IMPACT OF SOCIAL DETERMINANTS IN DIABETES MELLITUS PREVENTION AND MANAGEMENT: COMMUNITY AND AMBULATORY CARE APPROACH

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Convención del Colegio de Farmacéuticos de Puerto Rico, CFPR 2023

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FINANCIAL RELATIONSHIP DISCLOSURE

Dr. Cathyria M. Marrero Serra, PharmD, BCPS, faculty of this activity, has no relevant financial relationship (RFR) with an ineligible company.

OBJECTIVES

At the end of the CPE activity, the participants will be able to:

- ☑ Define population health, health disparities, health equity and Social determinants of health (SDOH).
- ☑ Identify social determinants of health and how they affect diabetes prevention and management.
- ☑ Identify opportunities for the pharmacist to address social determinants of health to optimize care of patients with diabetes.

OBJECTIVES

At the end of the CPE activity, the participants will be able to:

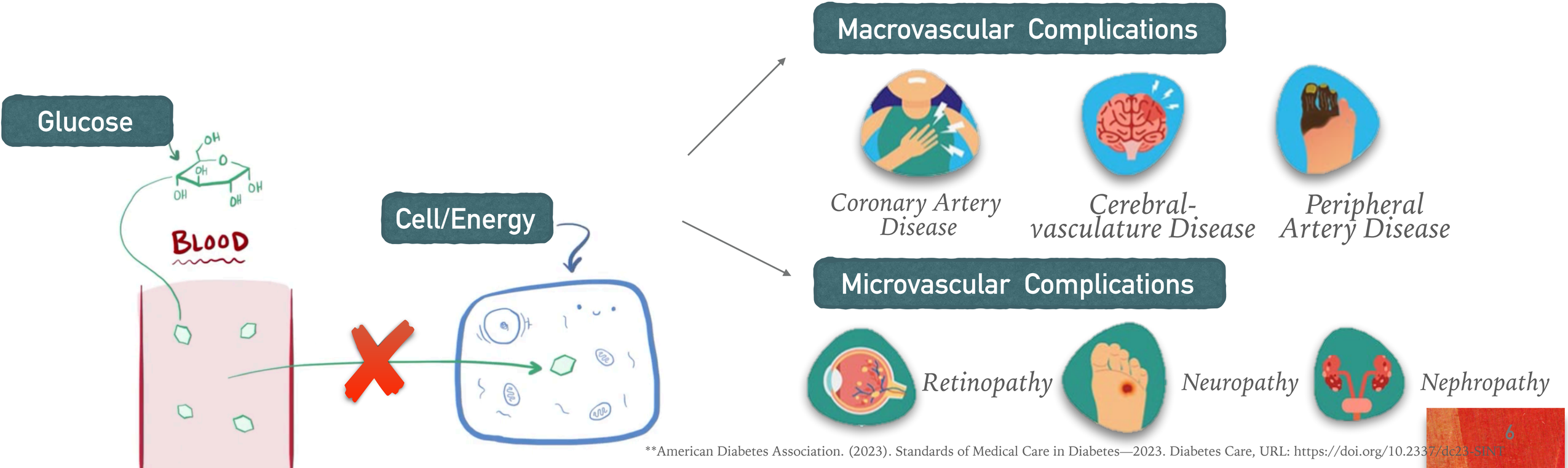
- ☑ Describe innovative practice strategies for addressing social determinants of health in diabetes care.
- ☑ Value the role of the clinical pharmacist, the pharmacy technician and the pharmacy team in Diabetes care.

INTRODUCTION: DIABETES MELLITUS AND ITS IMPACT

INTRODUCTION*

Diabetes Mellitus

The American Diabetes Association®(ADA), describes diseases of abnormal carbohydrate metabolism that are characterized by hyperglycemia. It is associated with a relative or absolute impairment in insulin secretion, along with varying degrees of peripheral resistance to the action of insulin. (ADA, 2023)/ Hyperglycemia results from defects on insulin secretion, insulin action, or both.



**American Diabetes Association. (2023). Standards of Medical Care in Diabetes—2023. Diabetes Care, URL: https://doi.org/10.2337/dc23-SINT

INTRODUCTION*

Classic Signs and Symptoms

- Polyuria (excessive urination)
- Polydipsia (excessive thirst)
- Polyphagia (excessive hunger or increased appetite)

Manifestations/Classifications

- Type 1 diabetes
- Type 2 diabetes
- Gestational diabetes mellitus

Specific types of diabetes due to other causes

Excesive Urination

UTIs

Fatigue

Weight changes

Hunger/ Thirst

Numbness

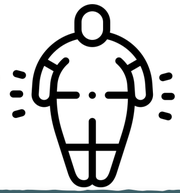
Slow session healing

*American Diabetes Association. (2023). Standards of Medical Care in Diabetes—2023. Diabetes Care, URL: https://doi.org/10.2337/dc23-SINT

RISK FACTORS*

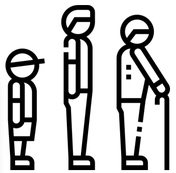
Hx of Pre-diabetes

Obesity



BMI 23 Kg/m^2

Age: 40 years or older



Family History

Gestational Diabetes

Physically active less than 3 times a week

African American, Hispanic or Latino, American Indian, or Alaska Native person.

*American Diabetes Association. (2023). Standards of Medical Care in Diabetes—2023. Diabetes Care, URL: https://doi.org/10.2337/dc23-SINT

RISK FACTORS IN PUERTO RICO*

Informe de Enfermedades Crónicas de Puerto Rico 2018-2020- Published on 2023

- **Obesity** 82.9%
- **Sedentarism** 56.9%
- **Smoking** 7.6%

Comorbidities

- **Hypertension** 75.1%
- **Hyperlipidemia** 71.6%
- **Arthritis** 40.5%
- **Depression** 22.4%
- **Asthma** 17.7%
- **CVD** 12.0%
- **MI** 15.7%
- **CKD** 9.3%

**Informe de Enfermedades Crónicas de Puerto Rico Health Department 2023. URL: https://www.salud.pr.gov/CMS/DOWNLOAD/7815*

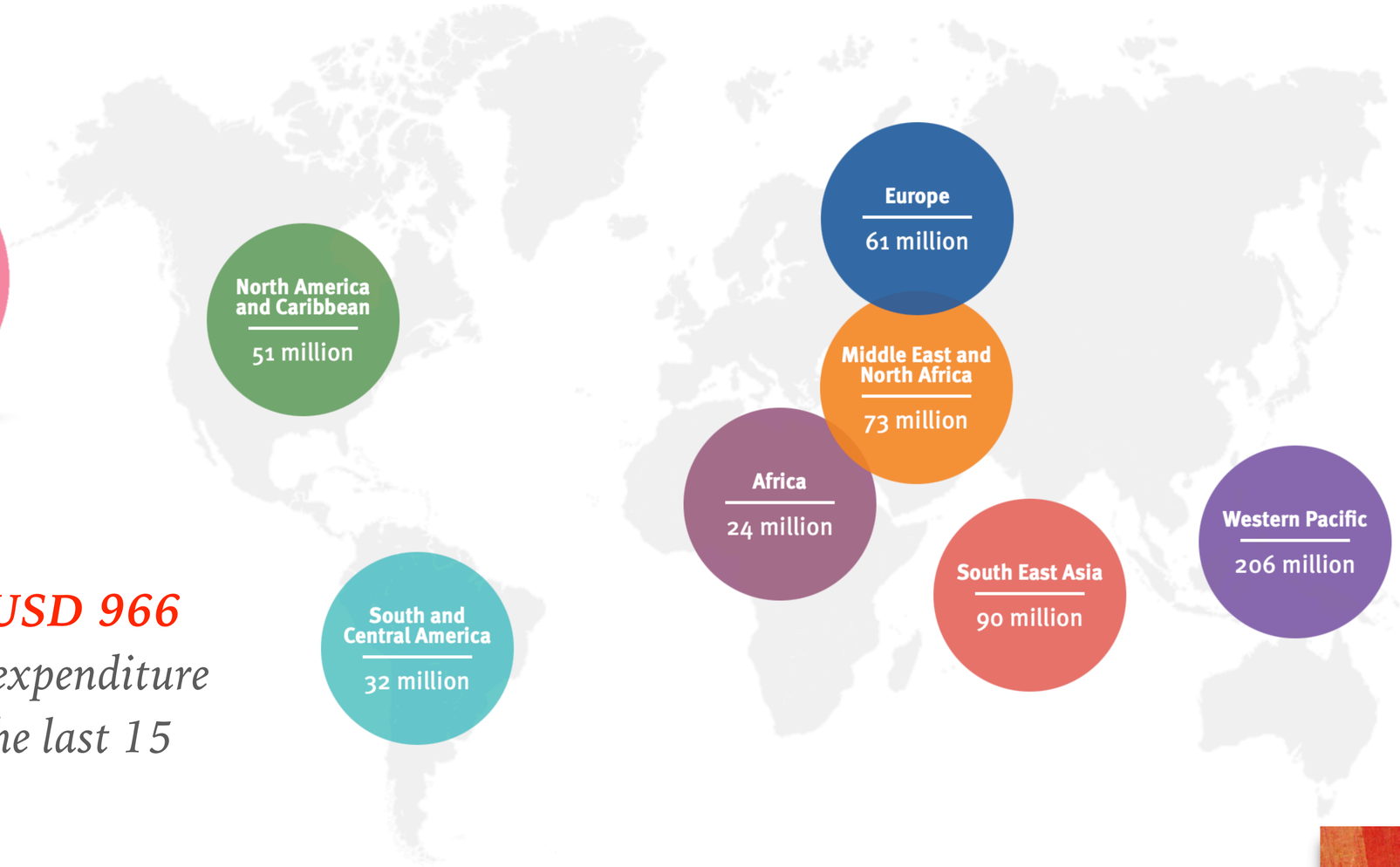
INTRODUCTION: IDF DIABETES ATLAS 10TH EDITION*

Epidemiology

Diabetes around the world in 2021

537 million adults are living with diabetes

6.7 million deaths due to diabetes in 2021



*Diabetes caused at least **USD 966 billion** dollars in health expenditure – a 316% increase over the last 15 years.*

*IDF- International Diabetes Federation: https://idf.org

INTRODUCTION: IDF DIABETES ATLAS 10TH EDITION

Epidemiology

Diabetes around the world in 2021

537 million adults are living with diabetes

6.7 million deaths due to diabetes in 2021

"It is expected that by 2030, this number will increase to 643 million."

INTRODUCTION: IDF DIABETES ATLAS 10TH EDITION*

Epidemiology

National Diabetes Statistics Report

Estimates of Diabetes and Its Burden in the United States

One out of every 5 patients does not know they live with diabetes

Fast Facts on Diabetes

Diabetes

- **Total:** 37.3 million people have diabetes (11.3% of the US population)
- **Diagnosed:** 28.7 million people, including 28.5 million adults
- **Undiagnosed:** 8.5 million people (23.0% of adults are undiagnosed)

Prediabetes

- **Total:** 96 million people aged 18 years or older have prediabetes (38.0% of the adult US population)
- **65 years or older:** 26.4 million people aged 65 years or older (48.8%) have prediabetes

North America and Caribbean

51 million

*Centers for Disease Control and Prevention (2022). National Diabetes Statistics Report website. https://www.cdc.gov/diabetes/data/statistics-report/index.html.

INTRODUCTION

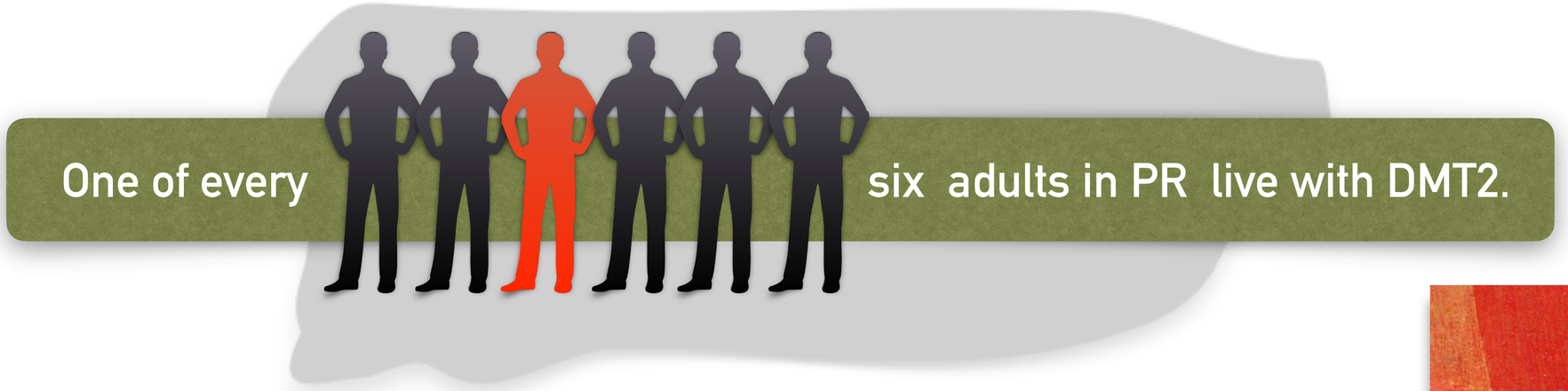
Epidemiology

- The leading causes of death in Puerto Rico are chronic diseases.
- *Chronic diseases* - gradual onset, no cure, change over time, and require significant interventions, including pharmacologic and non-pharmacologic management.
- In 2020, diabetes was the third leading cause of death on the island.

Which means that 60 adults per 100,000 inhabitants died from this disease.

456,640

Adults in Puerto Rico live with Diabetes



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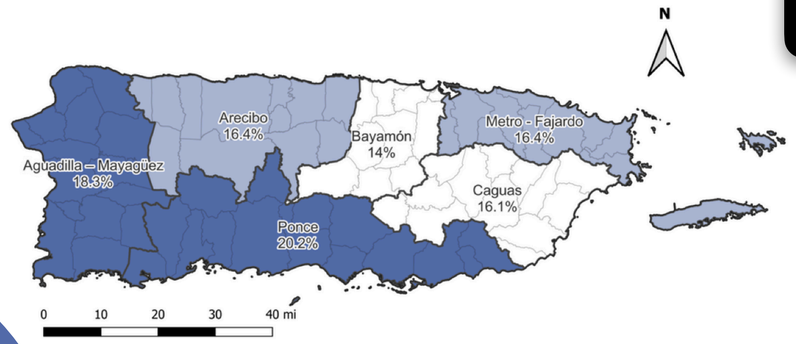
INTRODUCTION

Epidemiology



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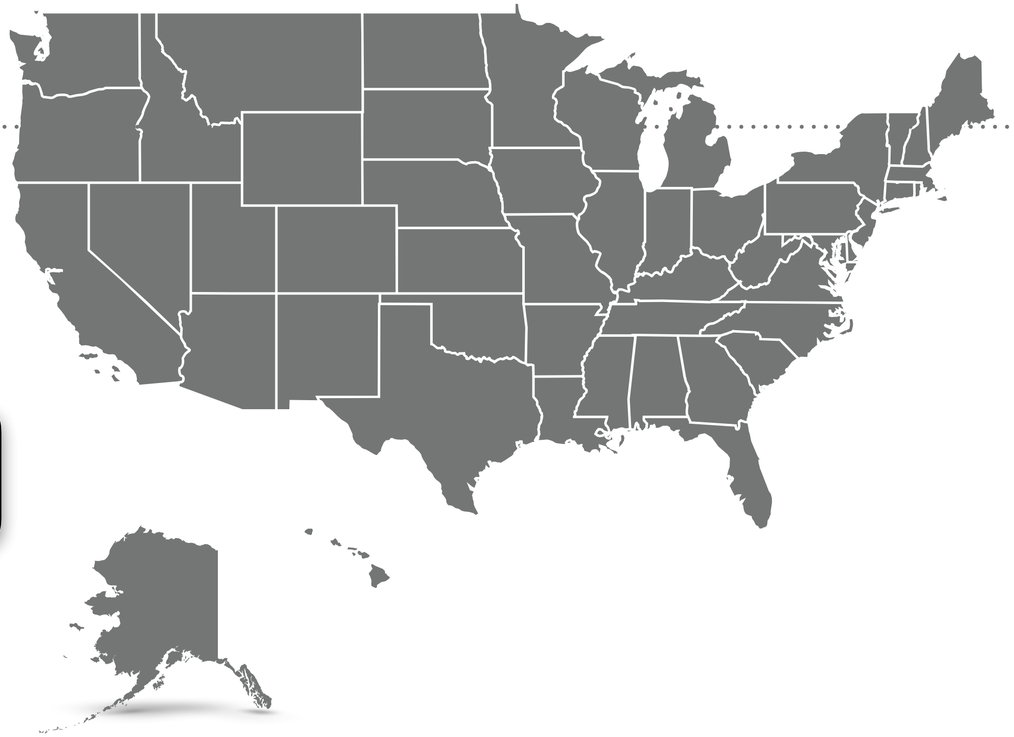

456,640

Adults in Puerto Rico live with Diabetes

- When compared with the United States (USA), for 2020, PR has a prevalence (adjusted for age) of 14.4%, while the USA had a median prevalence of 11.1%.

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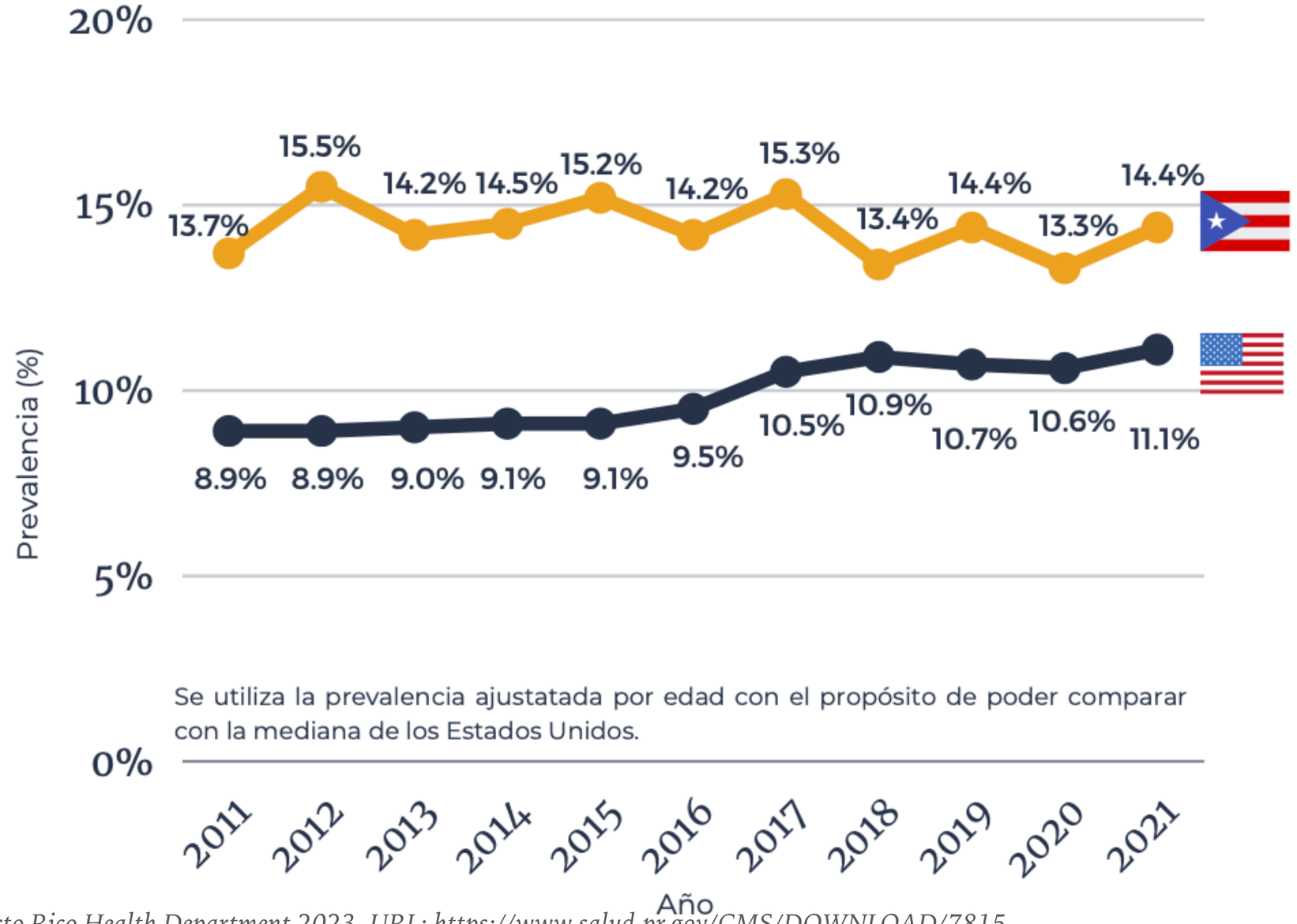
INTRODUCTION

Epidemiology

"2011-2021, the age-adjusted prevalence of diabetes in PR has been consistently higher than in the US"

— *PR Health Department 2021*



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INTRODUCTION

Epidemiology

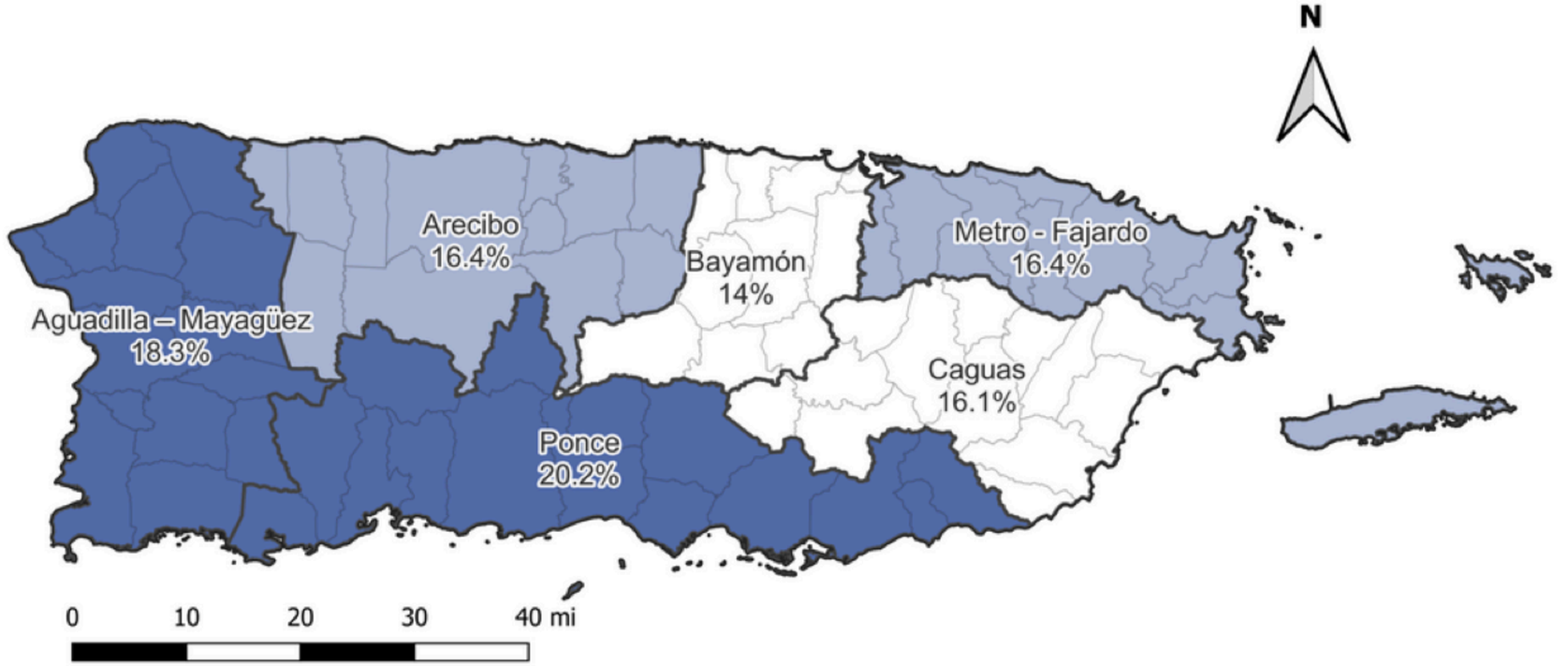
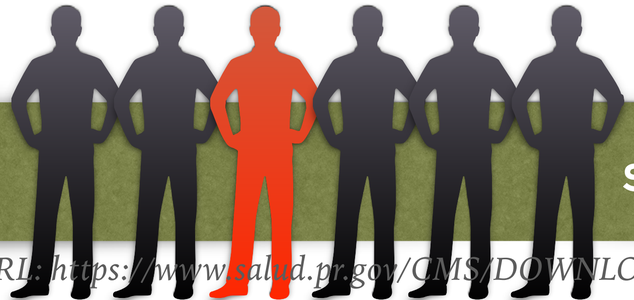


FIGURE 1. Unadjusted prevalence of diabetes among adults 20 years of age and older in Puerto Rico by county, 2021

456,640

Adults in Puerto Rico live with Diabetes

- *By 2021, residents of the health regions of Ponce (20.2%) and Aguadilla-Mayagüez (18.3%) reported the highest prevalence of diabetes in PR.*



One of every six adults in PR live with DMT2.

**Informe de Enfermedades Crónicas de Puerto Rico Health Department 2023. URL: https://www.salud.pr.gov/CMS/DOWNLOAD/7815*

PREVALENCE OF DIABETES DURING 2021, PR DEPARTMENT OF HEALTH*

Epidemiology

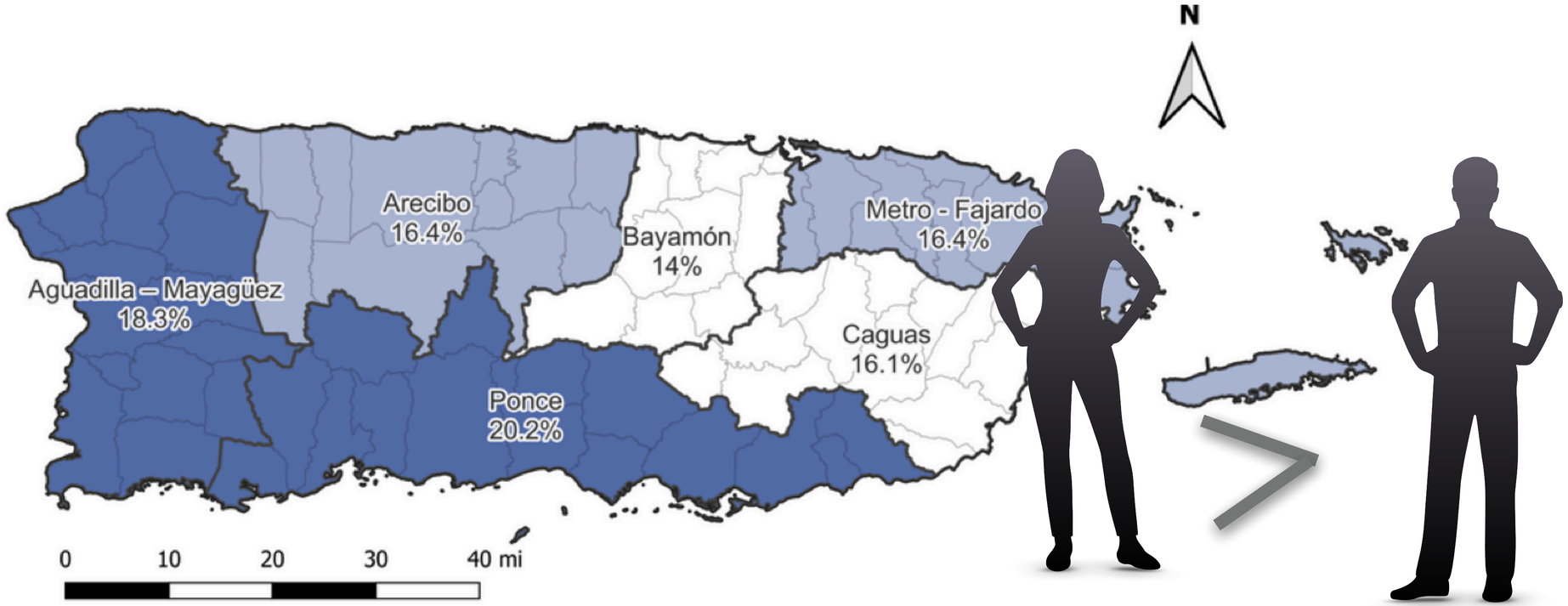


FIGURE 1. Unadjusted prevalence of diabetes among adults 20 years of age and older in Puerto Rico by county, 2021

- *Prevalence:*
  - *INCREASES with increasing age, with the group of 65 years or older being the MOST affected (35.0%).*
  - *Higher when annual ECONOMIC INCOME is less than $15,000, an EDUCATIONAL LEVEL less than or equal to higher school, widowed, and retired/disabled.*
  - *Higher in woman than man.*

**Informe de Enfermedades Crónicas de Puerto Rico Health Department 2023. URL: https://www.salud.pr.gov/CMS/DOWNLOAD/7815*

INTRODUCTION

- Decades of research have demonstrated that diabetes affects a disproportionately high number of racial and ethnic minorities and low-income adults in the U.S. and outcomes are NOT as expected with the advances in management.
- There is a high rate of mortality and morbidity.
- Health care shift toward greater emphasis on population health outcomes and value-based care, social determinants of health (SDOH) have risen to the forefront as essential intervention targets to achieve health equity.

Social Determinants of Health and Diabetes: A Scientific Review

Diabetes Care 2021;44:258–279 | https://doi.org/10.2337/dci20-0053

Felicia Hill-Briggs,[1,2] Nancy E. Adler,[3] Seth A. Berkowitz,[4] Marshall H. Chin,[5] Tiffany L. Gary-Webb,[6] Ana Navas-Acien,[7] Pamela L. Thornton,[8] and Debra Haire-Joshu[9]

INTRODUCTION

- In diabetes, understanding and mitigating the impact of SDOH are priorities due to:
  - Disease prevalence
  - Economic costs
  - Disproportionate population burden

Complex chronic condition that requires comprehensive care to manage effectively!

Pharmacist should be knowledgeable in terms of how to address SDOH for the prevention and management of diabetes.

HEALTH DISPARITIES, HEALTH EQUITY, AND SOCIAL DETERMINANTS OF HEALTH (SDOH)

POPULATION HEALTH

- Population health is defined as **"the health outcomes of a group of individuals, including the distribution of health outcomes within the group"**; these outcomes can be measured in terms of:

  ☑ **Health outcomes**

  - mortality, morbidity, health, and functional status

  ☑ **Disease burden**

  - incidence and prevalence

  ☑ **Behavioral and metabolic factors**

  - physical activity, nutrition, A1C, etc.

*Nuha A. ElSayed, Grazia Aleppo, Vanita R. Aroda, Raveendhara R. Bannuru, Florence M. Brown, Dennis Bruemmer, Billy S. Collins, Marisa E. Hilliard, Diana Isaacs, Eric L. Johnson, Scott Kahan, Kamlesh Khunti, Jose Leon, Sarah K. Lyons, Mary Lou Perry, Priya Prahalad, Richard E. Pratley, Jane Jeffrie Seley, Robert C. Stanton, Robert A. Gabbay; on behalf of the American Diabetes Association, 1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2023. Diabetes Care 1 January 2023; 46 (Supplement_1): S10–S18. https://doi.org/10.2337/dc23-S001

HEALTH DISPARITY

Definition: A particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage.

Preventable differences in the **burden of disease**, injury, violence, or opportunities to achieve optimal health that are experienced by socially disadvantaged populations. (CDC, 2023).

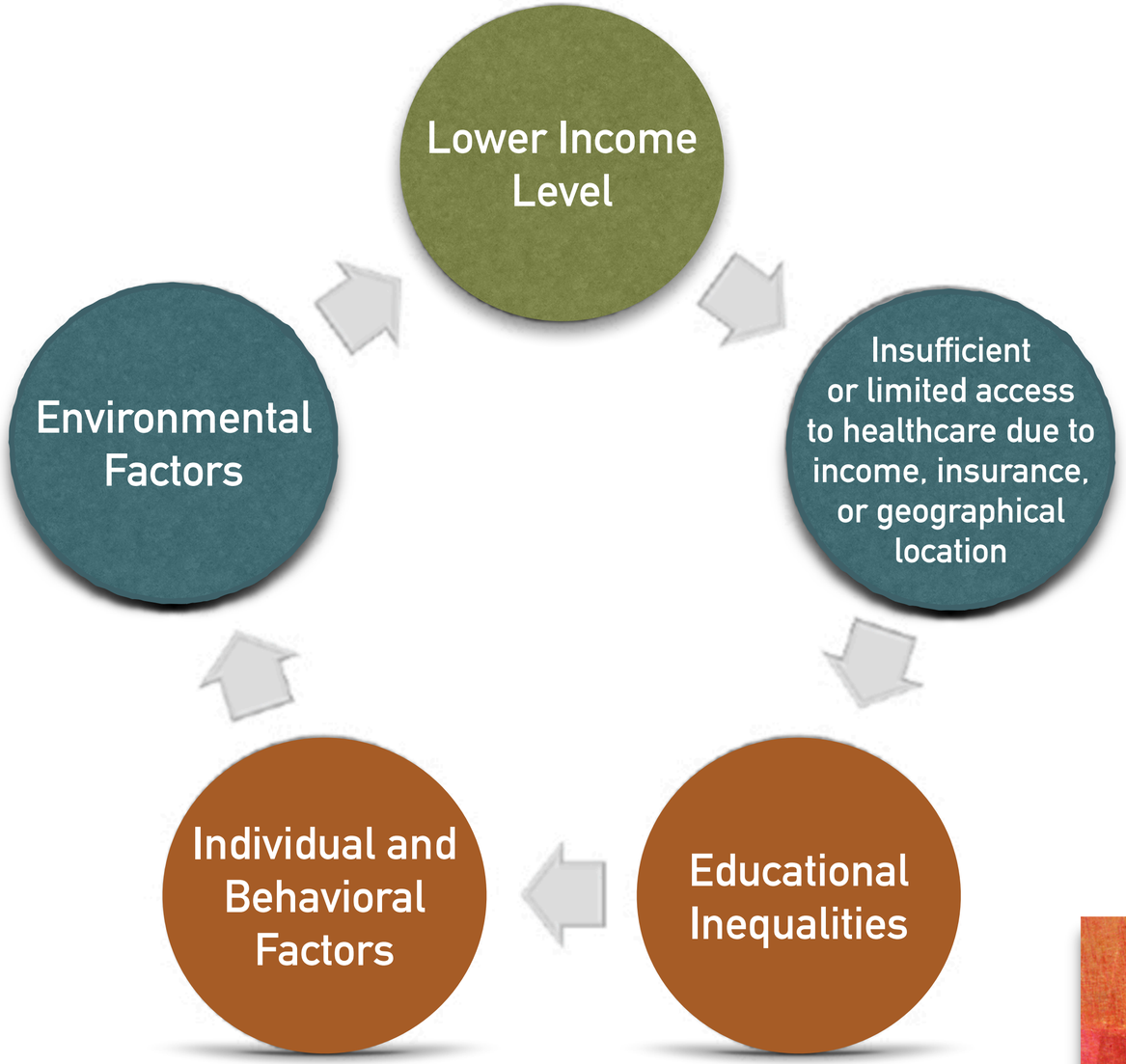
A health disparity is often **beyond an individual's control** and caused by health inequities.

HEALTH DISPARITY

- **Adversely affects** groups of people who have **systematically** experienced greater obstacles to health based on:
  - Racial or ethnic group
  - Religion
  - Socioeconomic status
  - Sex
  - Age
  - Mental health
  - Cognitive, sensory, or physical disability
  - Sexual orientation or gender identity
  - Geographic location
  - Other characteristics historically linked to discrimination or exclusion.

HEALTH DISPARITY

- Healthcare disparities can be classified as racial/ethnic, socioeconomic, and geographical (CDC, 2021).
- Manifest themselves as major differences in the rate of disease prevalence, incidence, morbidity, mortality, or survival of certain patient populations when compared with the health status of the majority population.



HEALTH INEQUITY

- Occur when health outcomes differ across groups due to **systematic, avoidable, and unjust** social and economic policies and practices that create barriers to opportunity.
- Significant social and economic impact on individuals and societies.
- Example: U.S. -> issue of race and diabetes management. Studies consistently show that racial inequities are causing health disparities in Black, American Indian, and Alaskan Natives, with the **rate of diabetes as high as 14.5% for American Indians compared to a rate of 7.4% for non-Hispanic whites.**

HEALTH DISPARITY VS HEALTH INEQUITY

- Disparity implies a **difference of some kind**, whereas inequity implies unfairness and injustice.

1. *Health equity is the absence of avoidable, unfair, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other means of stratification.* ***TRUE / FALSE***

1. *Health equity is the absence of avoidable, unfair, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other means of stratification.* ***TRUE*** */* ***FALSE***

HEALTH EQUITY

The Centers for Medicare & Medicaid Services (CMS) defines **health equity** as:
Absence of avoidable, unfair, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other means of stratification.

- "Health equity" or "equity in health" implies that ideally everyone should have a fair opportunity to attain their full health potential and that no one should be disadvantaged from achieving this potential

HEALTH EQUITY

- Attainment of the highest level of health for all people.
- Achieving HE **requires valuing everyone equally** with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities.

FROM HEALTH DISPARITY TO HEALTH EQUITY**

Health Disparities:

"…**preventable** differences in the burden of disease, injury, violence, or opportunities to achieve optimal health that are experienced by socially disadvantaged populations"[1]

Health Equity:

"When **every person has the opportunity to 'attain his or her full health potential'** and no one is 'disadvantaged from achieving this potential because of social position or other socially determined circumstances"[2]

SOCIAL DETERMINANTS OF HEALTH*

Definition: conditions in which people are born, grow, live, work, and age, and they can have a profound impact on an individual's health and well-being.

- Together, they account for 50% to 60% of health outcomes and are a key contributor to health and health care disparities (CDC, 2023).

*Felicia Hill-Briggs, Nancy E. Adler, Seth A. Berkowitz, Marshall H. Chin, Tiffany L. Gary-Webb, Ana Navas-Acien, Pamela L. Thornton, Debra Haire-Joshu; Social Determinants of Health and Diabetes: A Scientific Review. Diabetes Care 1 January 2021; 44 (1): 258–279. https://doi.org/10.2337/dci20-0053

WHAT CAN WE DO WITH HEALTH DISPARITY AND SODH?

The Healthy People 2030 and the CDC state that since establishing **health equity** is a top priority for their agency, they are undertaking **several measures to identify and address the SDOH**, which are defined as non-medical factors affecting clinical outcomes that can impact an individual's health and well-being, centered on where individuals are born, grow, live, work, and age.

DRIVERS OF DISPARITIES IN DIABETES CARE

- ***Affordability:*** having the economic means to pay for medications
- ***Awareness:*** understanding therapy options and the significance of adherence to the therapy plan
- ***Accessibility:*** being able to access routine healthcare and treatment easily
- ***Trust:*** having a degree of confidence and comfort with healthcare providers

Understanding health disparities in diabetes to improve health

November 17, 2020 | Diabetes

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SOCIAL DETERMINANTS OF HEALTH AND HOW THEY AFFECT PREVENTION AND MANAGEMENT OF DIABETES

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Education

LITERACY** skills are the **STRONGEST** predictors of **HEALTH STATUS

- **Stronger than ethnicity, income level, age and other SODH factors, literacy** dictates a **patient's ability to understand** important elements of health status, self-care/monitoring, and care plans so that they appropriately take care for themselves longitudinally.

- Limited education can lead to a **lack of health literacy**, making it **difficult** for individuals to understand diabetes management principles, medication instructions, and the importance of lifestyle modifications.

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Education

- Age-adjusted **incidence of diagnosed diabetes** in adults

  Highest — 10.4 per 1,000 persons — for adults with **less than a high school education vs.** 5.3 per 1,000 persons for those with more than a high school education.

- **Prevalence** in the adult U.S. population

  Highest (12.6%) for those with less than a high school education vs. 7.2% for those with more than a high school education.

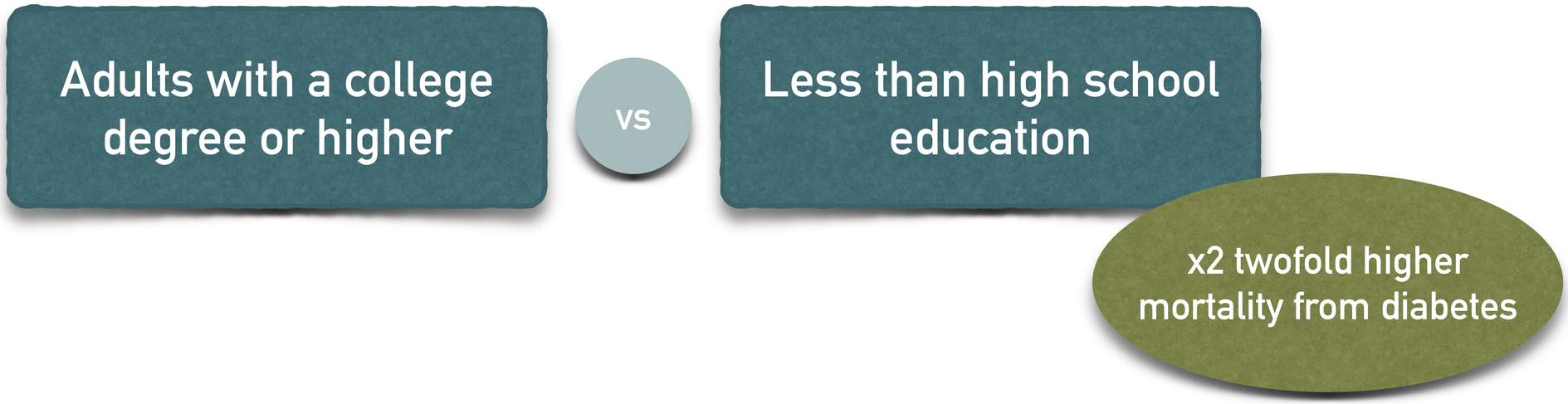
- Having a college education or more is associated with the lowest odds of diabetes.

*Felicia Hill-Briggs, Nancy E. Adler, Seth A. Berkowitz, Marshall H. Chin, Tiffany L. Gary-Webb, Ana Navas-Acien, Pamela L. Thornton, Debra Haire-Joshu; Social Determinants of Health and Diabetes: A Scientific Review. Diabetes Care 1 January 2021; 44 (1): 258–279. https://doi.org/10.2337/dci20-0053

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Education

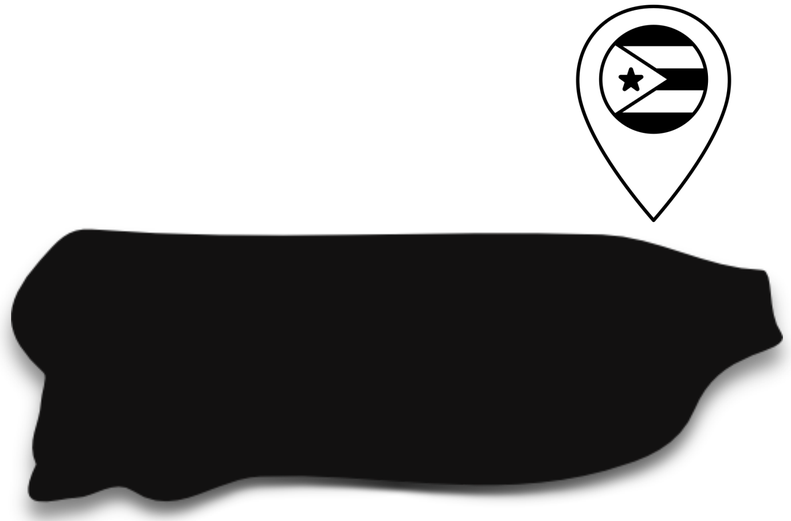
- **Risk of diabetes-related mortality** based on lowest to highest education level.



- In adults with T1DM, NOT having a college degree is associated with a **threefold higher mortality** from diabetes compared with counterparts with a college degree.
- Lower educational level is associated with higher HbA_{1c}, with a meta-analysis reporting a pooled mean difference in HbA_{1c} of 0.26% (95% CI, 0.09–0.43).

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Education



United States® Census Bureau

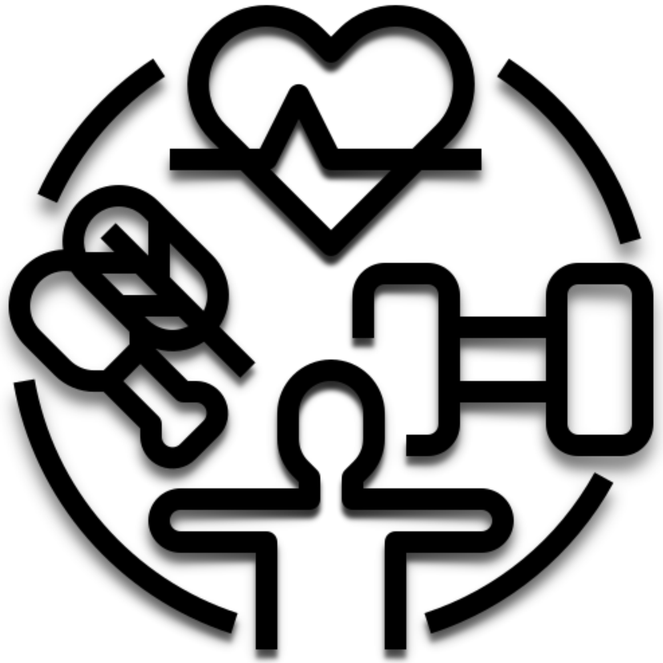
Education	
High school graduate or higher, percent of persons age 25 years+, 2017-2021	78.4%
Bachelor's degree or higher, percent of persons age 25 years+, 2017-2021	27.4%

**United States Census Bureau. (2021). https://www.census.gov/quickfacts/fact/table/PR/PST045222

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Socioeconomic Status

- People with lower socioeconomic status may face challenges in:
  1. Accessing healthcare
  2. Obtaining medications
  3. Adopting healthier lifestyle habits

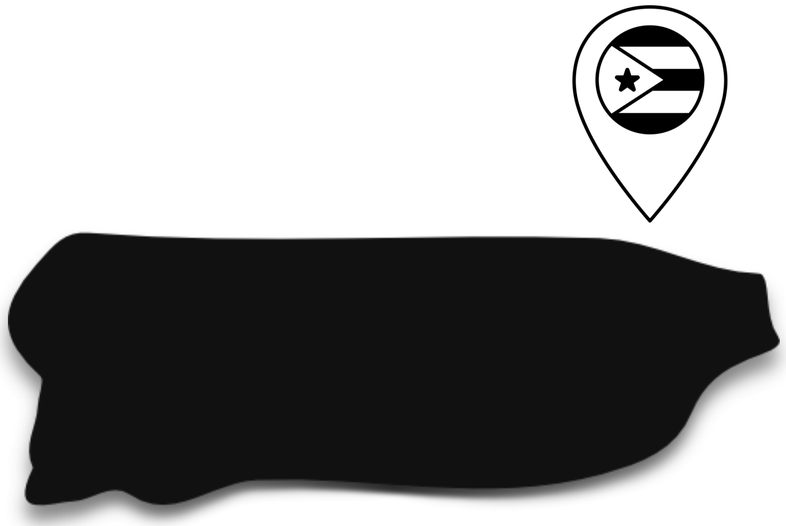


- Financial constraints can limit access to nutritious food, proper diabetes management tools, and education.

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Socioeconomic Status

- During 2021, in Puerto Rico the **prevalence** of diabetes increases with increasing age, with the group of 65 years or older being the most affected (35.0%).
- In turn, it is observed that the **prevalence** of the condition is higher in those with an **annual economic income of less than $15,000**, an educational level less than or equal to higher school, widowed, and retired/disabled.



United States® Census Bureau

Income & Poverty	
Median household income (in 2021 dollars), 2017-2021	$21,967
Per capita income in past 12 months (in 2021 dollars), 2017-2021	$14,047
Persons in poverty, percent	⚠ 40.5%

**United States Census Bureau. (2021). https://www.census.gov/quickfacts/fact/table/PR/PST045222

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Access to Healthcare

- Access to care as a social determinant of health can significantly impact diabetes management and prevention in several ways.

1. **Early detection and diagnosis:** access to healthcare facilities and regular check-ups enable individuals to get screened for diabetes at an early stage. Timely intervention and management, reduces the risk of complications associated with uncontrolled diabetes.

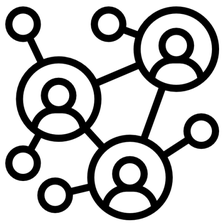
2. **Treatment and medication adherence:** ensures that patients receive appropriate treatment and medications. Regular medical visits help monitor BG levels, adjust treatment plans, and educate patients on proper self-management — better adherence to treatment and lifestyle changes.

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Access to Healthcare

- Access to care as a social determinant of health can significantly impact diabetes management and prevention in several ways.

3. **Diabetes education and self-management:** Patients with better access to care are more likely to receive comprehensive diabetes education, empowering them to make informed decisions about their health.



4. **Access to resources and support:** healthcare facilities often connect patients with resources and support groups that can help them cope with diabetes and maintain a healthier lifestyle. These resources may include dietitians, diabetes educators, mental health services, and support groups.

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Access to Healthcare

5. **Regular monitoring and follow-up:** ensure that treatment plans are adjusted as needed, promoting better glycemic control and overall health.

6. **Lifestyle interventions:** access to guidance on lifestyle modifications, such as diet and exercise, which are crucial in diabetes prevention. Access to care facilitates ongoing support and encouragement for patients to adopt and maintain healthy lifestyle practices.

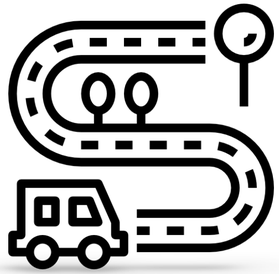
7. **Diabetes prevention programs:** increases the likelihood of individuals being aware of diabetes prevention programs and services available in the community. These programs can help individuals at high risk for diabetes make lifestyle changes to prevent or delay the onset of the condition.

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Access to Healthcare

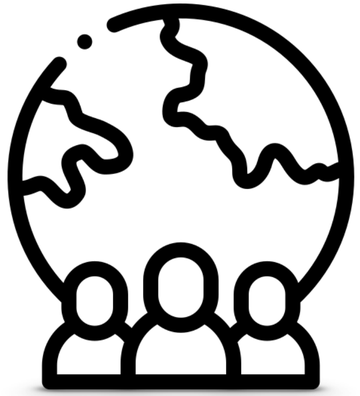
8. **Social and economic factors:** Access to care allows healthcare professionals to address social and economic factors that may hinder diabetes management. For example, they can help patients overcome barriers related to:

- ☑ Transportation
- ☑ Food insecurity
- ☑ Financial constraints that could impact their ability to follow recommended treatment plans.



SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Cultural and Social Factors



Influences a person's attitudes toward diabetes and its management. Some communities may stigmatize diabetes, leading to avoidance of medical care and social isolation.

Food Environment

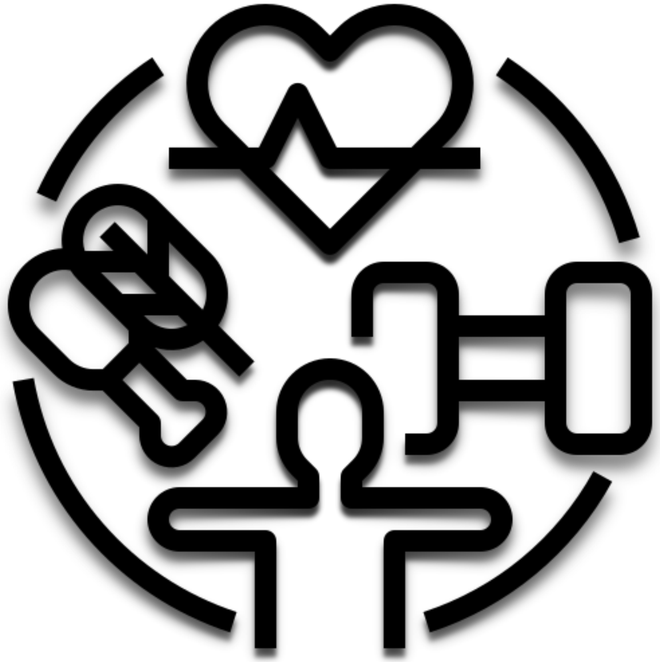
Physical, economic, and sociocultural factors that influence individuals' access to, availability of, and choices regarding food.

Limited access to affordable, fresh, and nutritious foods = higher consumption of unhealthy options (processed foods/sugary beverages). This can contribute to the development of type 2 diabetes and hinder effective diabetes management for those already diagnosed.

SOCIAL DETERMINANTS THAT AFFECT DIABETES CARE

Physical Environment

Safe neighborhoods, opportunities for physical activity, and access to recreational facilities can affect a person's ability to engage in regular exercise, which is crucial for diabetes management.



2. SDOH in diabetes include socioeconomic status, neighborhood and physical environment, food security and environment, health care and social context. It includes education, access to services and medications, social support, income, among others. **TRUE / FALSE**

2. SDOH in diabetes include socioeconomic status, neighborhood and physical environment, food security and environment, health care and social context. It includes education, access to services and medications, social support, income, among others.
TRUE / FALSE

HOW TO IDENTIFY AND ADDRESS SDOH IN COMMUNITY AND AMBULATORY CARE SCENARIO

PHARMACIST ROLE IN DIABETES CARE AND PREVENTION

- Pharmacists and pharmacy team play an essential role in the multidisciplinary management of diabetes and can help address the social determinants of health (SODH) that impact diabetes care.
- The American Diabetes Association (ADA) "Standards of Care in Diabetes" includes the ADA's current clinical practice recommendations and is intended to provide the components of diabetes care, general treatment goals and guidelines, and tools to evaluate and improve quality of care.

1. Improving Care and Promoting Health in Populations: *Standards of Care in Diabetes—2023*

Diabetes Care 2023;46(Suppl. 1):S10–S18 | https://doi.org/10.2337/dc23-S001

Nuha A. ElSayed, Grazia Aleppo, Vanita R. Aroda, Raveendhara R. Bannuru, Florence M. Brown, Dennis Bruemmer, Billy S. Collins, Marisa E. Hilliard, Diana Isaacs, Eric L. Johnson, Scott Kahan, Kamlesh Khunti, Jose Leon, Sarah K. Lyons, Mary Lou Perry, Priya Prahalad, Richard E. Pratley, Jane Jeffrie Seley, Robert C. Stanton, and Robert A. Gabbay, on behalf of the American Diabetes Association

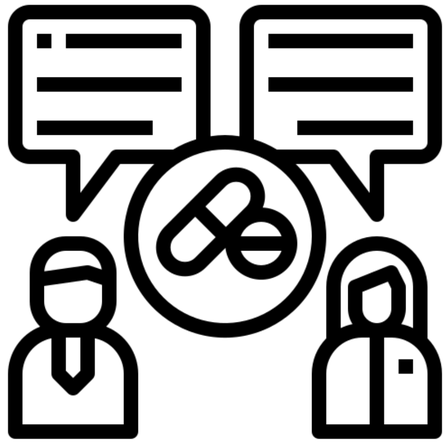
DIABETES AND POPULATION HEALTH ADA 2023 RECOMMENDATIONS

1.1 Ensure treatment decisions are timely, rely on evidence-based guidelines, include social community support, and are made collaboratively with patients based on individual preferences, prognoses, comorbidities, and informed financial considerations. B

1.2 Align approaches to diabetes management with the **Chronic Care Model.** This model emphasizes person-centered team care, integrated long-term treatment approaches to diabetes and comorbidities, and ongoing collaborative communication and goal setting between all team members. A

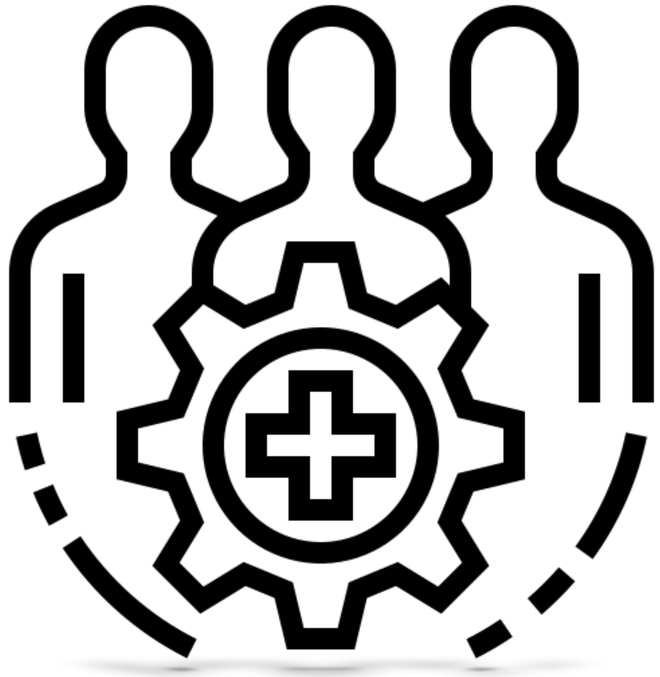
DIABETES AND POPULATION HEALTH ADA 2023 RECOMMENDATIONS

- Multidisciplinary teams **MUST** work together to support the needs of the person with diabetes.
- **Why Pharmacists?**
  - **Most accessible health care professionals.**
    - People with diabetes see a pharmacist **7 times more often** than they see a primary care physician. (CDC-DSMES, 2022).



WHY PHARMACISTS?

- Community pharmacies
- Clinics or provider practices
- Hospitals
- Managed care organizations
- Long-term care facilities
- Government entities such as US Department of Veterans Affairs medical centers and Federally Qualified Health Centers.



DIABETES AND POPULATION HEALTH ADA RECOMMENDATIONS

1.3 Care systems should **facilitate in-person and virtual team–based care**, including those knowledgeable and experienced in diabetes management as part of the team, and utilization of patient registries, decision support tools, and **community involvement to meet patient needs.** B

PHARMACIST KEY ROLES IN DIABETES CARE AND PREVENTION

1. Medication Management

Pharmacists can assist in:

- ☑ Optimizing medication regimens
- ☑ Ensuring proper dosing
- ☑ Identifying medication-related problems
- ☑ Addressing drug interactions, managing medications side effects and detecting/managing medication related problems (MRPs).

Full Length Research Paper

Chronic care model for diabetics by pharmacist home health in Bangkok Metropolitan: A community based study

Sirirat Tunpichart[1]*, Rungpetch Sakulbumrungsil[2], Ratana Somrongthong[1] and Duangtip Hongsamoot[3]

[1]College of Public Health Sciences, Chulalongkorn University, Thailand.
[2]Faculty of Pharmaceutical Sciences, Chulalongkorn University, Thailand.
[3]Nation Health Security Offices, Bangkok, Thailand.

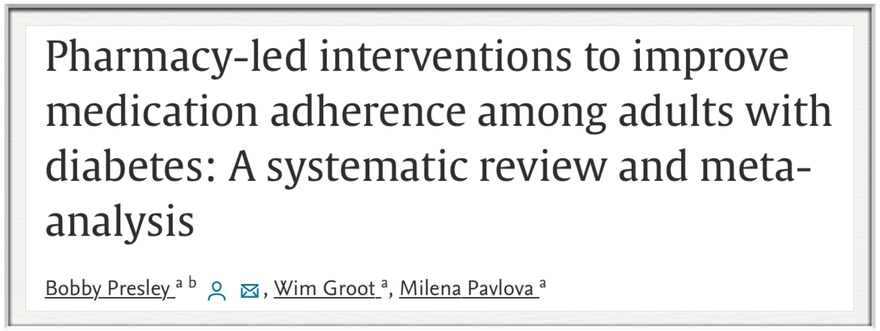
Accepted 2 April, 2012

Diabetes was increased in Thailand with increasing burden of morbidity and mortality. There were 42.8% of diabetes patients in Bangkok who had been treated, but the disease conditions were uncontrolled. Diabetes with drug related problems (DRPs) frequently occurred, leading to problems of uncontrolled disease conditions. The objective of this study was to apply chronic care model (CCM) which has been introduced using medication therapy management (MTM) services by community pharmacist home health care and monitor patients' drug utilization in diabetic patients at home. An action research was conducted in the community in Bangkok Metropolitan. The uncontrolled diabetes conditions were purposively selected and identified by nurse home care team. The community pharmacists provided the MTM service 3 times as the delivery service design template that was planned over the 6-month period. The study implemented on CCM with MTM services as the main delivery system. The outcomes were evaluated on three aspect of ECHO model. Data were gathered for 288 uncontrolled diabetic patients with high prevalence of drug related problems. The number of drug were taking mean standard deviation (SD) 7.1 (3.1) per patient at enrollment. The 2.98 number problems per patient and 95.8% non-adherence were identified by community pharmacist. After 3 interventions, non-adherent patients' state was changed to adherent medication level and partially medication adherent level by 18.2 and 26.0%, respectively. The pharmacists identified problems and improved in safety issues (adverse drug reactions, drug interactions), adherence issue and effectiveness issue (sub-therapeutic dosage). The clinical outcome found the average systolic and diastolic blood pressures to improve significantly in 48.6% patients with hypertension including those in pre-hypertension, stage I and stage II. The data was limited and results showed that the fasting plasma glucose (FPG) was not significantly reduced from baseline due to lack of linkage among hospital and community settings. The non-compliance issue had an effect on excessive medications per patient on the average of $543.24 per year. This study concluded that implementation MTM service through CCM by community pharmacist home health care could alleviate patients' medication utilization problems and would thus improve overall quality of patient care.

Key words: Chronic care model (CCM), drug related problems (DRPs), medication adherence, home health care, medication therapy management (MTM).

PATIENT EDUCATION AND ACCESS TO MEDICATIONS

2. Patient Education: Pharmacists can provide education on **diabetes management**, **medication adherence**, **blood glucose monitoring**, and **lifestyle modifications**. They can also improve health literacy by using language and visuals that are easy to understand.



Pharmacy-led interventions to improve medication adherence among adults with diabetes: A systematic review and meta-analysis

Bobby Presley [a b], Wim Groot [a], Milena Pavlova [a]

- Meta-Analysis
- Pharmacist-led interventions **enhanced outcomes in patients with diabetes** (standardized mean difference (SMD) −0.68; 95% CI -0.79, −0.58; p<0.001).
- Further analysis showed that **education, printed/ digital material, training/group discussion, were more effective than other interventions.**

ADCES

Impact Factor: **3.9** / 5-Year Impact Factor:

Restricted access | Research article | First published online December 4, 2009

Pharmacist-Led Group Medical Appointment Model in Type 2 Diabetes

Tracey H. Taveira, PharmD, Peter D. Friedmann, MD, MPH, [...], and Wen-Chih Wu, MD +4 View all authors and affiliations

Volume 36, Issue 1 | https://doi.org/10.1177/0145721709352383

- VA-MEDIC (Veterans Affairs Multi-disciplinary Education and Diabetes Intervention for Cardiac risk reduction)
- N= 118 participants
- 109 completed the study.
- After 4 months, a greater proportion of VA-MEDIC participants versus controls **achieved an A1C of less than 7%** and a **systolic blood pressure less than 130 mm Hg.**

ACCESS TO MEDICATIONS AND SCREENING/MONITORING

3. Access to Medications: Collaborate with healthcare providers to find cost-effective medication options and assist patients in accessing financial assistance programs or generic alternatives.

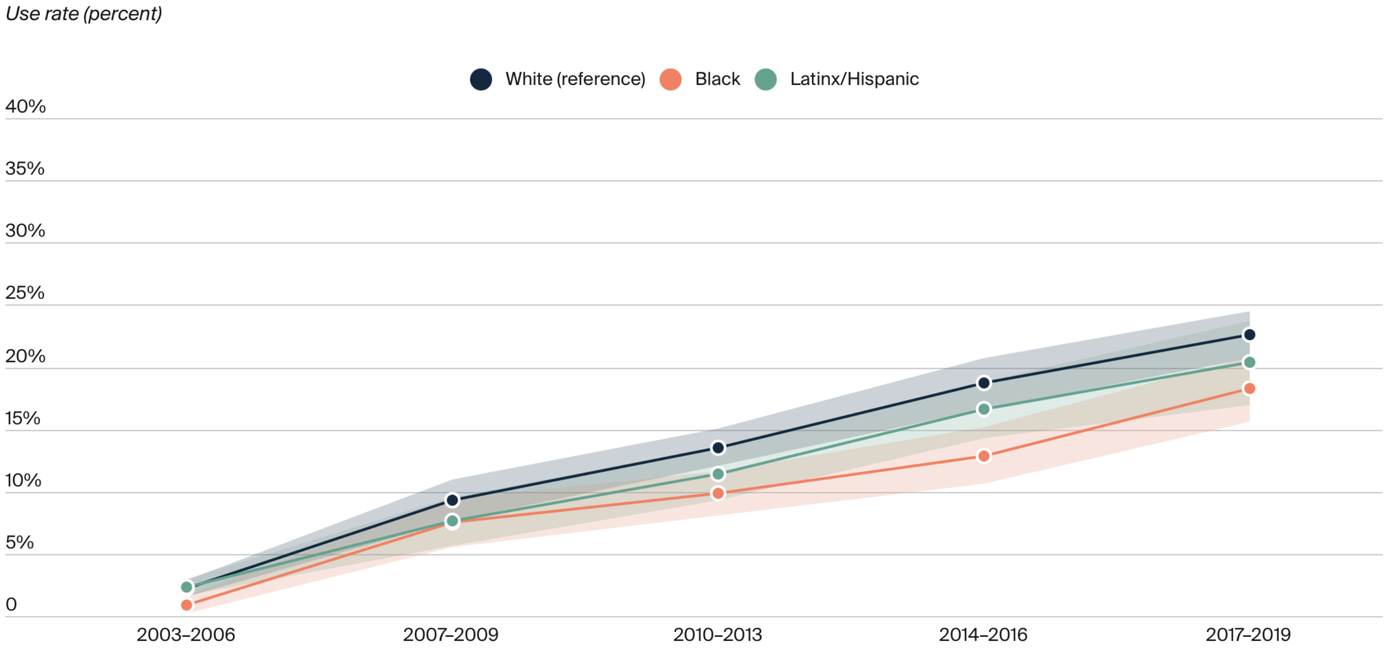
- Cost of diabetes medications is an **ongoing barrier** to achieving glycemic goals.
- Up to **25% of patients** who are prescribed insulin report cost-related insulin underuse. (Nuha, 2023)
- Cost also, influences prescribing patterns and medication use because of patient burden and lack of secondary payer support for effective approved glucose-lowering, cardiovascular disease risk-reducing, and weight management therapeutics.

ACCESS TO MEDICATIONS AND SCREENING/MONITORING

- **SGLT-2 / DPP-4**
- Indicated for millions of US individuals with heart disease, diabetes, or kidney dysfunction.
  - High retail price, at over $500 per month.
  - High costs may contribute to **physician inertia** to prescribe therapy, impede early initiation, and decrease patient adherence.

Use of New Diabetes Medications by Race and Ethnicity

OLS Adjusted Means with 95% CI



Notes: New diabetes medications are GLP-1 RA, DPP4-i, and SGLT2-i. OLS regression controls for year period, education level, poverty level, insurance coverage, sex, age, region, and chronic conditions, as well as interaction terms between year period and insurance coverage, poverty level, education level, race, and ethnicity. Estimates are weighted using the survey weights provided by the MEPS. CI = confidence interval; OLS = ordinary least squares. When hovering over data points, statistically significant estimates are marked with asterisks: *p<0.1, **p<0.05, ***p<0.01.

SCREENING/MONITORING

4. Screening and Monitoring: Pharmacists can offer diabetes screenings, monitor blood glucose levels, and provide recommendations for managing hypoglycemia or hyperglycemia.

AMERICAN JOURNAL OF PHARMACEUTICAL EDUCATION

Am J Pharm Educ. 2016 Oct 25; 80(8): 129. PMCID: PMC5116781
doi: 10.5688/ajpe808129 PMID: 27899825

The Role of Pharmacists and Pharmacy Education in Point-of-Care Testing

James P. Kehrer, PhD[a] and Deborah E. James, PhD[b]

Author information Article notes Copyright and License information PMC Disclaimer

Am J Pharm E

J Pharm Technol. 2015 Aug; 31(4): 143–148. PMCID: PMC5990194
Published online 2015 Mar 23. doi: 10.1177/8755122515579106 PMID: 34860949

Pharmacy Technicians and Point of Care Testing

Megan E. Keller, PharmD, BCACP,[1] Sarah E. Kelling, PharmD, MPH, BCACP,[2] and David R. Bright, PharmD, BCACP[3]

Author information Copyright and License information PMC Disclaimer

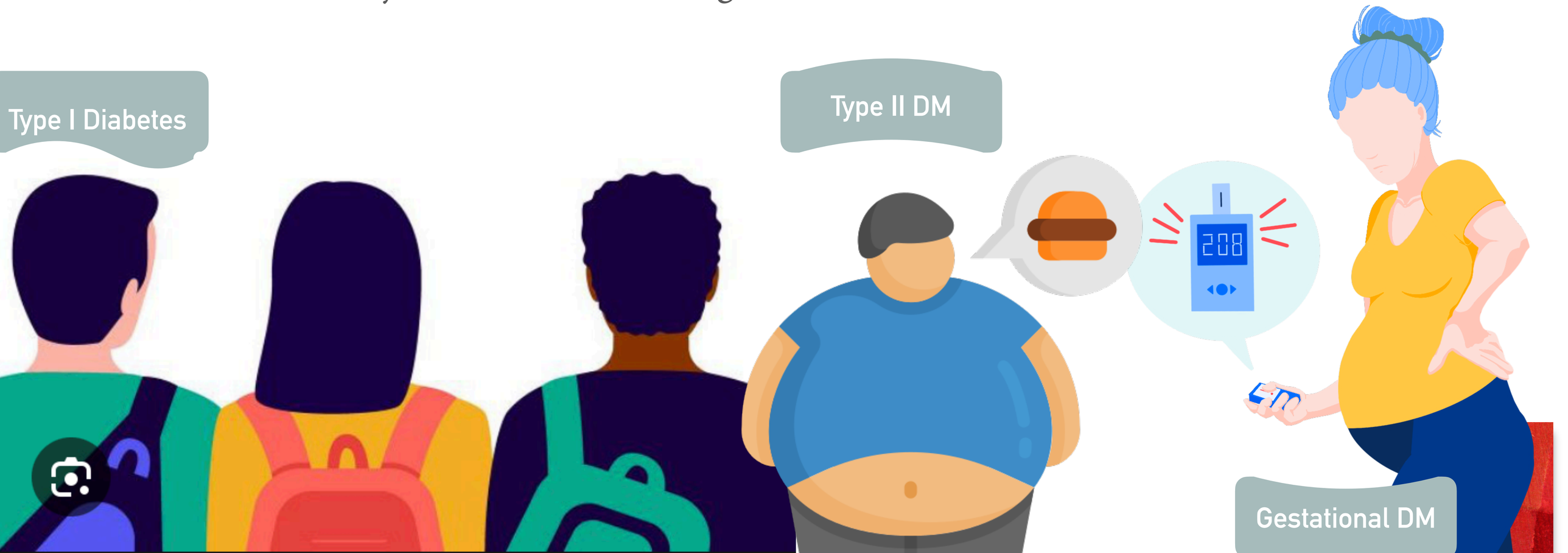
J Pharm Technol

"…POCT provides an excellent opportunity for pharmacists to adopt a greater role in patient care; one that builds upon their knowledge and expertise in drugs and drug therapy, and their access to patients." (Khehrer, 2016)

"Pharmacy technicians are well suited to participate in portions of the POCT process, and the involvement of pharmacy technicians may improve POCT efficiency." (Keller, 2015)

5. LIFESTYLE COUNSELING

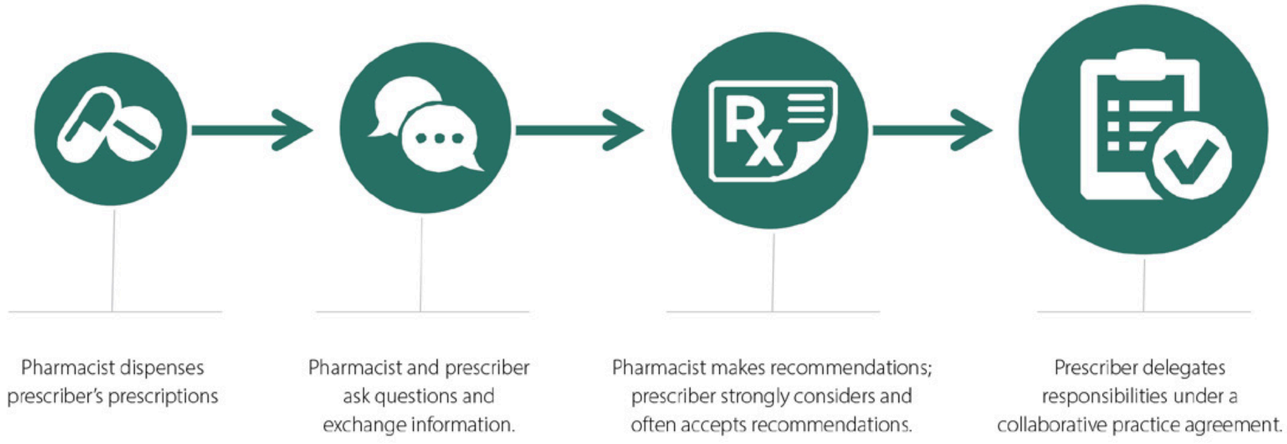
- Pharmacists can offer guidance on diet, exercise, smoking cessation, and weight management, which are critical components of diabetes care.
- Also, can identify individuals with higher SODH risk and look for resources.



6. COLLABORATIVE CARE

- Pharmacists can collaborate with other healthcare providers, such as physicians, nurses, dietitians, and social workers, to ensure comprehensive diabetes care and address social determinants that may affect a patient's health.

Figure 1: Level of Professional Interaction Reflects Degree of Trust Between the Pharmacist and the Prescriber



6. COLLABORATIVE CARE

- The care team, which **centers around the patient**, should **AVOID therapeutic inertia** and prioritize timely and appropriate intensification of behavior change (nutrition and physical activity) and/or pharmacologic therapy for patients who have not achieved the recommended metabolic targets.

Therapeutic Inertia

"lack of timely adjustment to therapy when a patient's treatment goals are not met."

3. Pharmacist can actively address health disparities educating patients and referring them to appropriate community and health care services.

TRUE / FALSE

3. Pharmacist can actively address health disparities educating patients and referring them to appropriate community and health care services.

TRUE / **FALSE**

TOOLS AND RESOURCES AVAILABLE TO ADDRESS SOCIAL DETERMINANTS

TOOLS AND RESOURCES AVAILABLE TO ADDRESS SOCIAL DETERMINANTS

SCAN ME

Tools and resources

Screening and Assessment Tools

- Pre-diabetes Risk Test
- Diabetes Self-Management Questionnaires
- Diabetes Medication Adherence Questionnaires
- Diabetes Quality of Life Questionnaires

Referral Networks

- Community organizations such as:
  - ✓ Food Banks
  - ✓ Housing Assistance Programs
  - ✓ Mental Health support
  - ✓ Social Support Groups

Diabetes Education Materials

- Educational materials
- Community's cultural and linguistic needs
- Materials should be accessible and easy to understand

Patient Counseling and Support

- One-on-one counseling sessions
- Help patients understand the impact of social determinants on their diabetes management and provide support.

Collaboration with Healthcare Providers

- Work closely with physicians and other healthcare providers to ensure a holistic approach to diabetes management.

Technology and Telehealth Solutions

Tele-health

EHR

InnovaMD

TOOLS AND RESOURCES AVAILABLE TO ADDRESS SOCIAL DETERMINANTS

Tools and resources

Pharmacy-Led Health Screenings

- Health screenings for diabetes-related complications
- Offer health promotion events within the community to raise awareness.

Discount Programs

- Help patient finding coupons to ensure they are able to afford medications

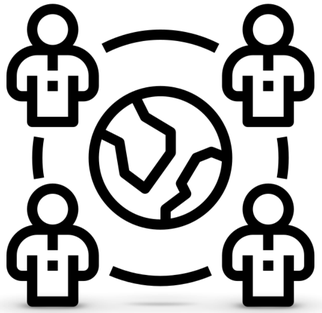
Community Outreach Events

- Free diabetes screenings
- Educational workshops
- Immunization (extramural)

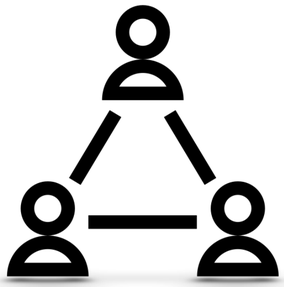
Social Media and Online Platforms

- Educational content
- Resources,
- Community events related to diabetes management.

Cultural Competency Training



Collaboration with Nonprofits and Advocacy Groups



TOOLS AND RESOURCES AVAILABLE TO ADDRESS SOCIAL DETERMINANTS

- Each community may have different needs, so it's essential to assess and tailor your approach accordingly.
- By addressing social determinants of health and connecting patients with the appropriate resources, you can make a significant impact on diabetes management outcomes in your community pharmacy.

☑ *Programa para la Prevención y el Control de la Diabetes*

- *https://www.salud.pr.gov/CMS/430*

GOBIERNO DE PUERTO RICO
centro de diabetes
PARA PUERTO RICO

- *https://www.diabetes.pr.gov*

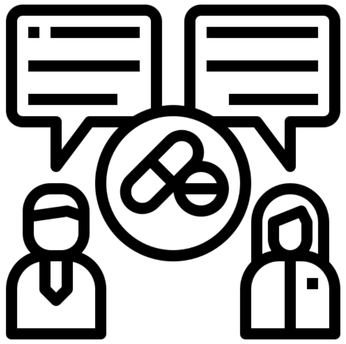
4. Pharmacists can play a major role in assisting patients in identifying affordable sources of medication but there are few resources are available to help expand access to care. TRUE / FALSE

4. Pharmacists can play a major role in assisting patients in identifying affordable sources of medication but there are few resources are available to help expand access to care. **TRUE / FALSE**

INNOVATIVE STRATEGIES ADDRESSING SDOH IN DIABETES PREVENTION AND MANAGEMENT

INNOVATIVE STRATEGIES TO ADRESS SODH

Addressing social determinants of health (SDOH) in diabetes prevention and management is crucial for improving health outcomes, especially in community pharmacy and ambulatory care settings.



Pharmacists play a vital role in patient care, and their involvement in **implementing innovative strategies** can have a significant impact on diabetes prevention and management.

Innovative strategies that pharmacists can adopt:

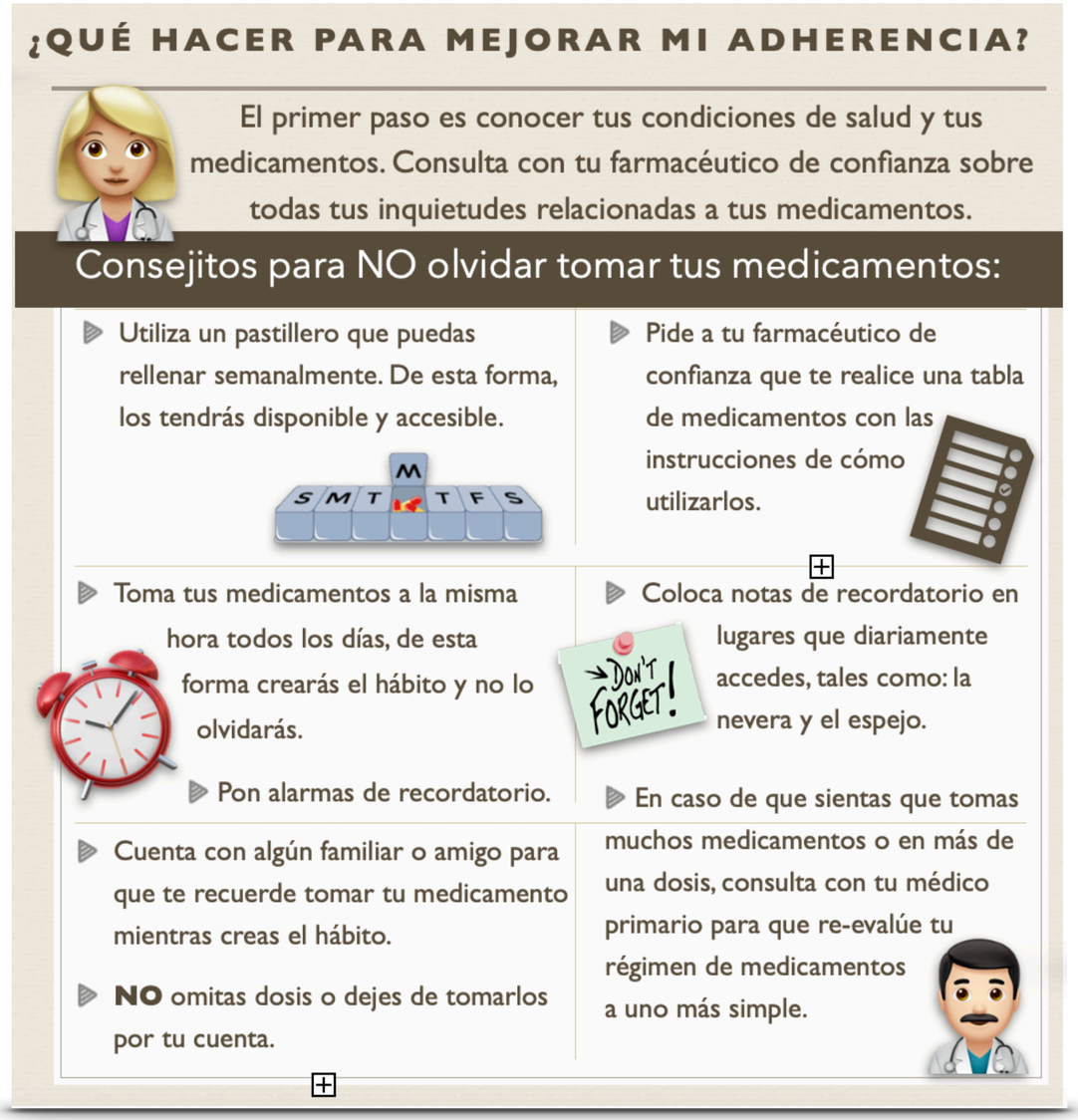
- ☑ *Patient Education and Empowerment*
- ☑ *Screening and Risk Assessment*
- ☑ *Social Prescribing*
- ☑ *Technology Integration*
- ☑ *Medication Adherence Programs*
- ☑ *Collaborative Care Teams*
- ☑ *Culturally Competent Care*

INNOVATIVE STRATEGIES TO ADRESS SODH

☑ *Patient Education and Empowerment*

Pharmacy Team can:

- Provide diabetes education to patients, taking into account their unique social circumstances (cultural background, language barriers, and financial constraints).
- Empowering patients with knowledge and self-management skills can lead to better adherence and outcomes.



INNOVATIVE STRATEGIES TO ADRESS SODH

☑ *Screening and Risk Assessment*

- Diabetes prevention programs delay or prevent the onset of type 2 diabetes in people with pre-diabetes.
- Implementing systematic screening in community pharmacies and ambulatory care scenarios will help identifying patients at higher risk of developing diabetes or facing challenges in its management.
- This early identification can enable targeted interventions.

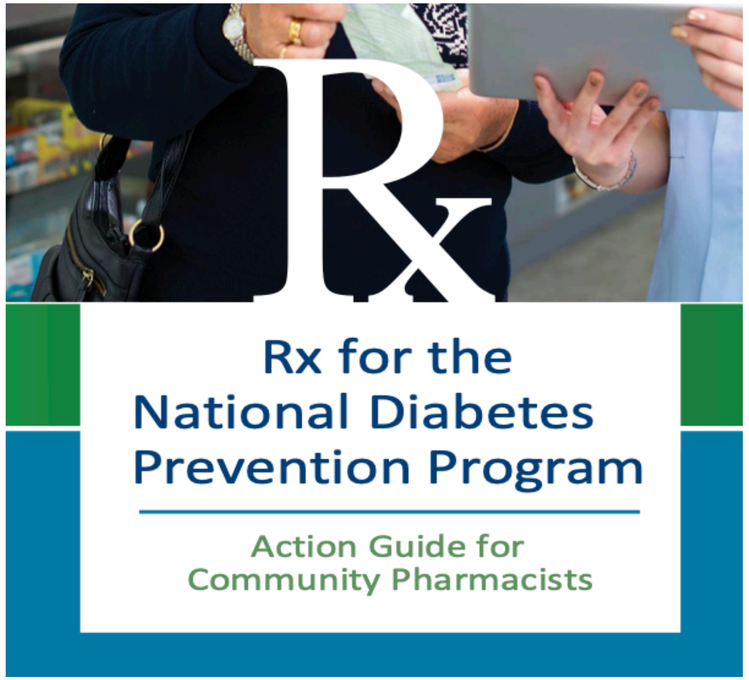
RESEARCH ARTICLE

The community pharmacy setting for diabetes prevention: Views and perceptions of stakeholders

Thando Katangwe[1,2]*, Hannah Family[3], Jeremy Sokhi[1], Hiyam Al-Jabr[1], Charlotte L. Kirkdale[2], Michael J. Twigg[1]

1 School of Pharmacy, University of East Anglia, Norwich, United Kingdom, **2** Boots UK, Nottingham, United Kingdom, **3** Medical School, University of Bristol, Bristol, United Kingdom

* T.Katangwe@uea.ac.uk



https://www.cdc.gov/diabetes/prevention/pdf/pharmacists-guide.pdf

INNOVATIVE STRATEGIES TO ADRESS SODH

☑ *Social Prescribing:*

"a way of linking patients in primary care with sources of support within the community to help improve their health and well-being".

— *Oxford University, 2021*

- Pharmacy team- easily accessible
- Knowledge and interpersonal skills
- Strong relationship with patients,

- Pharmacy Team can collaborate with community organizations, social workers, and local resources to "prescribe" non-medical interventions that address SDOH factors.

- These could include referrals to:
  - Social services
  - Community support groups
  - Financial assistance programs
  - Food security initiatives

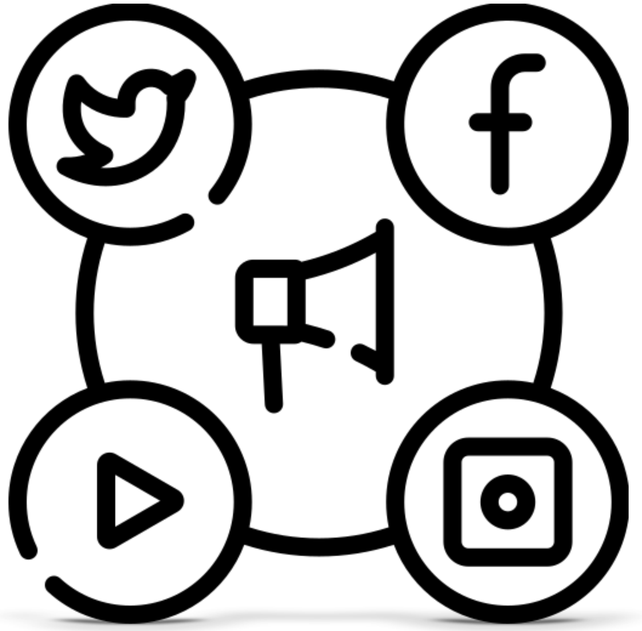
OXFORD SOCIAL PRESCRIBING RESEARCH NETWORK

https://socialprescribing.phc.ox.ac.uk/news-views/views/what-is-the-potential-role-of-community-pharmacists-in-social-prescribing

INNOVATIVE STRATEGIES TO ADRESS SODH

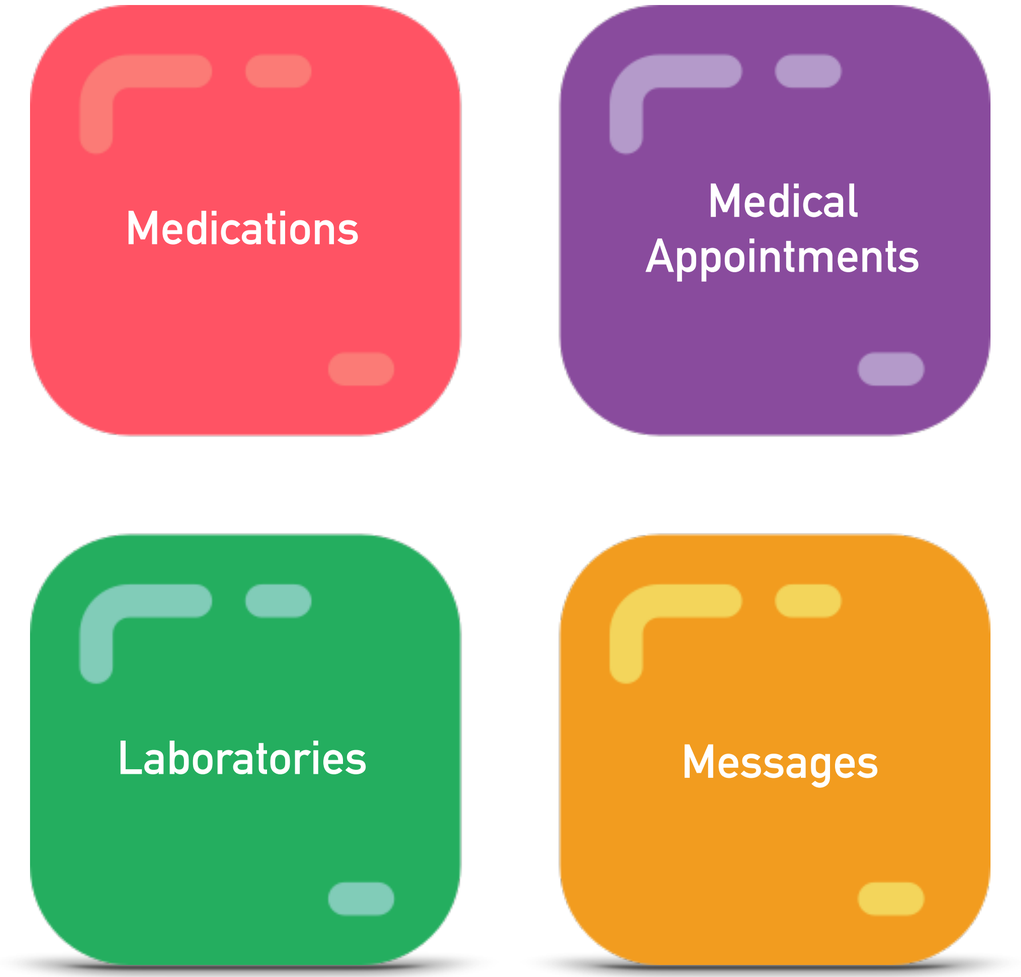
☑ *Technology Integration:*

- Leveraging technology can enhance communication and engagement with patients.
- Pharmacists can use **mobile apps, tele-health services, or online platforms to provide virtual consultations, medication reminders,** and support for diabetes management, making it more accessible to patients in different social circumstances.



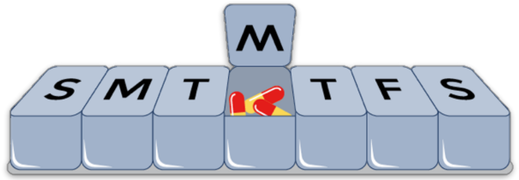
INNOVATIVE STRATEGIES TO ADRESS SODH

- **Telehealth and Digital Health Solutions:**
  - Utilize tele-health and digital health technologies to reach individuals who may have limited access to healthcare facilities.
  - Virtual consultations, remote monitoring of blood glucose levels, and mobile health applications can enhance diabetes management and provide support to patients in underserved areas.



INNOVATIVE STRATEGIES TO ADRESS SODH

☑ *Medication Adherence Programs/Culturally Competent Care*



- Developing personalized medication adherence programs can be beneficial for patients with limited access to healthcare. This might involve:
  - Dose synchronization
  - Blister packaging
  - Reminder services

- Understand/respect diverse cultural norms and beliefs.
- Cultural competency - provide personalized care that aligns with patients' cultural values.

INNOVATIVE STRATEGIES TO ADRESS SODH

☑ *Medication Adherence Programs/Culturally Competent Care*

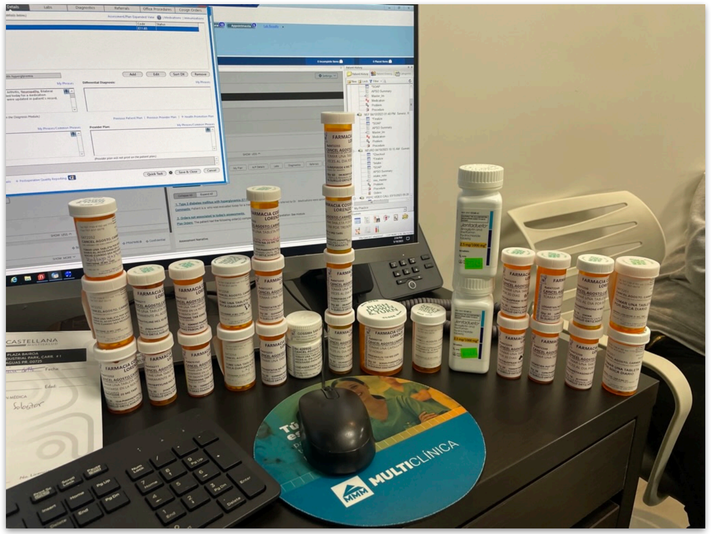
MI Terapia de Medicamentos

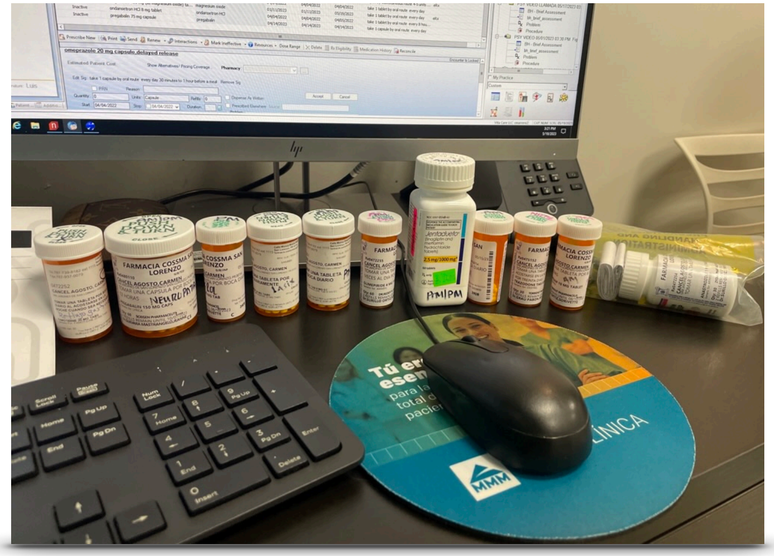
Nombre: Ejemplo Alergias: NKDA

Nombre de Medicamento	Dosis	Administrado	¿Cuándo lo tomo?					¿Para qué lo tomo?
			Ayuna	Desayuno	Almuerzo	Cena	Al acostarme	
Omeprazole	20 mg	1 cápsula 30 minutos antes del desayuno	X					Acidez
Irbesartan	300 mg	1 tableta en la mañana		X				Presión Alta
Chlorthalidone	25 mg	1 tableta en la mañana		X				Presión Alta
Xigduo XR	10/1000 mg	1 tableta en la mañana		X				Diabetes
Sertraline	25 mg	1 tableta en la mañana		X				Depresión
Bupropion ER	300 mg	1 tableta en la mañana		X				Depresión
Gabapentin	800 mg	1 tableta en la tarde				X		Neuropatía** Si es necesario**
Simvastatin	40 mg	1 tableta en la tarde				X		Colesterol
Amlodipine	5 mg	1 tableta en la tarde				X		Presión Alta

Preparada Por: Dr Cathyria Marrero Serra, PharmD, BCPS Actualizada en: 01/18/2023

30 Bottles





11 Bottles

INNOVATIVE STRATEGIES TO ADRESS SODH

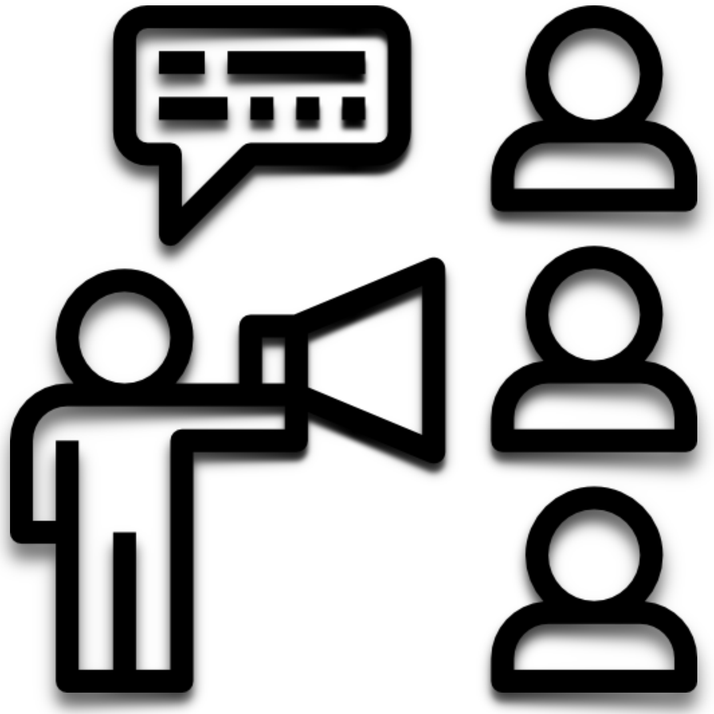
☑ **Community-Based Diabetes Programs:**

- Develop community-centered programs that focus on diabetes prevention and management, taking into account the unique needs and challenges faced by specific populations.
- These programs can include **health education**, **lifestyle interventions**, and **access to resources** such as **healthy food** options and **physical activity opportunities.**
- Community health screenings in collaboration with local organizations can increase diabetes awareness and early detection of the condition. These screenings can be combined with SDOH assessments to identify the specific needs of the community.
- Group education sessions and workshops.

INNOVATIVE STRATEGIES TO ADRESS SODH

☑ Advocacy and Policy Change

- Pharmacists can advocate for policies that address SDOH and support diabetes prevention and management. This may include advocating for increased access to affordable healthcare, nutritious food options, and safe living environments.
- Advocate for policy changes at local, regional, and national levels to address systemic issues that contribute to social determinants of health. This may include policies related to healthcare access, food security, affordable housing, education, and social safety nets.



5. Innovative practice strategies for addressing social determinants of health in diabetes may include the use of telehealth and tele-pharmacy. **TRUE** / FALSE

5. Innovative practice strategies for addressing social determinants of health in diabetes may include the use of telehealth and tele-pharmacy. **TRUE** / FALSE

PHARMACY TEAM ROLE

- **Pharmacists** should know the **impact on outcomes of the SDOH** and how to minimize the negative impact of these.
- Should know how to use the available resources to help patients have access to optimal therapy, and increase adherence to medications.
- Pharmacists and pharmacy technicians can use tools to assist in systematically addressing SODH to enhance the delivery of patient care.
- Can address SDOH and help prevent diabetes and improve its management.
- Play a major role in assisting patients in identifying affordable sources of medication, thus expanding access to care.
- Pharmacy technicians can help pharmacists support patients addressing SDOH.

PHARMACY TEAM ROLE**

- Medication Management:
  - ☑ Review and adjust medication regimens to achieve and maintain optimal blood glucose levels.
  - ☑ Address medication-related concerns (ADEs, DDRs, and adherence issues).
  - ☑ Collaborate with healthcare providers (doses adjustments/consolidation).
- Patient Education:
  - ☑ Provide information on blood glucose monitoring, insulin administration, and use of diabetes-related devices.
  - ☑ Educate patients about the importance of medication adherence and proper timing.
  - ☑ Offer guidance on self-care practices, including foot care, skin care, and recognizing and managing hypoglycemia.

American Pharmacists Association (APhA). "Pharmacists' Patient Care Process." APhA, 2016.

Powers MA, et al. "Role of the pharmacist in diabetes care." American Journal of Health-System Pharmacy, 2018; 75(18): 1371-1379.

PHARMACY TEAM ROLE**

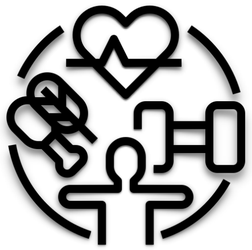
- Blood Glucose Monitoring:
  - ☑ Educate patients on proper blood glucose monitoring techniques.
  - ☑ Interpret blood glucose readings and discuss trends with patients.
  - ☑ Help patients understand how their diet, physical activity, and medications affect their blood glucose levels.
- Prevention Strategies
  - ☑ Immunization
  - ☑ Identify patients at risk for developing diabetes
  - ☑ Counseling on lifestyle modifications.

American Pharmacists Association (APhA). "Pharmacists' Patient Care Process." APhA, 2016.

Powers MA, et al. "Role of the pharmacist in diabetes care." American Journal of Health-System Pharmacy, 2018; 75(18): 1371-1379.

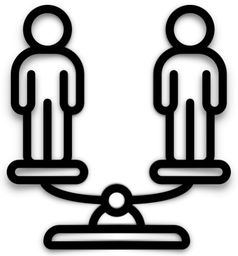
TAKE-AWAY POINTS

- In **Puerto Rico**, diabetes **prevalence is higher in women than in men**, increases with age, and increases as the level of annual income and educational level decrease.



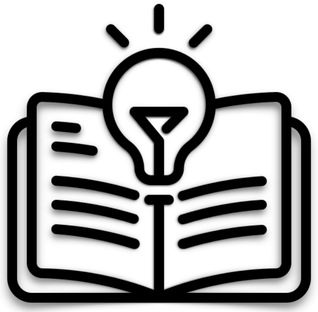
- Addressing **social determinants of health (SDOH)** in diabetes prevention and management is **crucial** for improving health outcomes, especially in community pharmacy and ambulatory care settings.

- By addressing social determinants of health and actively **involving pharmacists in diabetes care, healthcare systems can enhance patient outcomes** and reduce the burden of diabetes on individuals and communities.



- Addressing healthy equity needs an understanding of social and environmental factors that combined account for 50% to 60% of health outcomes.

TAKE-AWAY POINTS



- Understanding and mitigating the impact of SDOH are priorities due to DM disease prevalence, economic costs, and disproportionate population burden.
- **LITERACY skills are the STRONGEST predictors of HEALTH STATUS.**

- Access to care is a critical factor in DM prevention and management.
- Pharmacy team is more accesible than PCPs.

- Pharmacists play a vital role in patient care, and their involvement in **implementing innovative strategies** can have a significant impact on diabetes prevention and management.
- Pharmacy should advocate for policy changes.

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QUESTIONS

- ☑ Health equity is the absence of avoidable, unfair, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other means of stratification. **TRUE** FALSE
- ☑ SDOH in diabetes include socioeconomic status, neighborhood and physical environment, food security and environment, health care and social context. It includes education, access to services and medications, social support, income, among others. **TRUE** FALSE
- ☑ Pharmacist can actively address health disparities educating patients and referring them to appropriate community and health care services. **TRUE** FALSE
- ☑ Pharmacists can play a major role in assisting patients in identifying affordable sources of medication but there are few resources are available to help expand access to care. TRUE **FALSE**
- ☑ Innovative practice strategies for addressing social determinants of health in diabetes may include the use of telehealth and tele-pharmacy. **TRUE** FALSE

THANK YOU FOR YOUR ATTENTION

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