easier way to understand.

### **Conclusion**

Through the prompting by Helping Homeless MN, it was determined diabetic education and management is severely lacking in the homeless population. By providing diabetic education for Helping Homeless MN staff in a powerpoint presentation and brochure form, the homeless diabetic population served may have a lower rate of complications related to diabetes. Chapter 4 will provide a detailed outline of the project sent to Helping Homeless MN, results, and the limitations.

## Chapter 4: Results

### Introduction

This project aims to educate the homeless population served by Helping Homeless MN in Minneapolis MN, on the warning signs and proper management of T2DM. The final outcomes, results, and limitations of this community service project will be discussed below.

### Summary of Results

There is a current lack of education and resources of attainable and applicable healthy lifestyle options and diabetes management for homeless individuals in management of complications of T2DM (Schechter et al., 2020). Preventative measures and management early on can likely prevent the progression and manifestation of complications, such as neuropathy, vascular disease and foot ulcers (Everett & Mathioudakis, 2018). Our project provides education and applicable resources options for both a homeless organization and the individuals the organization serves with T2DM. Many homeless organizations are focused on providing basic services for people, however, may not have the resources, nor the time to provide educational resources for those with T2DM.

Our research group originally planned to do an in person presentation of the project with Helping Homeless MN, but due to lack of communication, COVID-19, and scheduling conflicts this was unable to happen. Instead a recorded presentation was created and sent to the organization so it could be played at their convenience and used to educate staff. This also allows future volunteers to view the presentation. Our PowerPoint, used in the recorded presentation, has slides that present the basic concepts of diabetes, possible complications, action that can be taken to prevent foot ulcers and applicable resources for those who are homeless and have T2DM.

In addition to our recorded presentation, a brochure was also created to be utilized as a tangible resource for Helping Homeless to distribute to those with T2DM. Our brochure also highlights the main concepts of diabetes, complications, how to prevent complications and resources that are applicable to those with T2DM and are homeless. Our brochure was shared with Helping Homeless MN to be able to print as many copies as they need to distribute. Our goal is to impact and help as many homeless individuals as possible that have T2DM. Our brochure and presentation were made with research into what services and information would best help homeless individuals with T2DM. Both the presentation and succinct brochure provide information on T2DM management at a fifth grade reading level, to cater to all levels of education.

The stated and described information was provided to Helping Homeless MN. It is not yet known the impact of this project on Helping Homeless MN staff or the individuals served with T2DM. Despite being unaware of the tangible impact the project had, the information was sent and the project was completed.

### **Limitations**

There were many limitations to this project, of which, the most impactful being the inability to communicate effectively with Helping Homeless MN. Due to Helping Homeless MN being run by a single person and staff made up of volunteers, communication was difficult. This made it difficult at times to communicate about updates and timeline for our project.

COVID-19 has also decreased the number of volunteers and events that have taken place with Helping Homeless MN. Instead of the previous frequent cook outs and spending time around the encampments, 2020 and 2021 events have been limited to dropping off bags filled with supplies. The decreased face-to-face time, limited the feedback we can receive on our

project; thus, potentially decreasing the ability to see the impact of this project. It would be beneficial, to gain greater feedback and see the effectiveness of this project; however the stated limitations regarding communication with Helping Homeless MN and COVID-19 likely decreases the amount and type of valuable feedback.

### **Further Projects**

One way to further improve the project is to complete a face-to-face presentation to allow for direct feedback. Creation of a tailored brochure after receiving ideas from the organization would assist the researchers in completing a usable and helpful project. For example, throughout conversations with the homeless organization and/or population, there may be conversations that expose deficiencies in education surrounding diabetes; the misunderstandings could be identified and educational material be written and placed in a brochure.

The project could also be expanded to other organizations in the Twin Cities area to get the information out to the largest audience. Due to COVID-19, there has been a decrease in the amount of events done by Helping Homeless MN, so partnering with homeless shelters or other organizations that have continued to do outreach through pandemic would be beneficial. Also, by doing more research of different resources available to the homeless population in other cities the project could be expanded to reach people outside of Minneapolis. The project could create a survey that would be completed by homeless organizations involved before and after the use of the information created by the research group. The survey could be used as a tool for the research group and organizations involved to see if the information provided was helpful.

## **Conclusion**

The project was used to create tools that could be used by Helping Homeless MN staff to allow them to be further educated and equipped to assist homeless individuals with T2DM. The research completed for the project pieced together and highlighted major themes that would overview main points of T2DM, the homeless population, and the current understanding of T2DM in the homeless population. Next the project was used to list some resources available for T2DM homeless individuals at a national and local level. These resources included, but were not limited to, resources assisting an individual with food, housing, healthcare, medications, and transportation.

The project taught the researchers about T2DM, the homeless population, the impact of T2DM on the homeless population, and current resources applicable to all these populations. The project also allowed the researchers to creatively work with one another to synthesize material that would be helpful to organizations helping homeless individuals. Though it is not known the array of influence this project had on the individuals it was created for, future research could still be done from this project to help homeless organizations and the populations they serve.

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Appendix A

Brochure

## ALL ABOUT DIABETES

**17.8%** Amount of the homeless population that suffers from diagnosed or undiagnosed diabetes

Up to 1/10 people have undiagnosed diabetes

### SYMPTOMS

<p><b>At first you may have ...</b></p> <ul style="list-style-type: none"> <li>• Thirst</li> <li>• Frequent urination</li> <li>• Weight loss</li> <li>• Weakness</li> </ul>	<p><b>In time you may have...</b></p> <ul style="list-style-type: none"> <li>• Tingling and numbness of your fingers and toes</li> <li>• Sores on your legs and feet</li> <li>• Heart disease and blood vessel damage</li> <li>• Confusion</li> </ul>
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### WHAT TO DO?

 <p>Check Blood Sugars</p>	 <p>Find and eat healthy foods</p>	 <p>Take care of wounds</p>
-------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------



### Helping Homeless MN

(763)486-2614  
 helpinghomelessmn@gmail.com

<https://www.facebook.com/HelpingHomelessMN>

## Diabetes Education



## FOOD CHOICES

**LOW SODIUM CANNED FOOD**

BEANS  
SOUP  
VEGETABLES  
CHICKEN  
TUNA

**GRAINS**

BROWN RICE  
QUINOA  
OATS  
SHELF STABLE TOFU  
WHOLE GRAIN BREAD

**OTHER**

FRUIT WITHOUT ADDED SUGAR  
POWDERED MILK

## Wound Care

Wear shoes that fit



Change socks



Lotion feet



Use ointment

Check feet with mirror



### When to be concerned?

The wound...  
 Is Red  
 Has pus  
 Is not healing



## Resources

### General

Catholic Charities:  
**(703)549-1390**

Union Gospel Mission Twin Cities:  
**(651)228-1800**

### Family Planning Resources

Safe Families for Children:  
**(651)762-2777**  
 Together for Good:  
**(651)440-4058**

### Housing Resources

People Serving People:  
**(612) 332-4500**  
 Stepping Stone Emergency Housing:  
**(763) 323-7006**

### Healthcare Resources

Freeclinic.com:  
**(641)715-3900 extension 301402**

### Medications

[www.GoodRX.com](http://www.GoodRX.com)

### Transportation at reduced cost

Metro transit passes:  
 Transit Assistance Program- Apply in person or on Metro Transit website

Nice Ride:  
[Niceridemn.com/nicerideforall](http://Niceridemn.com/nicerideforall)

Appendix B

Powerpoint

12/14/2021

## Type 2 Diabetes in the homeless population

David Grewe, McKenzie Kostreva, Karly Kroeten



## What is Type 2 Diabetes?




Too much sugar + Low insulin = Problems



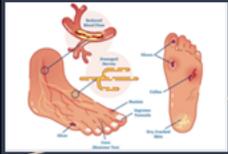
## What happens with unmanaged Type 2 Diabetes?

They may feel:

- Thirsty
- Having to go to the bathroom more often
- Weight loss
- Feeling weak



## Later in time...



They could develop...

- Tingling in fingers and toes
- No feeling in fingers or toes
- Heart and blood vessel damage
- Sores on their feet
  - Could progress to needing amputation
- Confusion



## Who has Diabetes



In the...

- United States: Possibly 8-13 out of 100 people
- Homeless Population: Not fully known, maybe between 17 or 18 out of 100 people



### What can be done to help?



- Make good food choices
- Prevention and proper care of wounds
- Check blood sugar levels
- Take medication to help lower sugar in blood
  - Oral diabetes meds: example- metformin
  - Injectables: example- insulin

### Why can't people go to a doctor?



- Lack of insurance
  - Even with insurance- unable to pay deductible
- Do not know how to access one

### Food choices

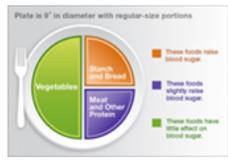


Plate is 9" in diameter with regular-size portions

- These foods have **low** sugar
- These foods **slightly** raise blood sugar
- These foods have **little effect** on blood sugar

### Preferred food choices

- Low salt canned foods
  - Beans
  - Soup
  - Vegetables
  - Chicken
  - Tuna
  - Fruit (Without added syrup)
- Grains
  - Brown rice
  - Quinoa
  - Oats
  - Eto
- Shelf stable Tofu
- Bread
- Powdered milk

### Wound care and prevention



### Steps to Diabetic Foot Care

1. Change socks everyday or when socks are wet
2. Find shoes that fit well
3. Make sure feet are clean and use lotion
4. Look to see if wounds are on feet
  - a. Between toes
  - b. Under feet (Use a mirror if you need)
5. If you see a wound, use antibiotic ointment and go to a health provider

12/14/2021

### Resources available near you in Minnesota

- **General resources:**
  - [Diabetes - Diabetes](#)
  - [Diabetes - Diabetes](#)
- **Family/Children Resources:**
  - [Diabetes - Diabetes](#)
  - [Diabetes - Diabetes](#)
- **Housing:**
  - [Diabetes - Diabetes](#)
  - [Diabetes - Diabetes](#)
- **Food:**
  - [Diabetes - Diabetes](#)
  - [Diabetes - Diabetes](#)
  - [Diabetes - Diabetes](#)
- **Healthcare:**
  - [Diabetes - Diabetes](#)
- **Medications:**
  - [Diabetes - Diabetes](#)
- **Transportation at reduced cost:**
  - [Diabetes - Diabetes](#)
  - [Diabetes - Diabetes](#)
  - [Diabetes - Diabetes](#)

### The Brochure

### Thank you for your time.

### Questions?

[d.gunn@christal.edu](mailto:d.gunn@christal.edu)  
<https://www.christal.edu/>

### Resources

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Appendix C

Approval from Helping Homeless MN

 **Sarah Cross** (roccocross16@gmail.com)

Sat, Jan 9, 2021 3:03 pm

To: you [Details](#) ▾

On behalf of Helping Homeless MN,

I Sarah Cross, give permission to Bethel University Physician Assistant students, Karly Kroeten, David Grewe, Mckenzie Kostreva, to conduct their Master's Research with this organization.

Sincerely,

Sarah Cross