

Implementation and Impact of Digital Health Technologies in Diabetes Management.

By

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***Synopsis submitted in partial fulfilment of the requirements of the degree MBA
Hospital and Health Management***

Academic year, 2021-2023

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CERTIFICATE

This is to certify that Mr. Nidhish ojha has successfully completed his Internship Program with us from 22nd February 2023 to 19th May 2023.

During the Internship, He was part of ten-hard organization and had worked on the project Implementation and Impact of Digital Health Technologies in Diabetes Management.

And we wish him the all the very best for his future endeavors.

Yours sincerely,

Date:

Place:

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled

Study on Implementation and Impact on Digital Health Technologies in Diabetes Management embodies my original work and has not served as the foundation for the award of any degree, diploma, associateship, fellowship, or titles in this institute or any other similar institution of higher learning, as stated in the submission made by Mr. Nidhish Ojha, Enrolment No. 1337, under the supervision of Kajal Sitlani, for the award of the MBA in Hospital and Health Management of the IIHMR University, completed during the time period of February 2023 to May 2023..

Signature

Background:

Technologies related to digital health are becoming effective instruments for managing chronic illnesses like diabetes. Diabetes is a complicated disorder that necessitates ongoing blood glucose testing, medication compliance, lifestyle adjustments, and regular communication with medical professionals. Traditional approaches to managing diabetes frequently involved routine clinic visits and self-checks for blood glucose using fingerstick measures.

Digital health technologies, on the other hand, have revolutionised the way diabetes is managed by delivering real-time data, individualised treatment suggestions, and improved patient participation. These technologies include a broad range of instruments, including as wearable technology, smartphone apps, telemedicine platforms, and artificial intelligence (AI) algorithms.

By giving people access to real-time and ongoing data about their blood glucose levels, continuous glucose monitoring (CGM) technologies have revolutionised glucose monitoring. CGM systems detect interstitial glucose levels using small sensors placed beneath the skin, and the information is wirelessly relayed to a receiver or smartphone app. This makes it possible for people to monitor their blood sugar levels throughout the day, see trends, and decide on insulin doses, food options, and physical activity with knowledge.

A growing number of people are using mobile applications made expressly for managing diabetes. These applications include features like tracking blood sugar, med reminders, carb counting, exercise tracking, and data visualisation. They make it easier for people to maintain their prescription regimens, keep track of their food consumption, check their blood sugar levels, and get individualised advice and instructional materials. Additionally, mobile applications promote a more team-based approach to managing diabetes by facilitating communication and data exchange with healthcare practitioners.

Particularly in rural or underdeveloped locations, telemedicine platforms have become an important resource. These platforms enable people to communicate virtually with medical professionals, doing away with the requirement for in-person meetings. From the convenience of their own homes, people may use telemedicine to discuss treatment plans, get personalised advice, and resolve concerns. Additionally, it makes it possible for remote monitoring, in which medical professionals may get data from devices like CGMs for analysis and feedback.

It has resulted in better glycaemic control, fewer hypo- and hyperglycaemic episodes, higher patient satisfaction, and greater patient-provider communication. By encouraging self-management behaviours, adherence to treatment plans, and improved overall health outcomes, these technologies enable people to actively participate in their diabetes management.

To effectively use the promise of digital health technology in the management of diabetes, however, issues including privacy concerns, data security, interoperability, and fair access must be addressed. The effective integration and wide-scale deployment of these technologies in diabetes treatment depend on ongoing research, technical improvements, and cooperation between healthcare providers, technology developers, and regulatory organisations.

Objective:

- The objective is to provide tools and resources that help individuals monitor their blood glucose level.
- To improve the accuracy and reduce the need for finger stick test.
- To enable healthcare providers to remotely monitor and manage their patient with diabetes.
- To enable secure messaging, video consultation and data sharing fostering a more proactive and efficient relationship.

Methodology:

- Primary data – A structured questionnaire sent through WhatsApp for assessment and evaluation to track the number of responses.
- A detailed report is prepared to analyse the data.

Acknowledgement

My respected professor, Mrs. Kajal Sitlani (Associate Professor, IIHMR), has provided me with essential advice, support, and encouragement as I've been working on my dissertation project, and I would want to extend my sincere thanks for all of that.

I also want to express my deep gratitude to IIHMR University in Jaipur for giving me a supportive academic setting that encouraged the growth of my mind. My research experience has been substantially enhanced and I have been able to investigate new areas of knowledge because to the resources, facilities, and chances provided by the institution.

Additionally, I would like to express my gratitude to all of the respondents for taking time out of their busy schedules to assist me in making this happen. In particular, I want to thank my colleagues for inspiring me to go above and beyond to complete a task that I never imagined I would be able to complete with such success. This has given me the assurance I need to make decisions in life and enter certain organisations.

I'd want to take this opportunity to thank everyone of my friends and coworkers who have contributed to the success of this project. I also want to apologise to anyone whose name I may have accidentally neglected to include.

Sincerely

MR Nidhish ojha

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INTRODUCTION

By offering creative ways to better the management of chronic conditions like diabetes, digital health technology has revolutionized the healthcare industry. A increasing demand for effective and economical means of monitoring and helping people with this illness has arisen as the incidence of diabetes increases globally. Diabetes management has benefited greatly from the development of digital health technologies, which include tools, platforms, and apps.

This Dissertation looks at how digital health technologies are applied and how it affects the treatment of diabetes. A few of the numerous technologies that will be examined are insulin pumps, smartphone applications, continuous glucose monitoring (CGM) devices, and web-based platforms. We will also examine the specific ways in which these technologies have altered the way diabetes is managed and the lives of those who have the condition.

Digital health technology has significantly changed how people track the parameters related to their diabetes, make informed decisions, and actively participate in their own treatment.

These technologies enable real-time blood glucose monitoring, automate insulin administration, make it simpler to keep track of one's diet and exercise regimen, and provide meaningful data analysis.

As a result of digital health technology, telehealth and remote monitoring services have also improved.

Patients' data may be accessed and reviewed remotely by healthcare professionals, enabling prompt interventions and alterations to treatment programs. With less frequent in-person visits required thanks to this remote care paradigm, diabetes treatment is easier and more convenient.

The use of digital health technology has significantly impacted the management of diabetes. Studies have demonstrated that these technologies have resulted in better glycemic management, lower HbA1c readings, and fewer complications from diabetes. Digital health solutions enable people to make knowledgeable decisions about their food, exercise, and medication management by giving them access to real-time data and personalized insights.

The cooperation between patients and providers has also been improved by these technologies, leading to greater communication and participation. With the help of technologies like real-time data sharing, messaging services, and virtual visits, people with diabetes may communicate with their healthcare professionals more effectively and get prompt advice and assistance.

Additionally, data-driven healthcare and the advancement of diabetes research have benefited from the use of digital health technology. For population health research, clinical trials, and the creation of prediction models, aggregated and anonymized data obtained through these technologies can be used. This data-driven strategy has the potential to improve treatment results and encourage the creation of personalized medicines.

As a result, the way people with diabetes monitor and manage their disease has changed as a result of the use of digital health technology. These technological advancements have improved glycemic control, increased patient empowerment, simplified remote treatment, and supported data-driven healthcare and research. The future of managing diabetes holds enormous potential for better outcomes and increased quality of life for those who have the disease. This is due to the development and integration of digital health technology.

Purpose:

Enhancing the monitoring, management, and general care of diabetes population is goal of using digital health technology in diabetes management. By improving self-care capabilities, enabling remote treatment, and facilitating communication between patients and healthcare professionals, these technologies hope to deliver more precise and real-time data.

The main goals are as follows:

- **Enhanced Monitoring:** Continuous glucose monitoring (CGM) devices, a type of digital health technology, let people monitor their blood sugar levels in real time. When compared to standard fingerstick readings, this offers more precise and regular data, improving comprehension of glucose patterns and trends.
- **Improved Self-Care:** Digital health platforms and apps offer functions including meal planning, carb counting, exercise monitoring, and medication reminders. These technologies enable users to actively manage their diabetes by making educated decisions, which improves adherence to medication regimens and lifestyle changes.
- Digital health solutions give users personalized insights depending on the data they have gathered. Algorithms and analytics may analyze the data and provide individuals with practical advice, like as adjusting their insulin dosage or changing their lifestyle, to improve glycemic control.
- **Remote Monitoring and Telehealth:** The use of digital health technology makes it possible to monitor diabetic patients remotely. Remote patient data access and evaluation by healthcare professionals enables prompt interventions and treatment plan modifications. Additionally, telehealth services permit virtual visits, which lessen the demand for in-person consultations and improve convenience for both patients and doctors.
- **Research and Data-Driven Healthcare:** Population health research, clinical trials, and the creation of prediction models may all be done with aggregated and anonymous data that has been obtained using digital health technology. The creation of personalized medicines is facilitated by this data-driven strategy, which also advances diabetes research and improves treatment results.

Digital health technologies are being used to treat diabetes with the overarching goals of empowering people with diabetes, improving glycemic control, lowering complications from diabetes, and raising people's quality of life. Healthcare professionals may give more individualized and proactive treatment by utilizing these technologies, and patients can actively participate in properly controlling their conditions.

Procedure:

The use of digital health technology in the management of diabetes entails a number of processes and factors. A general process that may be used is as follows:

- Conducting a thorough needs analysis is the first step in order to fully comprehend the demands and difficulties that diabetes patients, as well as the healthcare professionals involved, face. Demographics of the patients, infrastructure that is already in place, resources that are accessible, and intended results should all be taken into account during this evaluation.
- Choose the best digital health solutions for managing diabetes by identifying and assessing them. This includes taking into account gadgets like insulin pumps, CGM systems, smartphone apps, and web-based platforms. Consider each technology's features, usability, data security, integration potential, and compatibility with current systems.
- Plan and strategy for implementation of digital health technology should be developed in detail. Set the implementation's aims, targets, and deadlines. To make sure that the implementation process runs smoothly and successfully, take into account variables including the need for technical assistance, patient education, and training needs.
- Infrastructure and Integration: Evaluate the current healthcare infrastructure to see whether any changes or adjustments are needed to facilitate the adoption of digital health technology. Make that the chosen technologies can work with the data management platforms, communication tools, and electronic health record systems that are already in place.
- Training and Education: Educate healthcare professionals, including doctors, nurses, and other relevant staff members, on how to use and benefit from digital health technology. Similar to this, teach diabetes patients how to utilize technology for self-care, self-monitoring, and data management.
- Setting up policies and processes for data management and security. This entails verifying adherence to privacy laws, putting data encryption mechanisms into place, and creating safe data transit and storage procedures. Diabetes patients should be informed about data processing and privacy policies in order to provide informed permission.
- Conducting a pilot testing phase will allow you to gauge the functionality, usability, and efficacy of the adopted digital health technology. In order to identify areas for development and make the required modifications, gather input from healthcare professionals and people with diabetes.
- Establishing procedures for continuing upkeep, technical assistance, and monitoring of the digital health technology is important. This involves handling any user issues or concerns that surface throughout the installation and post-implementation stages, as well as routine data monitoring and help for troubleshooting.

Literature Review

Author	Title	Overview
Youfa Wang, Jungwon, Jacob Khuri, Hong Xue, Bo Xie, Leonard A Kaminsky, and Lawrence J Cheskin,	Treatment and Management of Diabetes and Obesity with Mobile Health Interventions: A Systematic Review of Systematic Reviews	• Future research is necessary to determine the best methods and frequency of patient contact, improve message personalization, and improve usability of mHealth therapies, which puts a larger emphasis on sustaining efficacy over time. • The use of mobile applications and text messaging, as well as the self-monitoring and management capabilities of mHealth programmes in patients with diabetes and obesity, were the main areas of focus.
Avivit Cahn , Amit Akirov , Itamar Raz	Using technology to treat diabetes and digital health	• Diabetes therapy significantly relies on patient self-management and empowerment since diabetic patients have to make several daily decisions on what to eat, when to exercise, and how much and when to take insulin, if necessary. Additionally, patients and healthcare providers are creating vast amounts of data from a number of sources, including electronic medical records, insulin pumps, sensors, glucometers, and other wearable devices, as well as developing genomic, proteomic, metabolomic, and microbiomes data.
Neal Kaufman, Mark Clements, and Eran Mel	Digital Health Technology for Diabetes Prevention and Treatment	• While other articles may discuss telemedicine (virtual patient-provider encounters) and methods for automated or aided insulin delivery, this article will focus mostly on treatments known as digital therapies. • In order to prevent, manage, or treat a medical ailment or disease, digital therapeutics (DTx) provides patients with evidence-based therapeutic treatments that are powered by top-notch software programmes.

Yilin Yoshida and Eduardo J. Simoes	Health Information Technologies for the Management of Diabetes	• The fastest-growing chronic illness in the world is diabetes. In every nation, the number of persons with type 2 diabetes (T2D) is rising. Additionally, diabetes is the fifth most common cause of mortality worldwide. In 2016, almost 1.6 million people lost their lives to diabetes.
G. Alexander Fleming ORCID logo ; John R. Petrie; Richard M. Bergenstal ORCID logo ; Reinhard W. Holl; Anne L. Peters; Lutz Heinemann	Diabetes Digital App Technology: Advantages, Drawbacks, and Advice. A consensus report from the Diabetes Technology Working Group of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)	• Digital health apps, in particular, have evolved swiftly and are becoming a regular element of diabetes therapy and self-management in several populations for persons who have or are at risk for diabetes. • Digital health technologies, in particular digital health applications (or "apps"), have been developing swiftly to help with diabetes control. Numerous health-related applications are accessible on smartphones and other wireless devices for diabetics who need to make lifestyle or prescription adjustments in response to data from glucose monitoring.

Research Question:

- How do Digital health technologies improve Self-management of Individuals with diabetes?
- What are the potential barriers in adoption of Digital Healthcare technologies in Diabetes?
- What is the impact of Digital health technologies on Diabetes?
- What are the benefits and challenges in implementation of Digital health technologies in Diabetes?

Objective:

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Methodology:

- Primary data – A structured questionnaire sent through WhatsApp for assessment and evaluation to track the number of responses.
- A detailed report is prepared to analyze the data.

Study design:

Descriptive Cross-sectional study customized to verify the responses of the patient got through the questionnaire made regarding Implication and Impact of Digital health technologies in Diabetes Management.

Study Population: Vidyaranyapura, Bangalore

Method: A structure questionnaire is used for the aim of assortment of knowledge for assessment of knowledge of patients concerning the Implication and Impact of digital health technology in Diabetes management. This can be Descriptive Cross-Sectional study. Distributed through google forms in random people about the use of digital health technology, In the amount of response I got from Feb 2023 to May 2023.

Study tools:

- WhatsApp,
- Microsoft excel, Word
- Google Scholar

Duration of the Study: March 2023 to May 2023

Sample Size:100-150

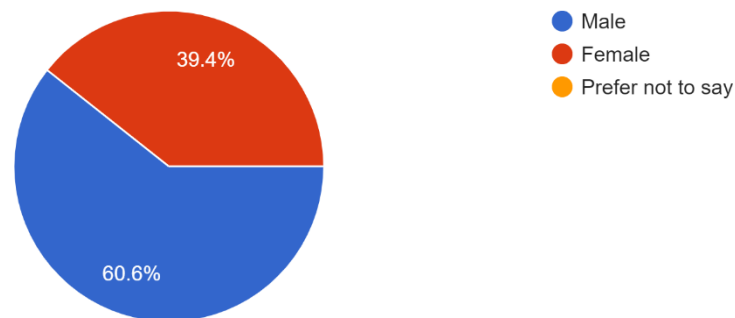
Sampling Technique: Data collected through questionnaire by Google forms.

Data Collection Method: Online (Google Forms)

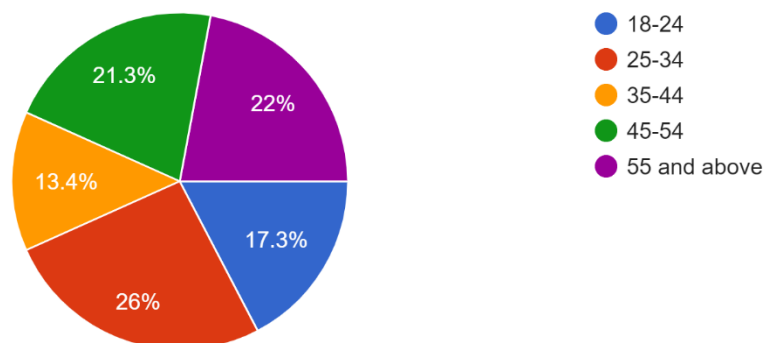
Data Analysis: After analyzing The Implication and Impact of Digital Health Marketing in Diabetes Management through questionnaires out of which I got 127 responses, based on that the analysis has been made.

Result: We analyze the assessment info of patients about the utilization of Digital health technology among the response that we got and the result are obtain from this research are as follows, these results obtained once inquiring the patients over that 79.5% people have used Digital health technologies for Diabetes management and 67% of the population find that digital health technology have better impact on health while using it and there are people i.e 41.7% thinks that it has filled the gap and improved the communication and made the collaboration with healthcare providers and 60% people thinks that there is a huge change in healthcare using digital health technologies.

Gender
127 responses

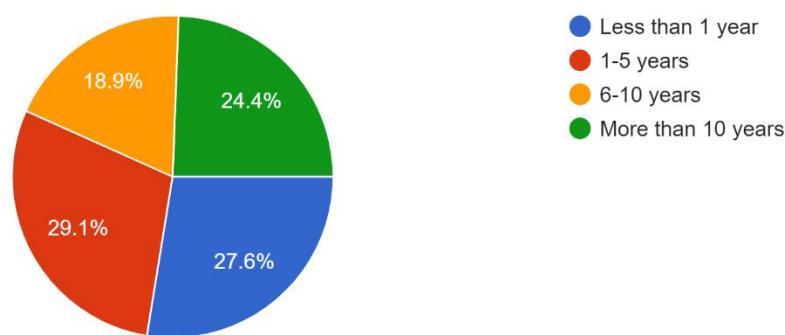


Age
127 responses



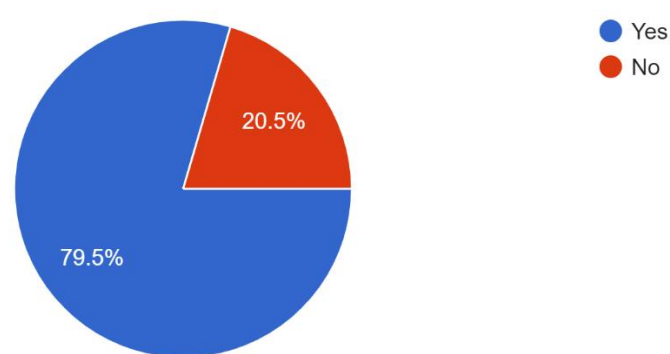
How longed have you been involved in diabetes management?

127 responses



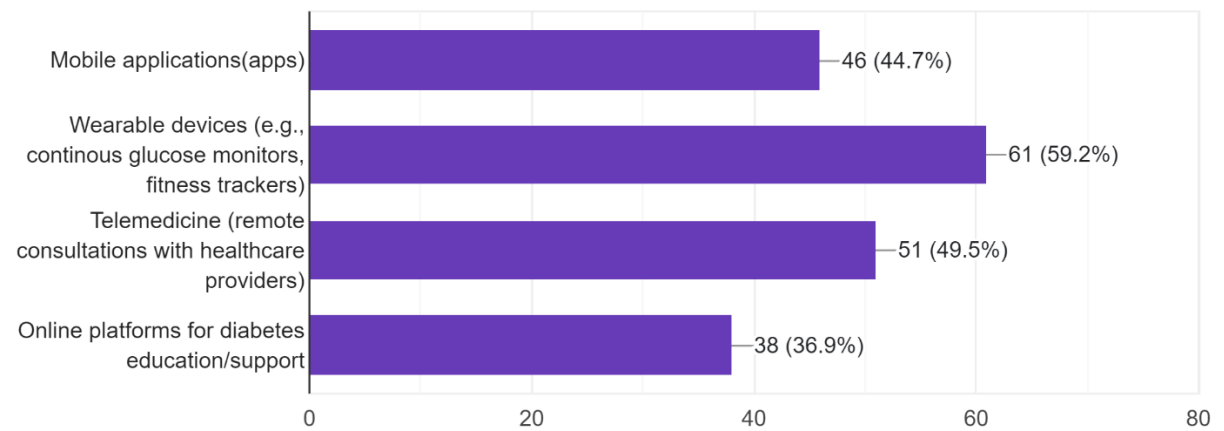
Have you used any digital health technologies for diabetes management?

127 responses



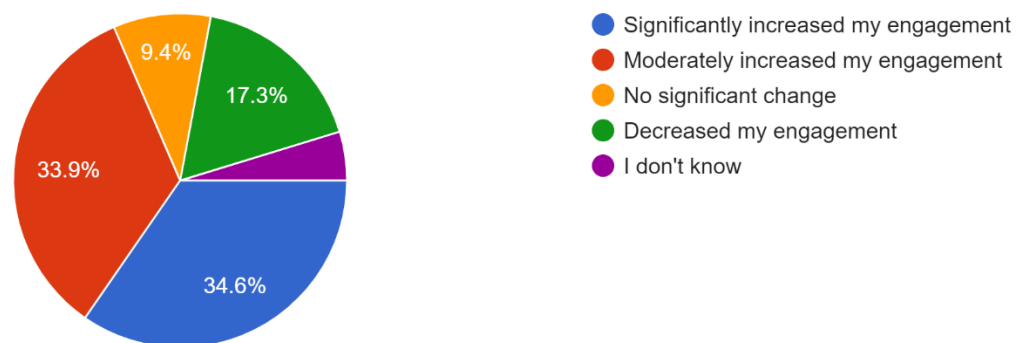
Which digital health technologies have you used for diabetes management?

103 responses



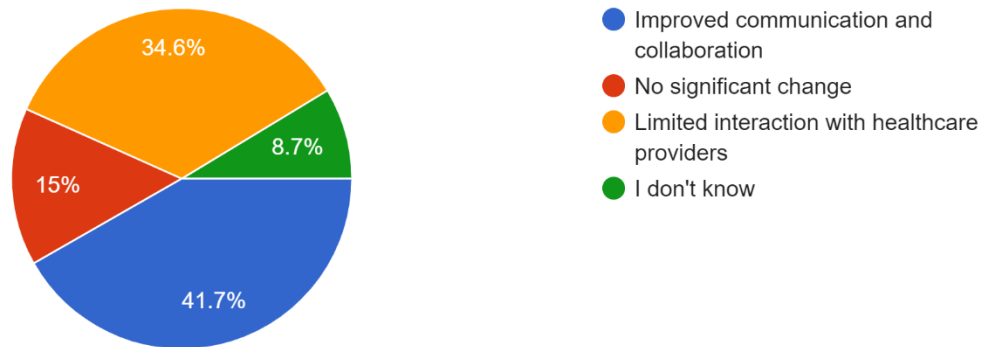
How do you feel digital health technologies have affected your engagement in diabetes self-care activities?

127 responses



How has the use of digital health technologies affected your communication and collaboration with healthcare providers?

127 responses



Have you observed any changes in your healthcare outcomes since using digital health technologies for diabetes management?

127 responses



Conclusion: In conclusion, the use of digital health technology to control diabetes has had a revolutionary effect and a favorable influence on patient care and results. Real-time blood glucose monitoring is made possible through continuous glucose monitoring (CGM) equipment, wearable tech, and mobile apps. This enhances glycemic management, lowers hypoglycemia, and boosts patient satisfaction. Furthermore, telemedicine platforms have permitted remote consultations, allowing people to effortlessly interact with healthcare professionals and receive individualized guidance and assistance.

Artificial intelligence (AI) and machine learning algorithms have further improved diabetes care by offering individualized treatment suggestions, forecasting glucose levels, and aiding with insulin dose modifications. These AI-driven solutions have been useful in raising glycemic control, lowering hypoglycemic episodes, and enhancing therapeutic results.

Through self-monitoring, medication tracking, diet and activity tracking, digital health technology have given people the capacity to actively participate in their diabetes treatment. The availability of educational materials and motivational assistance through mobile applications has improved patient involvement and adherence to treatment strategies.

Overall, the application of digital health technologies in diabetes management has revolutionized the way diabetes is managed, empowering people, enhancing patient-provider communication, and ultimately improving glycemic control for people with diabetes.

Discussion: I performed this study in order to check the awareness and knowledge about the Digital health technologies for Diabetes Management among the patients. I analyzed the fastest growing sector in healthcare industry with the help of Digital platform as I found that digital health technology is replacing the contemporary concept of medication various types of technology are being extracted and discovered for several diseases like Cardio vascular disease (Pacemaker), robotic surgeries etc.

Apart from that Digital health technology is helping the health sector to transit from curative to preventive therapy but there are many issues that are needed to resolve regard to the use studies about their efficiency, knowledge and techniques to determine the proper use. The information and knowledge among the people and healthcare provider is benefited.

From my study it includes process of collection of data from 60.6% male and 39.4% female which shows that use of healthcare technology is more common among male than females because males are more prone towards this co-morbidity.

Implementation and Impact of Digital Health Technologies in Diabetes Management

* Indicates required question

1. Gender *

Mark only one oval.

- ☐ Male
- ☐ Female
- ☐ Prefer not to say

2. Age *

Mark only one oval.

- ☐ 18-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55 and above

3. Occupation *

Mark only one oval.

- ☐ Healthcare professional (Doctors, Nurse, etc.)
- ☐ Diabetes educator
- ☐ Technology vendor/developer
- ☐ Social Worker
- ☐ Other: _____

4. How longed have you been involved in diabetes management? *

Mark only one oval.

- ☐ Less than 1 year
- ☐ 1-5 years
- ☐ 6-10 years
- ☐ More than 10 years

Digital Health Technologies in Diabetes Management

5. Have you used any digital health technologies for diabetes management? *

Mark only one oval.

- ☐ Yes
- ☐ No

If yes, please answer the following questions. If no, please skip to question 9.

6. Which digital health technologies have you used for diabetes management?

Check all that apply.

- ☐ Mobile applications(apps)
- ☐ Wearable devices (e.g., continous glucose monitors, fitness trackers)
- ☐ Telemedicine (remote consultations with healthcare providers)
- ☐ Online platforms for diabetes education/support
- ☐ Other: _____

7. How frequently do you use digital health technologies for diabetes management?

Mark only one oval.

- ☐ Daily
- ☐ Few times a week
- ☐ Once a week
- ☐ Rarely
- ☐ I no longer use them

8. What are the main reasons for using digital health technologies in your diabetes management?

Mark only one oval.

- ☐ Better self-care management
- ☐ Improved access to healthcare providers
- ☐ Monitoring blood glucose levels
- ☐ Tracking medication adherence
- ☐ Tracking physical activity and exercise
- ☐ Dietary management
- ☐ Connecting with a diabetes community/support
- ☐ Other: _____

Impact of Digital Health Technologies

9. How do you feel digital health technologies have affected your engagement in diabetes self-care activities? *

Mark only one oval.

- ☐ Significantly increased my engagement
- ☐ Moderately increased my engagement
- ☐ No significant change
- ☐ Decreased my engagement
- ☐ I don't know

10. In your opinion, how have digital health technologies influenced your self-care behaviors related to diabetes management? *

Mark only one oval.

- ☐ Improved medication adherence
- ☐ Enhanced blood glucose monitoring
- ☐ Facilitated healthier dietary choices
- ☐ Encouraged regular physical activity
- ☐ Improved overall diabetes management
- ☐ No significant impact
- ☐ Other: _____

11. How has the use of digital health technologies affected your communication and collaboration with healthcare providers? *

Mark only one oval.

- ☐ Improved communication and collaboration
- ☐ No significant change
- ☐ Limited interaction with healthcare providers
- ☐ I don't know

12. Have you observed any changes in your healthcare outcomes since using digital health technologies for diabetes management? *

Mark only one oval.

- ☐ Improved glycemic control
- ☐ Better quality of life
- ☐ Reduced healthcare visits/hospitalization
- ☐ No significant changes
- ☐ I don't know

Feedback and Recommendations

13. What are the main challenges or barriers you have encountered in using digital health technologies for diabetes management?

14. What improvements or features would you like to see in digital health technologies to better support your diabetes management?

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Google Forms

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