MAXIMIZING PREVENTION THROUGH INFORMATICS: IN DIABETES MANAGEMENT

Names of Individual or Group Members

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Abstract:

Health information technology (IT) plays a crucial role in healthcare strategies, particularly with the support of the federal government's initiatives like the HITECH Act of 2009. This legislation aims to promote the swift adoption of health IT, including electronic health records (EHRs), through programs like the canters for Medicare and Medicaid Services (CMS) EHR Incentive Program. By leveraging health IT, there is potential for enhancing diabetes prevention efforts and overall quality of care.

Our project delves into the role of information technology (IT) in improving the management of type 2 diabetes (T2D), a condition affecting approximately 1 in 11 adults worldwide. Through IT interventions like mobile apps and internet-based platforms, glycemic control in T2D patients can be enhanced, crucial for preventing complications such as cardiovascular disease. Despite the potential benefits, barriers like privacy concerns and funding limitations exist. Effective training and integration into routine care processes are essential for successful implementation of IT in diabetes management. Information technology (IT) has been utilized to offer assistance to patients, bring about changes in healthcare delivery, and grant clinicians' access to expertise and timely, valuable data regarding both individual patients and entire populations. Its adoption has been linked to notable enhancements in various aspects of diabetes care, such as better management of HbA1c levels, blood pressure, and lipids, as well as increased frequency of eye and foot examinations. By summarizing the latest research findings, our project highlights the effectiveness of health information technologies (HITs) in reducing HbA1c levels and managing T2D complications. It also identifies current research limitations and suggests future directions for leveraging HITs to improve diabetes care outcomes.

Introduction:

- Diabetes is a rapidly growing chronic condition globally, affecting about 1 in 11 adults worldwide, with 90% having type 2 diabetes (T2D).
- Successful glycemic control is crucial in preventing and reducing complications of T2D, such as cardiovascular disease, kidney disease, blindness, neuropathy, and limb amputation, as well as reducing related mortality.
- However, maintaining optimal glycemic control requires continuous monitoring and treatment, which can be costly and challenging.
- To enhance diabetes management, innovative self-care strategies are needed.
- Advances in health information technologies (HITs) have introduced approaches supporting effective and affordable healthcare delivery and patient education.
- "Digital health" refers to the integration of healthcare and technology, specifically utilizing connected devices, software, and apps to gather and utilize data, along with new care models to

improve chronic disease outcomes.

- The digital health field has experienced significant growth, with financing surpassing $4.5 billion in 2015, doubling from $1.8 billion in 2013. Projections for 2017 estimated funding to exceed $6 billion.
- In 2015, five digital health companies went public, with a total valuation exceeding $11 billion.
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Target population:

1. Individuals diagnosed with type 2 diabetes (T2D).
2. People at risk of developing type 2 diabetes, including prediabetic individuals.
3. Healthcare providers involved in the care and management of diabetes patients, including physicians, nurses, dietitians, and pharmacists.
4. Caregivers and family members of individuals living with diabetes who are involved in their day-to-day management and support.
5. Public health organizations and policymakers involved in diabetes prevention and management strategies.
6. Insurance providers and healthcare payers seeking to improve outcomes and reduce costs associated with diabetes care.
7. Researchers and developers working on the advancement of digital health technologies for diabetes management.

Informatics tools for diabetes management

1. Mobile Applications: Smartphone apps designed for diabetes management, offering features such as glucose monitoring, meal tracking, medication reminders, and educational resources.

2. Wearable Devices: Devices such as smartwatches and fitness trackers equipped with health monitoring features, including activity tracking, heart rate monitoring, and sleep tracking. Wearable devices provide valuable insights into patients' overall health and lifestyle habits, which can inform diabetes management strategies.

3. Electronic Health Records (EHRs): Integrated systems that store patient health information, including medical history, laboratory results, medication records, and treatment plans. EHRs streamline communication among healthcare providers and ensure comprehensive and coordinated care for diabetes patients.

4. Telemedicine Platforms: Virtual healthcare platforms that enable remote consultations between patients and healthcare providers. Telemedicine facilitates regular check-ins, medication adjustments, and educational sessions, enhancing access to care, especially for patients in rural or underserved areas.

5. Data Analytics and Predictive Modeling: Advanced analytics tools that analyze large volumes of healthcare data to identify trends, predict patient outcomes, and optimize treatment protocols. Data analytics and predictive modeling help healthcare providers personalize diabetes care plans and intervene proactively to prevent complications.

6. Remote Patient Monitoring (RPM) Systems: Remote monitoring systems that track vital signs, medication adherence, and glucose levels in real-time, allowing healthcare providers to remotely monitor patients' health status and intervene promptly when necessary.

These informatics tools collectively empower patients with diabetes to actively participate in their care, enable healthcare providers to deliver personalized and timely interventions, and contribute to improved health outcomes for individuals living with diabetes.

Informatics tools aid in diabetes prevention by:

1. Enabling early detection through predictive modeling.
2. Personalizing interventions for lifestyle modifications.
3. Allowing remote monitoring of health parameters.
4. Providing access to health education and self-management tools.
5. Facilitating care coordination among healthcare providers.

By leveraging these tools, preventive measures can be optimized, reducing the risk and burden of diabetes.

1. mobile applications and Personalizing interventions for lifestyle modifications.

Mobile health (mHealth) utilizes mobile technology to promote healthcare and encourage healthy lifestyle choices. This systematic review assesses the effectiveness of text messaging interventions on HbA1c levels in patients with Type 2 diabetes mellitus (T2DM). Eleven randomized controlled trials involving 1710 participants were included. Studies primarily focused on educational and motivational messages. Meta-analysis of nine studies showed a significant reduction in HbA1c levels by 0.38%. Lifestyle-focused text messaging proves to be a cost-effective strategy for motivating T2DM patients to adhere to healthy habits. Additionally, personalized interventions through health information technology, such as mobile apps for dietary tracking and physical activity monitoring, have shown promising results in achieving reductions in diabetic management.

https://pubmed.ncbi.nlm.nih.gov/30822496/

2. wearable devices (continues glucose monitoring:)

- Continuous glucose monitoring (CGM) systems offer real-time and predictive glycemic data beyond traditional blood glucose monitoring (BGM).
- CGM data can detect trends, identify asymptomatic events, and review glycemic variability over time.
- Increased frequency of glucose monitoring with CGM is associated with decreased hypoglycemia and increased time in range (TIR), leading to improved A1C.
- CGM data analysis can highlight areas needing treatment intervention, such as preventing hypoglycemia and improving glycemic control at specific times of day.
- CGM is beneficial for patients with inconsistent or confounding glycemic control, those seeking engagement in their own disease management, or those at risk of hypoglycemia due to their treatment plan.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7755046/

Healthcare providers (HCPs) can implement two modalities of continuous glucose monitoring (CGM):

1. Personal CGM devices: Prescribed for continuous or intermittent use by patients themselves.
2. Professional CGM systems: Purchased by practices and loaned to patients for short-term home use, primarily for diagnostic purposes.

DIFF TYPES

TABLE 1

Available Personal CGM Systems (17–22)

Manufacturer	Systems	Wear Time, days	Age Indications, years	Calibration Requirements	Related Data Apps	Reports and Computer Data Apps
Abbott 	FreeStyle Libre	14	≥18 (U.S.) ≥4 (O.U.S.)	Not required	LibreLink and LibreLinkUp (for sharing data with loved ones)	Libre View
	FreeStyle Libre 2	14	≥4	Not required		
Dexcom 	G6	10	≥2	Not required	Dexcom Clarity and Dexcom (for sharing data with loved ones)	Clarity
Medtronic 	Guardian Connect	7	≥14	Twice daily	CareLink and Guardian Connect (for sharing data with loved ones)	Carelink
Senseonics 	Eversense	90 (U.S.), SQ 180 (O.U.S.), SQ	≥18 (U.S.) ≥2 (O.U.S.)	Twice daily	Eversense Now and My Circle (for sharing data with loved ones)	Eversense Data Management System
	Eversense XL					

Indications vary by country. O.U.S., outside of the United States; SQ, subcutaneously; U.S., in the United States.

CGM data, either downloaded in the clinic or transmitted remotely, provide insight into a patient's true glycemic status, treatment effects, behaviors, and patterns. They reveal issues like hypoglycemia and aid in treatment decisions and education.

Professional CGM systems are used to measure the effects of variables over specific time intervals, evaluating interventions, behaviors, and therapies such as food, exercise, and medication effects.

CONTINUOUS SUB CUTANEOUS INJECTION

- A systematic review and meta-analysis evaluated the effectiveness and equity of continuous subcutaneous insulin infusion (CSII) versus multiple-daily injections (MDI) in pediatric type 1 diabetes.
- 16 randomized controlled trials (RCT) and 70 non-randomized studies (NRS) between 2000 and 2019 were included.
- CSII was found to moderately lower HbA1c levels compared to MDI in RCTs.

3.EHR

1. Healthcare professionals managing diabetes recognize the importance of data in the treatment process.
2. Electronic health records (EHRs) provide comprehensive diabetes flow sheets that enable clinicians to monitor a wide range of data, including vital signs, laboratory test results, and real-time changes from continuous glucose monitors.
3. These electronic flow sheets offer enhanced functionality compared to traditional paper- based records, making them essential tools for physicians.
4. EHRs have become an integral component of diabetes management due to their ability to capture and organize diverse data efficiently.

4.TELE MEDICINE PLATFORM FOR DIABETICS:

Tele medicine can provide:

1. Remote monitoring of vital signs and glucose levels.
2. Timely access to healthcare services.
3. Delivery of patient education and self-management resources.
4. Medication management, including dosage adjustments and prescription refills.
5. Enhanced communication between patients and healthcare providers.

Acc to one study, use of telemedicine (TM) to manage Type 2 diabetes have several benefits and showing positive results. The research examines the efficacy of TM compared to face-to- face (F2F) visits in optimizing health outcomes for patients across the diabetes spectrum, from prediabetes to uncontrolled diabetes. TM enables practitioners to monitor patients in real-time and provides timely access to healthcare services, potentially reducing complications associated

with T2DM. The findings emphasize the importance of shifting from disease-oriented tertiary care to preventative care solutions to address the global diabetes epidemic. Furthermore, the study suggests that informatics technology can be customized to improve care for patients with other chronic illnesses and reduce health disparities among communities affected by social determinants of health. Despite limitations, the research contributes to addressing critical needs in disease management, particularly in marginalized regions, and may inspire future studies in this area.

5.Predictive modeling

1. Predictive modeling is crucial for early detection, especially in populations with low routine medical checkup profiles.
2. Acc to one study utilized waist-hip ratio (WHR), triglycerides (TG), catalase, and atherogenic indices of plasma (AIP) to predict disease onset.
3. The predictive model achieved high accuracy, with 94% to 99% accuracy in identifying individuals who eventually developed diabetes.
4. Notably, an increase in waist-hip ratio (WHR) and elevated atherogenic indices of plasma (AIP) were significantly associated with a higher risk of type 2 diabetes.

diabeteshttps://www.ncbi.nlm.nih.gov/pmc/articles/PMC10808992/

HIT useful in predictive modelling are

1. Electronic Health Records (EHRs)
2. Data Mining and Analysis Tools
3. Predictive Modeling Algorithms
4. Clinical Decision Support Systems
5. Personalized Medicine Platforms.

6. Remote monitoring using health information technology:

it involves tracking various health parameters, such as glucose levels or physical activity, from a distance using devices like wearable sensors or mobile apps. This enables healthcare providers to monitor patients' health remotely and intervene promptly when necessary, improving the management of chronic conditions like diabetes

❖ **Data Mining in diabetis management:**

Diabetes is often called a modern-society disease because widespread lack of regular exercise and rising obesity rates are some of the main contributing factors for it. According to data from the 2011 National Diabetes Fact Sheet,[1] 25.8 million people, or 8.3% of the U.S. population, have diabetes. The estimated total cost of diabetes in the United States for 2007 was $174 billion. Worldwide, the picture is very similar, with an estimated 285 million people affected by diabetes in 2010, representing 6.6% of the world's adult population. Health care expenditures for diabetes are expected to be $490 billion for 2030, accounting for 11.6% of the total health care expenditure in the world.[2]

As we can see from these facts, problems related to diabetes are many and quite costly. Diabetes is a very serious disease that, if not treated properly and on time, can lead to very serious complications, including death. This makes diabetes one of the main priorities in medical science research, which in turn generates huge amounts of data. Constantly increasing volumes of data are very well suited to be processed using data mining that can readily handle them. Using data-mining methods in diabetes research is one of the best ways to utilize large volumes of available diabetes-related data for extracting knowledge. Both descriptive (association and clustering) and predictive (classification) data-mining methods are used in the process. These data-mining methods are different from traditional statistic approaches in many ways (for details, refer to reference 3). One major difference between them is that the process of data mining is much more complex than that of statistical approaches.

Data-Mining Technologies for Diabetes[a]

Author (Year)	**Study Purpose**	**Group/Topic of Research**	**Diabetes Type**	**Data set**	**Data-Mining Methods**	**Software**	**Outcome**
Bellazzi & Abu-Hanna, 2009[4]	Patient need	Interpretation and prediction of BGL	N/A	Blood glucose home-monitoring data, ICU blood glucose data	Association/Temporal abstraction, Classification/Subgroup discovery	N/A	Trends and daily cycles of BGL, predict high levels of BGL
Bellazzi *et al*., 1998[5]	Patient need	Interpretation of BGL	N/A	Blood glucose home-monitoring data	Association/Temporal abstraction	N/A	Trends and daily cycles of BGL
Breault *et al*., 2002[6]	Science	Prediction of BGL	N/A	15,902 patients	Classification/CART	CART softwar	Best predicto

	research			with diabetes		e by Salford Systems	r and rules to predict glycemic control
Brown *et al.*, 20057	Science research	Genomic data analysis	T2DM	LocusLink database	Clustering	ExQuest	Candidate genes that contribute to diabesity
Concaro *et al.*, 20098	Science research	Healthcare flow	N/A	101,339 health care events	Association/Temporal abstraction	N/A	Temporal association rules on sequences of hybrid events
Covani *et al.*, 20099	Science research	Genomic data analysis	T2DM	Gene list associated with T2DM, periodontitis, and sinusitis	Clustering/ Hierarchical, k-means	STRING 7.0	Leader genes and interactions among them
Duhamel *et al.*, 200310	Science research	Data preprocessing/ cleaning	T2DM	23,601 records of T2DM patients	Clustering/ k-means, Classification/Decision tree	Spina	Cleaned data
DuMouchel *et al.*, 200811	Science research	Adverse drug effect	N/A	2.4 million reports from FDA AERS database	Classification/Proportional Reporting Ratio, Bayes Multi-Item Gamma Poison Shrinker, Logistic regression	N/A	Diabetes-related adverse effect associated with antipsychotic drugs
Gerling *et al*, 200612	Science research	Genomic data analysis	T1DM	2D gel proteome data	Clustering/k-means, principal component analysis	GeneSpring version 6.2	37 differentially expressed spots

Huang *et al*, 200713	Science research	Feature selection	T2DM	2064 patient information: 1148 male, 916 female	Classification/Naïve Bayes, IB1, Decision tree—C4.5	N/A	Best predictor for each algorithm
Liou *et al*, 200814	Science research	Insurance-fraud detection	N/A	Taiwan's national health insurance database	Classification/Neural Network, Classification Tree	SPSS Clementine 7	Fraudulent health care provider
Miyaki *et al*, 200215	Science research	Feature selection	T2DM	165 patient's records	Classification/CART	SPSS Answer Tree 2.1 (IBM, Chicago, IL)	Best predictor
Richards *et al*, 200116	Science research	Prediction of early mortality	N/A	21,000 patient's clinical records	Classification/Simulated annealing	Lanner data-mining package	Association between patient's observation and early mortality
Sigurdardottir *et al*, 200717	Science research	Feature selection	T2DM	21 articles from Medline, Scopus, and CINAHL	Classification/Decision tree—C4.5	WEKA	Factors predict changes in HbA1c level
Toussi *et al*, 200918	Science research	Clinical guideline	T2DM	Patient records with missing or incomplete rules in guideline	Classification/Decision tree—C5.0	SPSS Clementine 10.1	New rules to enrich guideline

Wright *et al*, 2005[19]	Science research	Feature selection	T1DM, T2DM	MQIC data warehouse: 50,428 records extracted for this study from 3.6 million records	Classification/Reconstructibility analysis (RA)	OCCAM with RA package	Risk factor for diabetes mellitus
Yamaguchi *et al*, 2006[20]	Patient need	Predict BGL	T1DM	FBG, metabolic rate, food intake, and physical condition	Classification	dataFOREST	Next-morning FBG

Insights :

Four studies examining blood glucose levels (BGL) in diabetes patients were found. Two focused on predicting BGL, one on interpreting BGL, and another on both interpreting and predicting BGL.

1. Utilizing CART data-mining software, researchers analyzed data from 15,902 diabetes patients. They discovered that age was the most significant factor linked to poor glycemic control (HbA1c >9.5). Surprisingly, patients younger than 65.6 years old exhibited worse glycemic control compared to older individuals. This finding provides valuable insight for clinicians to target specific age groups prone to poor glycemic control.
2. Next, researchers Yamaguchi and colleagues employed dataForest software to predict next-morning fasting blood glucose (FBG). They utilized classification techniques on data gathered from four type 1 diabetes mellitus (T1DM) patients spanning 150 days. Their model incorporated FBG, metabolic rate, food intake, and physical condition, revealing that physical condition showed the highest correlation with FBG and was the most predictive variable.
3. Using two data-mining algorithms, TA and subgroup discovery, researchers aimed to predict blood glucose levels (BGL) in two patient groups: those who self-monitor BGL at home and intensive care unit (ICU) patients. This classification approach aids in identifying ICU patients at risk of diabetes, facilitating preventive measures to avoid treatments that could be detrimental to them.
4. Bellazzi and colleagues utilized a combination of structural time series (STS) analysis and temporal abstraction (TA) to interpret past blood glucose level (BGL) data. STS generated time-varying series, while TA enhanced interpretation. The outcome included trend and daily cycle diagrams representing BGL patterns.

❖ **In the context of diabetes management and maximizing prevention through informatics, network analysis can be a powerful tool for gaining insights into various aspects of the disease and its management.**

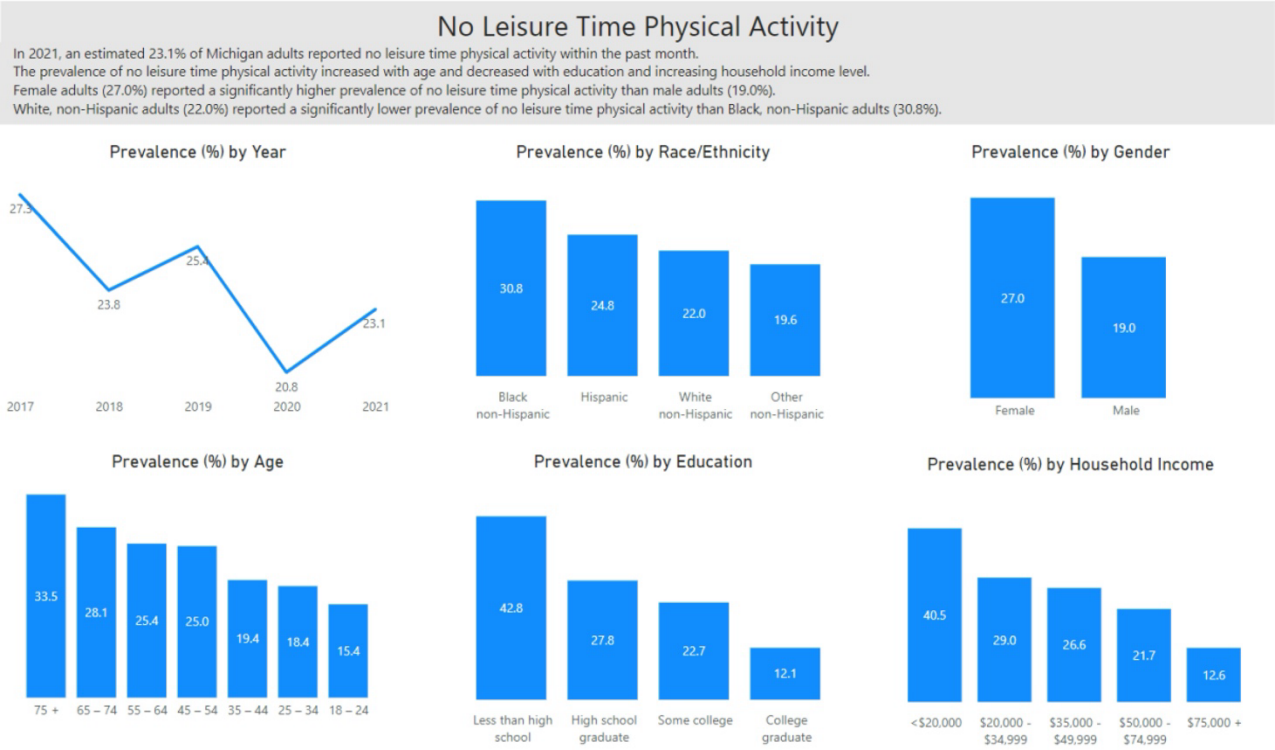
Six studies analyzed diabetes health care and clinical data for various purposes such as health care flow analysis, data preprocessing/cleaning, adverse drug effect analysis, insurance fraud detection, clinical guidelines enrichment, and prediction of early mortality.

Conclusion: Utilizing data mining to manage the vast amounts of clinical data from diabetes patients is a valuable resource, aiding researchers and clinicians in delivering improved healthcare. The increasing adoption of data-mining techniques in diabetes research is evident,

with 12 articles published post-2005 and 4 in 2009 alone. This trend underscores the promising future of data mining in biomedicine, especially in the domain of diabetes.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3262726/

- The prevalence estimates for **risk factors in Michigan between 2017 and 2021** can provide insights into the health trends and challenges faced by the population during that period. Common risk factors for various health conditions, including obesity, no leisure physical time(sedentary lifestyle), alcohol consumption, cigarette smoking, hypertension awareness, no routine checkups, age(risk increases with age), metabolic syndromes, ethinicity(certain ethnic groups, such as African Americans, Hispanic/Latino Americans, Native Americans, and Asian Americans, have a higher risk)can contribute to the overall burden of disease in a population.

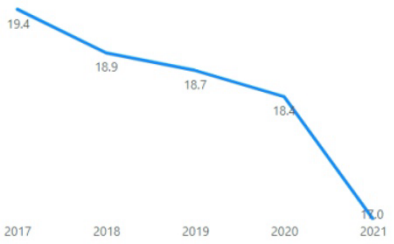


Click here to follow link

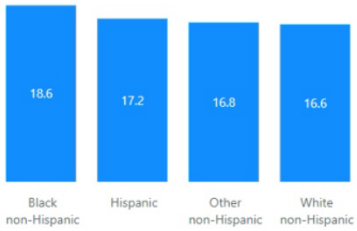
Cigarette Smoking

In 2021, an estimated 17.0% of Michigan adults reported that they currently smoke cigarettes on a regular basis.
Current smoking prevalence was highest among adults aged 35-44, and lower among both the oldest and youngest age groups.
Current smoking decreased with increasing education and increasing household income level. The prevalence of current smoking was similar by gender and race/ethnicity.

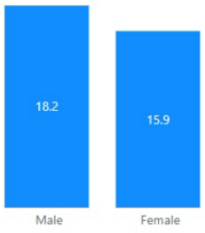
Prevalence (%) by Year



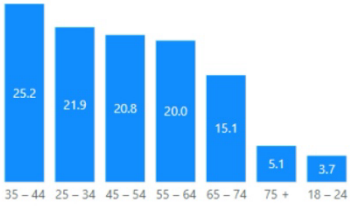
Prevalence (%) by Race/Ethnicity



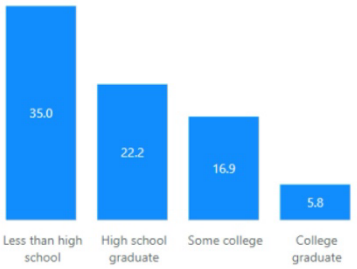
Prevalence (%) by Gender



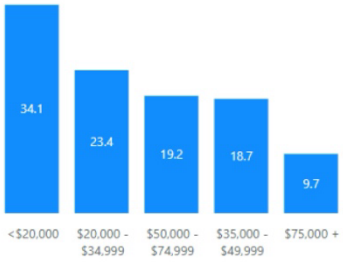
Prevalence (%) by Age



Prevalence (%) by Education



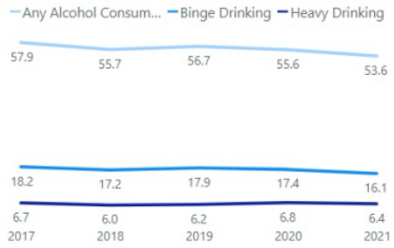
Prevalence (%) by Household Income



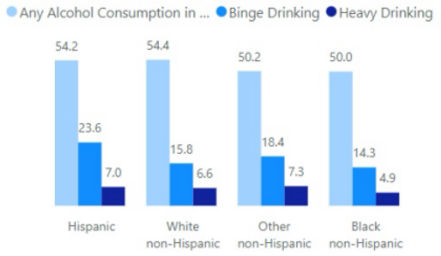
Alcohol Consumption

In 2021, an estimated 53.6% of Michigan adults reported some form of alcohol consumption within the past month. Furthermore, an estimated 16.1% of Michigan adults reported binge drinking on at least one occasion within the past month, and 6.4% reported heavy drinking over the past month.
Both binge drinking and heavy drinking are more prevalent within the younger age groups and decrease significantly within the older age groups.
Males (20.2%) reported a significantly higher prevalence of binge drinking than females (12.3%). The prevalence of binge drinking increased with increasing household income level.
Hispanic adults (23.6%) reported a significantly higher prevalence of binge drinking than white, non-Hispanic adults (15.8%).

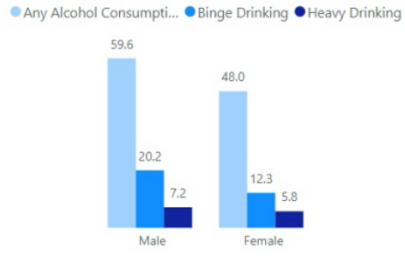
Prevalence (%) by Year



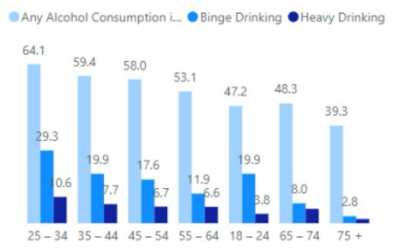
Prevalence (%) by Race/Ethnicity



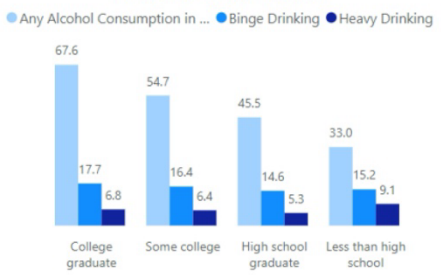
Prevalence (%) by Gender



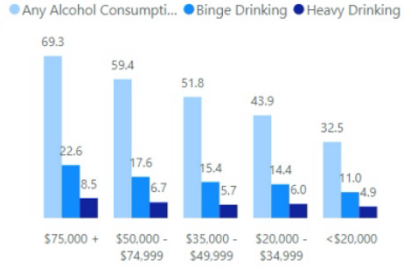
Prevalence (%) by Age

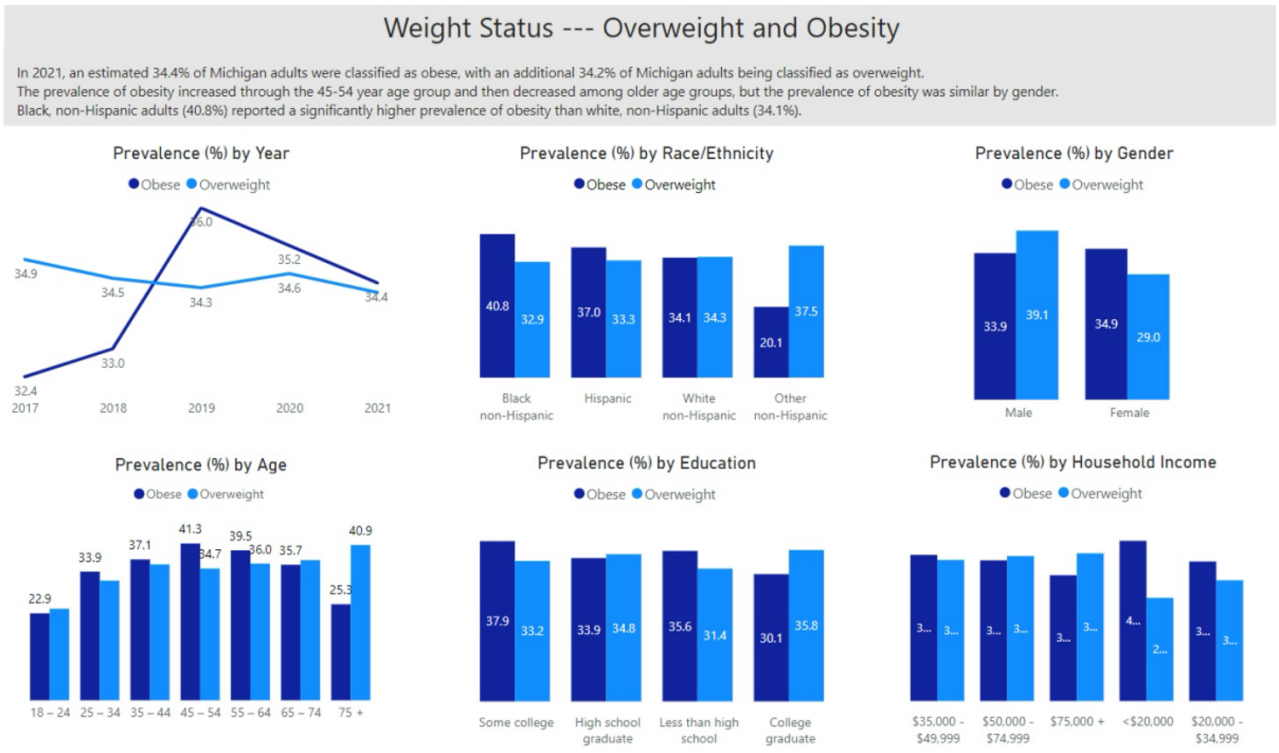


Prevalence (%) by Education



Prevalence (%) by Household Income





The Michigan Department of Health and Human Services' Diabetes Prevention and Control Program (DPCP) has developed a comprehensive five-year plan in collaboration with various stakeholders to enhance diabetes care across the state. This plan focuses on three key priority areas: state leadership, diabetes prevention, and diabetes management. Under state leadership, the DPCP aims to strengthen partnerships, engage leaders, foster innovation, and provide support and education for diabetes professionals. In the realm of diabetes prevention, efforts will be made to lower barriers to participation in prevention programs, improve policy and coverage for prediabetes interventions, and establish systems for early detection and referral. In terms of diabetes management, the plan seeks to enhance medical coverage for diabetes education and support, leverage technology, incentivize healthcare providers, and improve overall care for individuals living with diabetes. A significant emphasis of the plan is on health equity, with a focus on addressing disparities by directing resources to communities with the greatest needs.

Diabetes Improvement Plan
2021-2025

Executive Summary

The Diabetes Prevention and Control Program (DPCP) at the Michigan Department of Health and Human Services has created this five-year Diabetes Improvement Plan in collaboration with partners who represent many facets of diabetes experience, care, and advocacy. It reflects the priorities expressed by these partners, and our commitment to Michigan residents with diabetes.

In the plan that follows, the DPCP outlines the following three priority areas and their goals:

State Leadership	Diabetes Prevention	Diabetes Management
Enhance network partnerships.	**Reduce barriers to Diabetes Prevention Program (DPP) participant engagement and success.**	**Enhance medical coverage of Diabetes Self-Management Education and Support (DSMES).**
Engage leaders.	**Enhance policy and coverage for prediabetes and the DPP.**	**Increase utilization of technology.**
Drive innovation and expand cross-program collaboration.	**Build systems to support 'Screen, Test, Refer' for prediabetes.**	**Increase incentives for health care providers.**
Provide support and educational opportunities for diabetes professionals.		**Advance care for people living with diabetes.**

Many of the strategies we will use to address these goals highlight health equity. The impact of diabetes varies greatly between communities, and ensuring that increased resources are directed to those with greatest needs can reduce diabetes disparities and improve population health for Michigan residents.

This plan is not meant to represent all the work being done by the Diabetes Prevention and Control Program or our partners. We are funded through multiple sources, including the Centers for Disease Control and Prevention, and our work is far-reaching and complex. The goals in the Diabetes Improvement Plan represent our commitment to improve access to diabetes prevention and management resources in communities that need them most, and to advance in the areas that are most relevant to our partners.

https://www.michigan.gov/mdhhs/keep-mi-healthy/communicablediseases/epidemiology/chronicepi/bfrs.

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Challenges:

1. Data privacy and security concerns.
2. Interoperability issues between different health information systems.
3. Integration into existing healthcare workflows and infrastructure.
4. Limited access to technology among certain patient populations.
5. Ensuring the accuracy and reliability of data collected through informatics tools.
6. Cost-effectiveness and financial sustainability of implementing informatics solutions.
7. Training and education of healthcare professionals and patients on how to effectively utilize these tools.
8. Overcoming resistance to change and adoption of new technologies within healthcare organizations.
9. Addressing disparities in access to healthcare and technology among different socio- economic groups.
10. Regulatory challenges and compliance with healthcare laws and standards.

Conclusion:

- In short, using technology to manage diabetes looks promising. It helps doctors get patient information quickly, allows for remote monitoring, and supports making better treatment decisions. But there are problems like keeping data safe and making different systems work together. Despite these issues, technology can make a big difference in improving patient health and reducing differences in healthcare. To make it work well, doctors and patients need proper training, and the technology needs to fit into existing routines. Even though there are challenges like privacy concerns and not enough money, technology can help manage diabetes better by improving things like blood sugar levels(hbA1c) and complications like type 2 diabetes. In the future, we need to keep improving usage of health informatics tools for better diabetes care management.

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