International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Predictors of Health Outcomes Among Patients with Type Ii Diabetes Mellitus

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ABSTRACT

Diabetes Mellitus remains a major public health challenge worldwide. Health and wellness advocacy that promotes health-promoting behaviors is strongly encouraged. This study aimed to examine the factors that predict health outcomes among patients with Type II Diabetes Mellitus. This study utilized a predictive research design. The study included 128 patients aged 18 years and older who had been diagnosed with Type II Diabetes Mellitus for at least one year. Most respondents were 60 years old and above, female, vocational-education graduates, married, retired, and had been diagnosed with diabetes for more than 16 years. They reported a perceived good health status, weighed mostly below 50 kilograms, and had heights ranging from 1.54 to 1.69 meters (5'1" to 5'6"). In terms of treatment-related perceived barriers, 60 respondents agreed that managing multiple treatments was burdensome. Most respondents identified situational influences as a moderate problem. The level of adherence to health-promoting behaviors among the respondents was rated as good. Health outcomes, as measured by BMI, lipid profile, fasting blood sugar, and HbA1c, were within normal ranges. Sex, weight, and height were identified as predictors of BMI outcomes, while weight predicted lipid profile outcomes. Civil status, weight, and dietary behaviors were predictors of HbA1c outcomes.

INTRODUCTION

Background of the Study

Diabetes Mellitus is a common chronic condition worldwide. The management of this disease requires lifelong care and involves a complex course of therapy that demands a thorough understanding of the disease and strict adherence to the treatment regimen. Every individual with diabetes is expected to assume responsibility for self-management, which requires active involvement in the prescribed treatment plan. Adherence to health-promoting behaviors may improve the overall health outcomes of individuals with diabetes.

However, Diabetes Mellitus remains a major public health challenge worldwide. Evidently, the global prevalence of Diabetes Mellitus continues to increase significantly. This rise may be attributed to inadequate health education about the disease and insufficient health promotion efforts, leading to poor understanding of the condition and low adherence to health-promoting behaviors. Consequently, these factors may result in poor health outcomes among individuals with diabetes. According to the International Diabetes Federation (2011), approximately 366 million people worldwide were living with Diabetes Mellitus. In 2012, nearly 1.5 million deaths were directly attributed to Diabetes Mellitus, with more than 80% of these deaths occurring in low- and middle-income countries (World Health Organization, 2012). Moreover, this public health challenge has reached pandemic proportions, with a projected prevalence of 552 million individuals with Diabetes Mellitus by the year 2030 (International Diabetes Federation, 2011).

In the Philippines, there has been a drastic increase in the incidence of Diabetes Mellitus among Filipinos. A survey conducted by the Philippine Cardiovascular Outcome Study on Diabetes Mellitus in 2008 revealed that one out of every five Filipinos aged 30 years and older had Diabetes Mellitus. This represents 20.6% of the population, a significant increase from 3.9% in 1998 (Philippine Diabetes Statistics, 2012). Furthermore, according to the International Diabetes Federation (2010), the Philippines ranks among the top 15 countries worldwide and has emerged as one of the global hotspots for Diabetes Mellitus.

In the Davao Region, the Department of Health (2010) reported 1,122 deaths due to Diabetes Mellitus, reflecting a substantial increase in mortality from 784 deaths recorded in 2001. In Davao City, there were 329 recorded deaths due to Diabetes Mellitus in 2011, compared with 227 deaths in 2010, as reported by the Davao City Health Office.

The provision of the highest possible quality of health care that is accessible, efficient, equitably distributed, adequately funded, fairly financed, and appropriately utilized by an informed and empowered public is the primary goal of the Universal Health Care program of the Department of Health. This initiative aims to address inequities in the health care delivery system in the Philippines (Department of Health, 2010). Health and wellness advocacy that promotes health-promoting behaviors is strongly encouraged. Therefore, health care providers must adopt effective strategies to develop, implement, and support health promotion programs for individuals with diabetes. The purpose of this study is to examine the factors that predict health outcomes among patients with Type II Diabetes Mellitus.

Statement of Purpose

The purpose of the study is to examine the factors that predict health outcomes among patients with Type II Diabetes Mellitus in Davao City. Specifically, the study seeks to answer the following questions:

1. What are the profiles of the patients with Type II Diabetes Mellitus in terms of:
   1.1. personal factors;
   1.2. perceived barriers to action; and
   1.3. situational influences?
2. What is the level of adherence of patients with Type II Diabetes Mellitus to health-promoting behaviors in terms of:
   2.1. health responsibility behaviors;
   2.2. medication adherence behaviors;
   2.3. dietary behaviors; and
   2.4. exercise behaviors?
3. What are the health outcomes of the patients with Type II Diabetes Mellitus in terms of:
   3.1. body mass index;
   3.2. lipid profile;
   3.3. fasting blood sugar; and
   3.4. glycosylated hemoglobin A1c?
4. Is there a significant factor that predicts the health outcomes of the patient with Type II Diabetes Mellitus?

Statement of Null Hypothesis

Ho: There is no significant factor that predicts the health outcomes of patients with Type II Diabetes Mellitus.

METHODS

Design

This study utilized a predictive research design to examine the factors that predict health outcomes among patients with Type II Diabetes Mellitus. A predictive design was deemed appropriate because the study aimed to identify variables that significantly influence health outcomes and to determine the extent to which these variables can explain variations in clinical indicators such as body mass index, lipid profile, fasting blood sugar, and glycosylated hemoglobin A1c. The design also allowed for the systematic description of the characteristics of the population under study and facilitated the analysis of relationships among personal factors, perceived barriers to action, situational influences, and health-promoting behaviors. Furthermore, this approach enabled the description, explanation, and interpretation of conditions that already existed at the time of data collection, as documented in existing records and supported by survey data, without manipulating any variables.

Setting

This study was conducted in a tertiary government hospital under the Department of Health, located along J.P. Laurel Avenue, Bajada, Davao City. The hospital provides specialized care programs for adult patients with Type I and II Diabetes Mellitus and related complications. Specifically, the study was carried out in a diabetes clinic, situated on the second floor of the Out-Patient Preventive and Care Center Building, operating every Tuesday and Wednesday from eight in the morning to 12 noon.

Participants

The participants of this study were adult patients diagnosed with Type II Diabetes Mellitus. The inclusion criteria for participation were as follows: (1) age 18 years or older; (2) diagnosed with Type II Diabetes Mellitus for at least one year; (3) no history of surgery or hospitalization; (4) independent or requiring minimal assistance in self-care activities; (5) able to read, understand, and sign the informed consent; (6) living in a home setting; and (7) currently receiving outpatient care.

A non-probability convenience sampling technique was employed, allowing the researcher to select participants based on the inclusion criteria. A total of 128 patients who sought consultation were enrolled and fully enumerated. Additionally, a power analysis was conducted to determine the minimum acceptable sample size for the study.

Instruments

The Health Interview Questionnaire was used to collect secondary data from the participants. This instrument was adapted and modified from both the National Health and Nutrition Examination Survey (NHANES) and the Diabetes Attitudes, Wishes, and Needs (DAWN™) Study.

NHANES is a major program of the National Center for Health Statistics (NCHS) under the Centers for Disease Control and Prevention (CDC). Initiated in the early 1960s, NHANES was originally conducted as a series of surveys focusing on specific population groups or health topics. Since 1999, it has been implemented as a continuous program, with a dynamic focus on health and nutrition measurements to address the emerging needs of different population groups (Centers for Disease Control and Prevention, 2015).

The DAWN™ Study was launched in 2001 by Novo Nordisk in partnership with the International Diabetes Federation (IDF) and an international advisory panel composed of prominent diabetes specialists and patient advocates. The first DAWN™ Study is recognized as the largest study of its kind, aiming to explore the psychosocial challenges faced by individuals with diabetes and those assisting them, while identifying ways to improve diabetes care. Despite the availability of effective treatments, fewer than half

of the diabetic population achieved adequate glycemic control, which prompted the initiation of this study (Diabetes Attitudes, Wishes and Needs, 2015).

The survey instrument used in this study was divided into five sections: (1) personal factors; (2) perceived barriers to action; (3) situational influences; (4) health-promoting behaviors; and (5) health outcomes. To ensure comprehension, the instrument was translated from English into the local Cebuano dialect. The Cebuano version was preliminarily developed for this study, and 10 respondents, who were not part of the main study, were involved in pilot testing and content validation. Reliability testing was conducted using Cronbach's alpha, which yielded a coefficient of 0.892, interpreted as very good.

Responses on the survey instrument were scored and interpreted according to the following scale:

Problem Areas in Diabetes Survey Parameter Limits

Scale	Interpretations	Parameter Limits
4	Serious problem	3.21 – 4.0
3	Somewhat serious problem	2.41 – 3.2
2	Moderate problem	1.61 – 2.4
1	Minor problem	0.81 – 1.6
0	Not a problem	0.0 – 0.8

Adherence Level to Health-Promoting Behaviors Survey Parameter Limits

Scale	Interpretations	Parameter Limits
5	Always/ Excellent	4.21 – 5.0
4	Oftentimes/ Very Good	3.41 – 4.2
3	Sometimes/ Good	2.61 – 3.4
2	Rarely/ Fair	1.81 – 2.6
1	Never/ Poor	1.0 – 1.8

Data Gathering Procedure

To ensure that all important details and information were accurately obtained, the researcher devised a systematic approach to optimize the time spent during data collection. Prior to conducting the study, transmittal letters were addressed to the Dean of the University Graduate School, the Head of the selected hospital, and the participants, seeking approval to conduct the study. Informed consent forms were also prepared and translated from English into the local Cebuano dialect to ensure that participants fully understood the purpose of the study in their own vernacular before signing the forms.

Additionally, the researcher obtained permission from participants to conduct physical measurements, including weight and height, and to review laboratory test results to obtain diabetic control indicators such as lipid profile, fasting blood sugar, and glycosylated hemoglobin A1c from the records of the diabetes clinic.

The participants were also asked to complete the Health Interview Questionnaire, which included questions on personal profiles, perceived barriers to action (including challenges related to managing multiple treatments), situational influences, adherence to health-promoting behaviors, and health outcomes. This systematic approach ensured comprehensive data collection while respecting ethical guidelines and participant understanding.

Data Analysis

The data collected were tabulated using the Microsoft Excel version 14 software and converted into Statistical Package for the Social Sciences (SPSS) using version 21 software. The following statistical treatments were applied: (1) frequency, percentage, and weighted mean were used to describe the profiles of the participants; (2) weighted mean was used to determine the adherence level of participants to health-promoting behaviors; (3) frequency and percentage were used to summarize the participants' health outcomes; and (4) logistic regression analysis was performed to identify predictors of health outcomes among patients with Type II Diabetes Mellitus.

Ethical Considerations

Approvals for the study were obtained from the University's Institutional Review Board (IRB) and from the study setting. Potential participants were invited to attend a brief discussion of the study objectives, during which all questions and concerns were addressed. After the objectives were clearly explained, eligible participants who agreed to take part in the study were asked to sign two copies of the informed consent form—one for the researcher and one for the participant. The informed consent process was conducted in the study setting.

All information obtained in this study was treated with strict confidentiality. Participant information was not disclosed to any third party without their consent or a clear legal requirement. All transcripts and summaries were assigned codes and stored separately from any identifying information. Study documents were kept in locked files at all times, accessible only to the researcher. Access to names or identifying information was restricted to instances where it was essential for the study.

Participation in the study was entirely voluntary. Potential participants were not coerced to join, and those who declined experienced no consequences. Participants who agreed to join were free to withdraw at any time or refuse to answer any specific question without penalty. The researcher respected participants' decisions to withdraw or refuse participation.

All collected data were encoded into a computer without any identifying information, ensuring that individual responses could not be traced back to the participants. The interview schedules were stored securely at the Graduate School of the University and will be retained for a period of five years, after which they will be destroyed by shredding. No conflicts of interest were present in this study, and the study did not receive funding or support from any external source.

FINDINGS

Profiles of the Patients with Type II Diabetes Mellitus

Table 1 presents the personal factors of patients with Type II Diabetes Mellitus, including age, sex, education, civil status, occupation, financial status, length of disease diagnosis, perceived health status, and body measurements (weight and height).

In terms of age, more than half of the respondents were 60 years and older, comprising 66.4% of the sample, and the majority were female, accounting for 68.8%. Nearly half of the respondents had attained at least a vocational education (42.2%), and approximately half were married (52.2%). About one-third of the respondents were retired (29.7%), and most reported living with below-average incomes (79.7%). Regarding the length of disease diagnosis, 35.9% of respondents had been diagnosed with Type II Diabetes Mellitus for more than 16 years. Most respondents perceived their health status as good, comprising 40.6% of the sample. For body measurements, the largest proportion of respondents weighed less than 50

kilograms (23.4%), while the majority had heights ranging from 1.54 to 1.69 meters (5'1" to 5'6"), accounting for 64.1%.

Age is an important factor influencing the diabetes care regimen, particularly among older individuals. Older adults with diabetes often experience poorer financial status, higher levels of social isolation and depression, and an increased susceptibility to hypoglycemic episodes (Sinclair, 2006). Health behaviors also differ between men and women, with men generally utilizing fewer healthcare services than women (Courtenay, 2000). While women are more likely to seek preventive care, extensive research has documented sex-based disparities in the care received by men and women (Bird et al., 2007).

Table 1.
Personal Factors of the Patients with Type II Diabetes Mellitus

Profile	Indicators	n	%
Age	18 to 29 years	6	4.7
	30 to 39 years	4	3.1
	40 to 49 years	12	9.4
	50 to 59 years	21	16.4
	60 years and above	85	66.4
Sex	Male	40	31.3
	Female	88	68.8
Educational attainment	Elementary	12	9.4
	High School	51	39.8
	Vocational	54	42.2
	College	3	2.3
	Post-Graduate	8	6.3
Civil status	Single	7	5.5
	Married	67	52.3
	Widow/Widower	42	32.8
	Annulled/Separated	12	9.4
Occupation	Unemployed	33	28.5
	Self-Employed	31	24.2
	Employed	26	20.3
	Retired	38	29.7
Financial status	Below Average	102	79.7
	Average	25	19.5
	Above Average	1	0.8
Length of disease diagnosis	1 to 5 years	9	7.0
	6 to 10 years	29	22.7
	11 to 15 years	44	34.4
	More than 16 years	46	35.9
Perceived health status	Poor	12	9.4
	Fair	46	35.9
	Good	52	40.6
	Very Good	18	14.1

Profile	Indicators	n	%
Weight	Less than 50 kg	30	23.4
	51 to 55 kg	28	21.9
	56 to 60 kg	15	11.7
	61 to 65 kg	28	21.9
	66 to 70 kg	17	13.3
	More than 71 kg	10	7.8
Height	Less than 1.53 m (5 ft.)	25	19.5
	1.54 to 1.69 m (5'1 to 5'6 ft.)	82	64.1
	1.70 to 1.84 m (5'7 to 6 ft.)	21	16.4

Note: n=128

Educational attainment is another critical factor affecting health behaviors in individuals with Diabetes Mellitus, given the importance of diabetes self-care and health-related lifestyle practices (Mirowsky, 1998). Lower educational attainment is strongly associated with poorer health literacy (Baker et al., 1998), which, in turn, has been linked to poorer health outcomes (Street et al., 1993). Individuals with inadequate or marginal literacy are less likely to recognize hypoglycemic symptoms (Williams, 1998) and often exhibit higher glycosylated hemoglobin A1c levels (Schillinger, 2002).

Financial status also influences access to healthcare services and adherence to health-promoting behaviors. Even within publicly accessible health systems, individuals from lower-income groups often face longer wait times and fewer referrals to specialized care (Dunlop et al., 2002). Rabi et al. (2006) found that low-income individuals exhibited a higher prevalence of Diabetes Mellitus and lower utilization of diabetes care services compared to higher-income individuals.

The length of diabetes diagnosis has been shown to affect glycosylated hemoglobin A1c levels. Rhee et al. (2005) reported a positive relationship between duration of diagnosis and glycosylated hemoglobin A1c, indicating that longer disease duration is associated with higher A1c levels.

Perceived health, defined as a subjective assessment of one's overall health status, serves as an important indicator of general health (European Community Health Indicators and Monitoring, 2010). However, Mitchell et al. (2004) found no significant relationship between perceived health status, blood glucose self-monitoring, and glycosylated hemoglobin A1c levels.

Table 2 presents the treatments perceived as barriers to action among patients with Type II Diabetes Mellitus. Among the respondents, 60 individuals (46.88%) agreed that there were too many treatments to manage, while the smallest proportion (7.81%) strongly disagreed with this statement

Table 2.

Treatments as Perceived Barriers to Action of the Patients with Type II Diabetes Mellitus

Indicators	*n*	%
Strongly Agree	44	34.38
Agree	60	46.88
Disagree	14	10.94
Strongly Disagree	10	7.81

Note: n=128

Financial and logistical barriers may influence adherence to diabetes self-care management. These barriers include physical limitations in accessing services, time constraints, service locations, financial costs, local availability of healthcare resources, and the lack of ongoing support after self-care training or guidance. System-level barriers include conflicting advice or insufficient collaboration among healthcare and social care professionals, which can result in fragmented information, services, and support for self-care management (Diabetes UK, 2009).

Additional situational barriers arise from constraints of time, limited social support, inadequate coping skills, lack of knowledge about diabetes management, feelings of helplessness, and frustration due to poor glycemic control or disease progression despite adherence. While some of these barriers may appear relatively static, many can fluctuate in intensity from day to day.

Table 3 presents situational influences among patients with Type II Diabetes Mellitus. Worrying about the future and the possibility of serious complications (Mean=2.56), coping with diabetes-related complications (Mean=2.55), and feeling burned out by the constant effort required to manage diabetes (Mean=2.59) were all rated as somewhat serious problems. The overall situational influences had a grand mean of 2.08, indicating that respondents considered these issues a moderate problem.

Situational influences reflect the social context of managing diabetes, including family and healthcare interactions (Fisher et al., 2012; Polonsky et al., 2005). Emotional problems such as depression, anxiety, and diabetes-specific emotional distress are often under-recognized (Pouwer et al., 2006). When identified, these issues may be labeled as general depression, even when they are directly related to diabetes and its treatment (Gonzales et al., 2011).

The study observed that limited support from family or peers—especially financial, emotional, and psychological support—can exacerbate situational barriers. Effective diabetes care should involve partnership with the patient during care planning. Family relationships are particularly important for diabetes management, influencing communication, adherence to the regimen, and conflict levels.

Table 3.
Situational Influences of the Patients with Type II Diabetes Mellitus

	Indicators	Mean	Interpretation
1.	Not having clear and concrete goals for your diabetes care.	1.34	Minor problem
2.	Feeling discouraged with your diabetes treatment plan.	1.52	Minor problem
3.	Feeling scared when you think about living with diabetes.	1.97	Moderate problem
4.	Uncomfortable social situations related to your diabetes care (e.g., people telling you what to eat).	1.98	Moderate problem
5.	Feelings of deprivation regarding food and meals.	1.99	Moderate problem
6.	Feeling depressed when you think about living with diabetes.	1.73	Moderate problem
7.	Not knowing if your mood or feelings are related to your diabetes.	1.87	Moderate problem
8.	Feeling overwhelmed by your diabetes.	1.95	Moderate problem
9.	Worrying about low blood sugar reactions.	2.30	Moderate problem

	Indicators	Mean	Interpretation
10.	Feeling angry when you think about living with diabetes.	2.16	Moderate problem
11.	Feeling constantly concerned about food and eating.	2.13	Moderate problem
12.	Worrying about the future and the possibility of serious complications.	2.56	Somewhat serious problem
13.	Feelings of guilt or anxiety when you get off track with your diabetes management.	2.11	Moderate problem
14.	Not accepting your diabetes.	1.88	Moderate problem
15.	Feeling unsatisfied with your diabetes physician.	1.73	Moderate problem
16.	Feeling that diabetes is taking up too much of your mental and physical energy every day.	2.09	Moderate problem
17.	Feeling alone with your diabetes.	2.14	Moderate problem
18.	Feeling that your friends and family are not supportive of your diabetes management efforts.	2.02	Moderate problem
19.	Coping with complications of diabetes.	2.55	Somewhat serious problem
20.	Feeling burned out by the constant effort needed to manage diabetes.	2.59	Somewhat serious problem
	Grand Mean	2.03	Moderate problem

Note: n=128. 3.21-4.0 Serious problem; 2.41-3.2 Somewhat serious problem; 1.61-2.4 Moderate problem; 0.81-1.6 Minor problem; 0-0.8 Not a problem

Respondents reported worrying about the future and the possibility of serious complications (Mean=2.56), indicating a moderately serious problem. Poor stress management and coping mechanisms have been associated with adherence difficulties later in life (Peyrot et al., 1999). Diabetes-related emotional distress, including anxiety, depression, and eating disorders, has also been linked to poorer diabetes management in both young and adult populations (Delameter et al., 2001).

The respondents generally did not foresee a bright future as individuals living with Type II Diabetes Mellitus. Coping mechanisms were often weak and closely associated with ongoing problems. Many respondents reported experiencing stress and depression, which contributed to disordered eating behaviors. They perceived their health to be declining and believed that their condition would worsen over time, making these concerns a serious problem for most participants.

In contrast, not having clear and concrete goals for diabetes care (Mean=1.34) was considered a minor problem. Perceived barriers play an important role in the self-care process among individuals with diabetes. Key barriers include lack of awareness of health and nutrition programs, insufficient social support, and self-management perceptions (Nagelkerk et al., 2006). Rothman et al. (2008) reported that inappropriate dietary and exercise habits among patients were related to perceived barriers, while Glasgow et al. (2001) found a significant but inverse relationship between perceived barriers and engagement in self-care behaviors.

In this study, having unclear or undefined goals for diabetes care was only a minor issue because respondents were generally aware of how to perform self-care activities, manage their diet, and recognize the importance of incorporating physical activity into their daily routines. This awareness likely mitigated the impact of goal-setting as a perceived barrier among the participants.

Adherence Level to Health-Promoting Behaviors of the Patients with Type II Diabetes Mellitus

Table 4 presents the level of adherence of patients with Type II Diabetes Mellitus to health-promoting behaviors. Health-promoting behaviors had a factor mean of 3.44, rated as very good; medication adherence behaviors had a factor mean of 3.61, also rated as very good; dietary behaviors had a factor mean of 3.59, rated as very good; and exercise behaviors had a factor mean of 2.93, rated as good.

Table 4.

Adherence Level to Health-Promoting Behaviors of the Patients with Type II Diabetes Mellitus

	Indicators	Mean	Interpretation
	Health-Responsibility Behaviors		
1.	I visit my doctor periodically.	3.47	Very good
2.	I self-monitor my blood sugar daily.	3.45	Very good
3.	I have Lipid Profile, Fasting Blood Sugar (FBS) and Glycosylated Hemoglobin A1c (HbA1c) examined periodically.	3.41	Very good
	Factor Mean	3.44	Very good
	Medication Adherence Behaviors		
1.	I take my prescribed medications on time daily.	3.73	Very good
2.	I never forget to take my prescribed medications.	3.70	Very good
3.	Sometimes if I feel worse when taking the prescribed medications, I never stop taking it.	3.52	Very good
4.	Even if I feel better, I still take my prescribed medications.	3.51	Very good
	Factor Mean	3.61	Very good
	Dietary Behaviors		
1.	I control my diet while eating outside.	3.51	Very good
2.	I avoid high fat, oily and sweet foods intake.	3.55	Very good
3.	I am concerned with my blood sugar.	3.69	Very good
4.	I have a balanced diet.	3.55	Very good
5.	I include fruits and vegetables intake daily.	3.63	Very good
	Factor Mean	3.59	Very good
	Exercise Behaviors		
1.	I do 150-minutes exercise every week.	3.01	Good
2.	On bad-weather days, I do exercise.	2.86	Good
	Factor Mean	2.93	Good

Indicators	Mean	Interpretation
Grand Mean	3.39	Good

Note: n= 128. 4.21-5.0 Excellent; 3.41-4.2 Very good; 2.61-3.4 Good; 1.81-2.6 Fair; 1.0-1.8 Poor

Despite significant advances in biomedical technology and the resulting improvements in the lives of individuals with Diabetes Mellitus, the management of Type II Diabetes Mellitus largely depends on the patients themselves. Effective self-management involves practices that patients must perform consistently, including following a healthy diet, engaging in regular physical activity, taking prescribed medications, self-monitoring blood glucose levels, attending routine clinic appointments, and managing stress, among other behaviors (American Diabetes Association, 2002).

The overall level of health-promoting behavior among respondents was rated as good, reflecting the extent to which patients themselves practiced self-care. Respondents sometimes engaged in regular exercise, assumed responsibility for their health, and adhered to daily medication intake. Effective diabetes management requires a multifaceted set of behaviors performed daily, including maintaining a healthy diet, engaging in physical activity, taking prescribed medications, and monitoring blood glucose. However, many respondents still reported unhealthy habits such as binge eating and sedentary lifestyles.

Health-responsibility behaviors had a factor mean of 3.44, rated as very good. Successful diabetes control requires lifelong adherence to multiple self-management activities in collaboration with healthcare professionals. Non-adherence has been linked to negative health outcomes; for example, prescription refill adherence correlates with improved glycosylated hemoglobin A1c (Schectman et al., 2002). The respondents regularly visited their physicians (Mean=3.47, very good) and monitored their blood sugar periodically (Mean=3.41, very good), which contributed to better glycemic control. Laboratory tests such as lipid profile, fasting blood sugar, and glycosylated hemoglobin A1c, while performed regularly, were the lowest among the indicators, likely due to the financial costs associated with these examinations.

Medication adherence behaviors had a factor mean of 3.61, rated as very good. The primary goal of medical treatment is to preserve life and alleviate symptoms, while secondary goals include preventing long-term complications and increasing longevity. In Type II Diabetes Mellitus, oral hypoglycemic agents and lifestyle modifications are the mainstays of treatment (Bastaki, 2005). Respondents reported taking their prescribed medications on time daily (Mean=3.73, very good). Even when feeling better, they continued to adhere to prescribed medications (Mean=3.51, very good), reflecting high regard for professional medical instructions. These results are consistent with the DAWN study, which reported patient-reported medication adherence rates of 78% among individuals with Type II Diabetes Mellitus (Delamater, 2008).

Dietary behaviors had a factor mean of 3.59, rated as very good. Dietary management is a cornerstone of diabetes treatment, influenced by social, cultural, and psychological factors (Ekore et al., 2008). Respondents demonstrated control over their diet, avoiding high-fat, oily, and sweet foods while including fruits and vegetables in daily intake. They were also attentive to blood glucose levels (Mean=3.69, very good). Regular self-monitoring of blood glucose is critical for detecting asymptomatic hypoglycemia and guiding therapy adjustments (Shrivastava et al., 2013). Controlling diet while eating outside (Mean=3.51, very good) was the lowest indicator within this domain, as respondents' dietary patterns sometimes mirrored those of the general population (Laar et al., 2006).

Exercise behaviors had a factor mean of 2.93, rated as good. Exercise is considered one of the four cornerstones of diabetes management, along with medication, diet, and blood glucose self-monitoring.

Exercise supports visceral fat loss, improves vascular risk factors, and enhances resilience to stress and depression associated with diabetes (Zacker, 2004). Most respondents engaged in approximately 150 minutes of moderate-intensity exercise per week (Mean=3.01, good), including activities such as brisk walking, biking, badminton, tai chi, and aerobics (Haskell et al., 2007). However, many led sedentary lifestyles and did not consistently perform these exercises, particularly during bad weather (Mean=2.86, good), which was the lowest indicator in this domain.

Table 5 presents a summary of the overall level of adherence to health-promoting behaviors among patients with Type II Diabetes Mellitus, including health-responsibility, medication adherence, dietary, and exercise behaviors. The grand mean was 3.39, indicating an overall rating of good.

Health-responsibility behaviors had a factor mean of 3.44, which was rated very good. Successful control of Diabetes Mellitus requires lifelong adherence to multiple self-management activities in close collaboration with the healthcare professionals. Lack of adherence to such activities has been revealed to be linked with negative health outcomes. For instance, prescription refill adherence to diabetes mellitus medications correlates with improved glycosylated hemoglobin A1c results (Schectman et al., 2002). As noted, the patients with Type II Diabetes Mellitus periodically visited their physicians for check-ups, and monitored their blood sugar on a regular basis. That is why there is better control of the sugar in the blood to good level.

Medication adherence behaviors had a factor mean of 3.61, which was rated very good. The goal of the medical treatment is primarily to save life and alleviate symptoms. Secondary goals are to prevent long term diabetic-related complications and, by eliminating various risk factors, to increase longevity. Insulin replacement therapy is considered to be one of the cornerstones for the patients with Type I Diabetes Mellitus while diet and lifestyle modifications are for the treatment and management of Type II Diabetes Mellitus patients. Oral hypoglycemic agents are also useful in the treatment of Type II Diabetes Mellitus (Bastaki, 2005). As noted, the respondents wanted to live a longer, healthy life; thus, most of the respondents got medical treatment in the event of secondary symptoms appears.

For the dietary behaviors, it had a factor mean of 3.59, which was rated very good. Dietary management is considered to be one of the cornerstones in treatment of Diabetes Mellitus. It is based on the adherence of healthy diet behaviors in the context of social, cultural, and psychological influences on food choices (Ekore et al., 2008). As noted, respondents had controlled in their diet while eating outside, and most of them avoided high fat, oily and sweet food intake as well as being concerned with their blood sugar. Most respondents had balanced diet and included fruits and vegetables in their daily intake.

For the exercise behaviors, it had a factor mean of 2.93, which was rated good. Exercise has been considered as an essential component of diabetes management. Diabetes specialists have established exercise as one of the four cornerstones of health-promoting behaviors, along with medication, diet and blood glucose self-monitoring. Exercise appears to support in the visceral fat loss. More recent study suggested that exercise may exert favorable effects on emerging vascular disease risk factors. Exercise may also play a protective role by increasing patient resilience to the emotional stress and depression often experienced with diabetes management (Zacker, 2004). However, as noted, this was only rated good as most of the respondents lived a sedentary lifestyle. The respondents did not involve much of their time into brisk exercise.

Table 5.

Summary of Adherence Level to Health-Promoting Behaviors of the Patients with Type II Diabetes Mellitus

Indicators	Factor Mean	Interpretation
Health-Responsibility Behaviors	3.44	Very good
Medication Adherence Behaviors	3.61	Very good
Dietary Behaviors	3.59	Very good
Exercise Behaviors	2.93	Good
Grand Mean	3.39	Good

Note: n=128. 4.21-5.0 Excellent; 3.41-4.2 Very good; 2.61-3.4 Good; 1.81-2.6 Fair; 1.0-1.8 Poor

Health Outcomes of the Patients with Type II Diabetes Mellitus

Table 6 presents the health outcomes of the patients based on actual assessments. Most respondents had normal body mass indices (BMI), comprising 73.4%, while 26.6% had BMIs above normal. Similarly, the majority of respondents had normal lipid profiles (78.1%), with 21.9% above normal. Fasting blood sugar (FBS) levels were normal for 80.5% of respondents, whereas 19.5% were above normal. Finally, glycosylated hemoglobin A1c (HbA1c) results showed that 53.1% of respondents had normal levels, while 46.9% were above normal, making it the indicator with the highest proportion of elevated results.

As observed, the overall health outcomes of patients with Type II Diabetes Mellitus were within normal ranges. Effective treatment of Diabetes Mellitus aims to restore blood glucose to near-normal levels in all patients. The American Diabetes Association (ADA) recommends treatment targets that include a glycosylated hemoglobin A1c (HbA1c) level of less than 7% and a fasting blood sugar (FBS) of less than 120 mg/dL (American Diabetes Association, 2000). Management of Type II Diabetes Mellitus is primarily designed to maximize the effectiveness of endogenous insulin by reducing insulin resistance (American Diabetes Association, 2000). However, achieving positive health outcomes also requires significant patient engagement in self-management practices, including adherence to medications, dietary modifications, regular exercise, and ongoing monitoring of blood glucose

Table 6.

Health Outcomes of the Patients with Type II Diabetes Mellitus

	Indicators	*n*	%
Body Mass Index	Normal	94	73.4
	Above Normal	34	26.6
Lipid Profile	Normal	100	78.1
	Above Normal	28	21.9
Fasting Blood Sugar	Normal	103	80.5
	Above Normal	25	19.5
Glycosylated Hemoglobin A1c	Normal	68	53.1
	Above Normal	60	46.9

Note: n=128

Predictor of Health Outcomes for Body Mass Index

Table 7 presents the predictors of health outcomes in terms of body mass index (BMI) among patients with Type II Diabetes Mellitus. The factors examined—including perceived barriers to action, situational

influences, health responsibility, medication adherence, dietary behaviors, exercise behaviors, age, educational attainment, civil status, occupation, financial status, length of disease diagnosis, and perceived health status—had p-values greater than 0.05. This indicates that none of these factors significantly predicted the BMI outcomes of the patients in this study.

The body mass index (BMI) of patients can be predicted using the following model: BMI = 2.740 (Sex) + 2.493 (Weight) − 3.453 (Height).

For example, if a patient is female (Sex=2), weighs less than 50 kilograms (Weight=1), and has a height between 1.54 and 1.69 meters (Height=2), then: BMI = 2.74 (2) + 2.493 (1) − 3.453 (2) = 1.067. This corresponds to a below-normal BMI (BMI = 1) for a female patient with these characteristics.

Table 7.

Predictor of Health Outcomes for Body Mass Index

Predictors	B	p	Exp(B)	Decision	Interpretation
Personal Factors					
Age	0.160	0.719	1.174	Accept Ho	Not significant
Sex	2.740	0.022	15.482	Reject Ho	Significant
Educational attainment	-0.597	0.305	0.551	Accept Ho	Not significant
Civil status	-1.001	0.142	0.368	Accept Ho	Not significant
Occupation	0.463	0.249	1.588	Accept Ho	Not significant
Financial status	1.840	0.109	6.300	Accept Ho	Not significant
Length of disease diagnosis	-0.924	0.147	0.397	Accept Ho	Not significant
Perceived health status	-0.841	0.143	0.431	Accept Ho	Not significant
Weight	2.493	0.000	12.101	Reject Ho	Significant
Height	-3.453	0.001	0.032	Reject Ho	Significant
Treatments as Perceived Barriers to Action	0.420	0.388	1.522	Accept Ho	Not significant
Situational Influences	-0.152	0.775	0.859	Accept Ho	Not significant
Health-Promoting Behaviors					
Health-responsibility behaviors	0.305	0.687	1.357	Accept Ho	Not significant
Medication adherence behaviors	1.561	0.073	4.762	Accept Ho	Not significant
Dietary behaviors	-1.877	0.094	0.153	Accept Ho	Not significant
Exercise behaviors	0.080	0.918	1.083	Accept Ho	Not significant
(Constant)	-4.815	0.429	0.008	Accept Ho	Not significant

Note: Significant at $p < 0.05$

Similarly, if a patient is male (Sex=1), weighs less than 50 kilograms (Weight=1), and has a height less than 1.53 meters (Height=1), then: BMI = 2.74 (1) + 2.493 (1) − 3.453 (1) = 1.78 ≈ 2. This corresponds to an above-normal BMI (BMI=2) for a male patient with these characteristics.

Statistical analysis showed that sex had a p-value of 0.022, which rejected the null hypothesis, indicating that sex is a significant predictor of BMI outcomes. Females were found to be 15.48 times more likely to become obese than males. Health behaviors differ dynamically between men and women: men are generally more physically active, whereas women's exercise patterns tend to be more health-promoting and sustainable (Dean, 1989). Men also utilize fewer healthcare services, despite women being more likely

to seek preventive care (Courtenay, 2000; Bird et al., 2007). As observed, the relatively lower physical activity among women in this study may explain the higher likelihood of obesity compared to men.

Both weight (p=0.000) and height (p=0.001) were also significant predictors of BMI, rejecting the null hypothesis. Respondents weighing less than 50 kilograms were 12.1 times more likely to have a normal BMI, whereas those with heights between 1.54 and 1.69 meters were 0.032 times more likely to have a normal BMI. BMI is a widely accepted indicator of body fat in adults, and nearly 90% of individuals with Type II Diabetes Mellitus are overweight or obese. Both BMI and body fat distribution—reflecting the proportion of weight to height—are strong predictors of obesity-related health risks, particularly in patients with Type II Diabetes Mellitus.

The American Diabetes Association recommends that modest weight loss and reduced energy intake improve glycemic control in insulin-resistant individuals (Boucher et al., 2007). As observed in this study, periodic weight monitoring can help patients become more aware of their BMI changes and encourage adherence to health-promoting behaviors.

Predictor of Health Outcomes for Lipid Profile

Table 8 presents the predictors of health outcomes in terms of lipid profile among patients with Type II Diabetes Mellitus. The factors analyzed—including perceived barriers to action, situational influences, health-responsibility, medication adherence, dietary behaviors, exercise behaviors, age, sex, educational attainment, civil status, occupation, financial status, length of disease diagnosis, perceived health status, and height—had p-values greater than 0.05. This indicates that none of these factors, except weight, significantly predicted the lipid profile of the patients.

The lipid profile can be predicted using the following model: Profile=0.713(Weight). This indicates that weight is a key predictor of lipid profile among patients with Type II Diabetes Mellitus, highlighting the relationship between body mass and lipid metabolism.

Statistical analysis showed that weight had a p-value of 0.002, which rejected the null hypothesis, indicating that weight is a significant predictor of lipid profile among patients with Type II Diabetes Mellitus. Respondents with higher body weight were 2.041 times more likely to exhibit elevated lipid profile results.

Lipid abnormalities are common in individuals with Type II Diabetes Mellitus. Insulin resistance and central obesity are closely linked factors that contribute to dyslipidemia in these patients (Brunzell & Hokanson, 1999). The role of insulin resistance in the pathogenesis of Type II Diabetes Mellitus was first ecognized by Himsworth (1936), and central obesity was later identified as a key risk factor for the disease (Vague, 1956). Subsequent research has consistently confirmed this relationship.

As observed in this study, periodic weight monitoring may help patients become more aware of changes in their body weight, which in turn can promote healthier eating habits and reduce sedentary behavior, ultimately supporting better control of lipid levels.

Table 8.
Predictor of Health Outcomes for Lipid Profile

Predictors	B	p	Exp(B)	Decision	Interpretation
Personal Factors					
Age	-0.169	0.593	0.844	Accept Ho	Not significant
Sex	0.272	0.719	1.312	Accept Ho	Not significant
Educational attainment	-0.395	0.310	0.673	Accept Ho	Not significant

Civil status	-0.173	0.709	0.842	Accept Ho	Not significant
Occupation	0.200	0.516	1.221	Accept Ho	Not significant
Financial status	0.821	0.268	2.272	Accept Ho	Not significant
Length of disease diagnosis	-0.424	0.279	0.654	Accept Ho	Not significant
Perceived health status	-0.689	0.079	0.502	Accept Ho	Not significant
Weight	0.713	0.002	2.041	Reject Ho	Significant
Height	-1.010	0.110	0.364	Accept Ho	Not significant
Treatments as Perceived Barriers to Action	0.664	0.064	1.942	Accept Ho	Not significant
Situational Influences	-0.578	0.147	0.561	Accept Ho	Not significant
Health-Promoting Behaviors					
Health responsibility behaviors	-0.146	0.781	0.864	Accept Ho	Not significant
Medication adherence behaviors	0.055	0.919	1.057	Accept Ho	Not significant
Dietary behaviors	-0.979	0.131	0.376	Accept Ho	Not significant
Exercise behaviors	-0.011	0.981	0.989	Accept Ho	Not significant
(Constant)	4.114	0.305	61.172	Accept Ho	Not significant

Note: Significant at $p < 0.05$

Predictor of Health Outcomes for Fasting Blood Sugar

Table 9 presents the predictors of health outcomes in terms of fasting blood sugar (FBS) among patients with Type II Diabetes Mellitus. The factors analyzed—including perceived barriers to action, situational influences, health-responsibility behaviors, medication adherence behaviors, dietary behaviors, exercise behaviors, age, sex, educational attainment, civil status, occupation, financial status, length of disease diagnosis, perceived health status, and height—had p-values greater than 0.05. This indicates that none of these factors significantly predicted the fasting blood sugar levels of the patients in this study.

Table 9.
Predictor of Health Outcomes for Fasting Blood Sugar

Predictors	B	p	Exp(B)	Decision	Interpretation
Personal Factors					
Age	-0.058	0.856	0.943	Accept Ho	Not significant
Sex	1.435	0.095	4.201	Accept Ho	Not significant
Educational attainment	0.761	0.076	2.141	Accept Ho	Not significant
Civil status	-0.187	0.650	0.829	Accept Ho	Not significant
Occupation	0.074	0.804	1.077	Accept Ho	Not significant
Financial status	-0.681	0.466	0.506	Accept Ho	Not significant
Length of diagnosis	0.058	0.885	1.059	Accept Ho	Not significant
Perceived health status	-0.378	0.338	0.685	Accept Ho	Not significant
Weight	0.285	0.173	1.330	Accept Ho	Not significant
Height	-0.427	0.476	0.652	Accept Ho	Not significant
Treatments as Perceived Barriers to Action	0.148	0.659	1.160	Accept Ho	Not significant
Situational Influences	0.708	0.067	2.030	Accept Ho	Not significant
Health-Promoting Behaviors					

Predictors	B	p	Exp(B)	Decision	Interpretation
Health-responsibility behaviors	0.009	0.986	1.009	Accept Ho	Not significant
Medication adherence behaviors	-0.840	0.118	0.432	Accept Ho	Not significant
Dietary behaviors	-0.331	0.564	0.718	Accept Ho	Not significant
Exercise behaviors	0.762	0.113	2.142	Accept Ho	Not significant
(Constant)	-4.090	0.294	0.017	Accept Ho	Not significant

Note: Significant at $p < 0.05$

Predictor of Health Outcomes for Glycosylated Hemoglobin A1c

Table 10 presents the predictors of health outcomes in terms of glycosylated hemoglobin A1c (HbA1c) among patients with Type II Diabetes Mellitus. The factors analyzed—including perceived barriers to action, situational influences, health-responsibility behaviors, medication adherence behaviors, exercise behaviors, age, sex, educational attainment, occupation, financial status, length of disease diagnosis, perceived health status, and height—had p-values greater than 0.05. This indicates that none of these factors significantly predicted the HbA1c levels of the patients in this study.

Table 10.

Predictor of Health Outcomes for Glycosylated Hemoglobin A1c

Predictors	B	p	Exp(B)	Decision	Interpretation
Personal Factors					
Age	-0.204	0.632	0.815	Accept Ho	Not significant
Sex	-1.113	0.211	0.328	Accept Ho	Not significant
Educational attainment	-0.399	0.350	0.671	Accept Ho	Not significant
Civil status	-1.117	0.028	0.327	Reject Ho	Significant
Occupation	-0.282	0.398	0.754	Accept Ho	Not significant
Financial status	1.886	0.088	6.594	Accept Ho	Not significant
Length of disease diagnosis	-0.061	0.896	0.941	Accept Ho	Not significant
Perceived health status	-0.086	0.837	0.918	Accept Ho	Not significant
Weight	0.907	0.000	2.477	Reject Ho	Significant
Height	-1.106	0.103	0.331	Accept Ho	Not significant
Treatment as Perceived Barriers to Action	0.458	0.243	1.580	Accept Ho	Not significant
Situational Influences	0.387	0.352	1.473	Accept Ho	Not significant
Health-Promoting Behaviors					
Health responsibility behaviors	0.344	0.568	1.410	Accept Ho	Not significant
Medication adherence behaviors	-0.425	0.477	0.654	Accept Ho	Not significant
Dietary behaviors	-1.606	0.022	0.201	Reject Ho	Significant
Exercise behaviors	-0.101	0.847	0.904	Accept Ho	Not significant
(Constant)	8.954	0.066	7737.401	Accept Ho	Not significant

Note: Significant at $p < 0.05$

The glycosylated hemoglobin A1c (HbA1c) of patients can be predicted using the following model: HbA1c = 8.954 − 1.606 (Dietary Behavior) − 1.117 (Civil Status) + 0.907 (Weight).

Dietary behavior had a p-value of 0.022, which rejected the null hypothesis, indicating that it is a significant predictor of HbA1c outcomes. Patients with better dietary behavior were 0.201 times more likely to achieve improved HbA1c results. Dietary management is a cornerstone in the treatment of Diabetes Mellitus, emphasizing adherence to healthy eating behaviors influenced by social, cultural, and psychological factors (Ekore et al., 2008). Proper dietary practices, including low fat and sodium intake and high fiber consumption, have been shown to significantly reduce HbA1c levels in diabetic patients (Shamsi et al., 2013; American Diabetes Association, 2008). As observed, adherence to healthy eating habits can improve blood glucose control and reduce the risk of diabetes-related complications.

Civil status had a p-value of 0.028, which also rejected the null hypothesis, indicating it as a significant predictor of HbA1c outcomes. Married respondents were 0.327 times more likely to achieve better HbA1c results. This may be attributed to the support provided by spouses, which can promote adherence to dietary guidelines, medication, and overall diabetes self-management.

Weight had a p-value of 0.000, which rejected the null hypothesis, showing that weight is a significant predictor of HbA1c outcomes. Patients weighing less than 50 kilograms were 2.48 times more likely to achieve improved HbA1c results. Nearly 90% of individuals with Type II Diabetes Mellitus are overweight or obese. Weight loss of more than 3% has been associated with improved glycemic control, particularly in newly treated patients (McAdam et al., 2014). Medications that promote weight loss or weight neutrality further enhance HbA1c goal attainment. As noted, proper weight management in combination with adherence to anti-diabetic medications can help improve glucose control and optimize HbA1c outcomes.

CONCLUSION

Based on the findings of this study, it can be concluded that sex, weight, and height were significant predictors of health outcomes in terms of body mass index (BMI); weight was a significant predictor of health outcomes for lipid profile; and civil status, weight, and dietary behaviors were significant predictors of health outcomes for glycosylated hemoglobin A1c (HbA1c) among patients with Type II Diabetes Mellitus.

These findings can serve as a foundation for the development of a health promotion program, guided by the Health Promotion Model of Nola J. Pender (1996), aimed at enhancing self-care management among patients with Type II Diabetes Mellitus. Such a program could support patients in adopting and maintaining health-promoting behaviors, ultimately improving their overall health outcomes and quality of life.

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