

The Level of Knowledge and Demographics of Older Adults with Type 2 Diabetes: A Comparative Study

Jhancy Ico¹, Jhamina Kim Aviles¹, April Joy Carretero¹, Annacil De Guzman¹, Joan Maricon Domantay¹, Maxeene Jomaira Repollo¹, Jordan Llego¹

College of Nursing, University of Luzon, Dagupan City, Philippines¹

Corresponding author:

Name: Jordan Llego

Address: College of Nursing,
University of Luzon, Dagupan
City, Philippines.E-mail: llegojordan@gmail.com**Article info:**<http://dx.doi.org/10.70848/cnj.v3i1.97>

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Abstract

Introduction: Type 2 diabetes mellitus (T2DM) is a major global public health concern, accounting for 90–95% of diabetes cases and affecting an estimated 537 million adults worldwide, a number projected to rise to 783 million by 2045. **Objective:** This study aims to determine differences in knowledge and demographic characteristics among older adults with Type 2 diabetes mellitus (T2DM) in two villages in Dagupan City. **Methods:** A total of 100 respondents completed the Filipino Version of the Michigan Diabetes Knowledge Test. Purposive sampling was employed. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used. Inferential statistics were applied to test for significant differences. **Results:** The findings revealed that participants demonstrated good awareness of the risks associated with high-fat diets but had limited knowledge regarding the effects of unsweetened fruit juices and “free foods” on blood glucose control. Overall, respondents exhibited a moderate level of understanding of diabetes care. Notable gaps were identified in insulin-related knowledge, particularly in managing comorbid conditions such as influenza. No significant differences in knowledge were observed across age groups and educational attainment. However, a significant difference was found between genders, indicating the need for gender-sensitive educational approaches. **Conclusion:** Overall, the study emphasizes the need to identify and address knowledge deficiencies in diabetes treatment in older adults. The research highlights the importance of tailored, culturally sensitive, and gender-specific educational programs in enhancing diabetes awareness among older adults. Nurses have a key role in delivering these interventions, which could have a substantial influence on diabetes control and the quality of life for this group.

Keywords:

Community-Based Research, Diabetes Mellitus, Older Adults, Knowledge on Diabetes, Nurses



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INTRODUCTION

A key research gap lies in understanding how demographic characteristics influence diabetes-related knowledge among older adults with Type 2 diabetes mellitus (T2DM). Examining the relationship between diabetes knowledge and demographic factors is essential in identifying the specific challenges this population faces in disease self-management.

Type 2 diabetes mellitus (T2DM) is a major and growing global public health concern. It is characterized by persistent hyperglycemia and is associated with a complex interplay of genetic, lifestyle, and environmental factors. As the most prevalent form of diabetes, T2DM accounts for approximately 90–95% of all cases. It imposes a substantial burden on individuals and healthcare systems worldwide, affecting an estimated 537 million adults in 2021, with projections reaching 783 million by 2045. The rising prevalence of obesity further exacerbates the progression of diabetes. In England alone, approximately 4.6 million individuals, or 9.5% of the population, are projected to have diabetes by 2030 (Khan et al., 2019). In the Philippines, an estimated 6.3% of adults are affected by diabetes, reflecting global trends. This corresponds to nearly 4 million individuals, excluding those who remain undiagnosed or at risk of developing the condition (Giron & de la Vega, 2022).

Older adults with T2DM require comprehensive knowledge of disease management, including dietary practices, physical activity, medication adherence, and blood glucose monitoring (Longo et al., 2019). Engagement in physical activity and advancing age have been associated with better knowledge and more positive attitudes toward diabetes management, highlighting the importance of education and psychological factors in this population (Lima et al., 2020). Furthermore, adherence to treatment and medication regimens is critical in maintaining quality of life among older adults with T2DM (Pratama et al., 2019). Adequate knowledge enables individuals to actively participate in their care, potentially improving outcomes and delaying the progression of diabetes-related complications (Kalra & Sharma, 2018). Among Filipinos, higher levels of self-efficacy have been linked to improved knowledge, emotional well-being, and self-care practices (Ku & Kegels, 2015).

However, previous studies have identified substantial gaps in diabetes-related knowledge among older adults. Borba et al. (2019) reported that many older adults lacked adequate understanding of key aspects of diabetes, including ketonuria, food substitution, and hypoglycemia management. Insufficient knowledge has been associated with negative attitudes toward diabetes self-care. Additionally, cultural influences, such as dietary preferences characterized by high sugar consumption, may hinder adherence to recommended lifestyle modifications among Filipinos (Tan, 2016).

Despite the recognized importance of diabetes knowledge, several factors, including aging, comorbidities, and psychosocial conditions, may influence self-management practices among older adults (Longo et al., 2019; Ku & Kegels, 2015). Individuals who are more physically active or older may demonstrate better knowledge, possibly due to increased exposure to health information (Lima et al., 2020). Nevertheless, persistent knowledge gaps in areas such as hypoglycemia, ketonuria, and food exchanges underscore the need for targeted and culturally relevant educational interventions. In the context of Dagupan City, examining the relationship between demographic factors and diabetes knowledge may provide valuable insights for developing effective, community-based interventions.

Hence, this study aims to determine the level of knowledge and demographic characteristics of older adults with T2DM. Specifically, it seeks to: (1) describe respondents' demographic profiles (age, gender, family history, lifestyle factors, and educational attainment); (2) assess levels of diabetes-related knowledge (general knowledge, insulin knowledge, and overall knowledge); and (3) examine differences between respondents' knowledge levels and their demographic profiles. The study is guided by the hypothesis that there is no significant difference between respondents' demographic characteristics and their overall level of diabetes knowledge.

METHODS

1. Design

This study employed a cross-sectional research design to examine the relationship between diabetes knowledge levels and demographic characteristics among older adults with Type 2 diabetes mellitus (T2DM). This design is appropriate as it provides a comprehensive snapshot of the current situation, is feasible to implement, and offers a basis for future research (Wang & Cheng, 2020; Setia, 2016).

2. Population and Sampling Technique

The study population consisted of older adults diagnosed with Type 2 diabetes mellitus residing in Barangay Pantal and Barangay Gueset in Dagupan City, Pangasinan, Philippines. These locations were selected based on data from the Dagupan City Health Office indicating a high prevalence of diabetes cases.

The inclusion criteria were: (1) individuals aged 60 years and above, classified as older adults in the Philippines; (2) a confirmed diagnosis of Type 2 diabetes mellitus based on American Diabetes Association standards and identification by barangay health workers; (3) residency in Barangay Pantal or Gueset; and (4) ability to provide informed consent.

Exclusion criteria included individuals with cognitive impairment or dementia that would hinder comprehension or consent, as well as those with severe diabetes-related complications (e.g.,

advanced neuropathy, blindness due to retinopathy, or end-stage renal disease) that could interfere with participation.

A total population of 120 eligible individuals was identified. Using the Lynch formula (confidence level = 95%, margin of error = 5%, population proportion = 50%), the minimum required sample size was 92. However, to minimize sampling bias, 100 respondents were recruited using purposive sampling.

3. Instruments

Data were collected using a two-part questionnaire. Part I included demographic information such as age, gender, family history, lifestyle factors, and educational attainment. Part II consisted of the Filipino Version of the Michigan Diabetes Knowledge Test (Filipino-DKT), adopted from Gomez and Gomez (2022).

The instrument demonstrated strong validity and reliability. Content validity indices showed an S-CVI of 0.91 and I-CVI ranging from 0.833 to 1, indicating high validity (Ku & Kegels, 2015). Reliability testing yielded a Cronbach's alpha of 0.70, indicating acceptable internal consistency (Ventura-León & Peña-Calero, 2021).

Face validity was also assessed by seven experts, including a Chief Nurse, Assistant Chief Nurse, Medical Ward Staff Nurse, Nursing Supervisor, U.S.-licensed Registered Nurse, Diabetes Clinic Nurse, and Clinical Instructor. The instrument achieved an average score of 4.56 out of 5, indicating high validity.

4. Data Collection Process

Data collection was conducted between December 2023 and January 2024. The recruitment process was facilitated by barangay officials and health workers, who assisted in identifying eligible participants.

Participants were first recruited in Barangay Gueset, followed by Barangay Pantal one week later. The researchers conducted face-to-face data collection, during which they remained present to assist respondents and clarify any questions while completing the questionnaire. A barangay official accompanied the researchers throughout the process.

Participants were not exposed to any educational intervention related to T2DM by the researchers prior to data collection. All respondents provided informed consent before participation.

5. Data Analysis

Data were encoded using Microsoft Excel and analyzed using SPSS version 25. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize the data.

Assumptions for parametric testing were evaluated and met. Normality was confirmed using Shapiro–Wilk and Kolmogorov–Smirnov tests ($p > .05$), while homogeneity of variance was verified using Levene's test ($p > .05$).

Inferential statistics included an independent-samples t-test to assess differences based on gender and a one-way ANOVA to evaluate differences across age groups and educational attainment. No missing data were recorded, as completeness was ensured during data collection.

6. Research Ethics

The study was approved by the University of Luzon College of Nursing Research Ethics Committee (Approval No. NR-SL-001-23). All participants provided informed consent prior to participation.

Participants were informed about the purpose of the study, voluntary participation, and their right to withdraw at any time without penalty. No incentives or coercion were used.

Confidentiality and anonymity were strictly maintained. Identifiable information, including exact residence, was not collected. Data were securely stored on a password-protected device and accessible only to the research team. Future access to the data requires formal request to the lead researcher.

RESULTS

1. Demographic Characteristics of Respondents

A total of 100 older adults with Type 2 diabetes mellitus participated in the study. The majority of respondents were female, and most were within the younger segment of the elderly population (60–69 years old). A considerable proportion reported having a family history of diabetes, while variations were observed in educational attainment and lifestyle factors among participants. The demographic characteristics of respondents are presented in Table 1.

2. Level of Diabetes Knowledge

Regarding general knowledge on diabetes (Table 2), respondents demonstrated good knowledge of the complications associated with high-fat food consumption (72.00%). However, poor knowledge was observed in several areas, including the effects of unsweetened fruit juice on blood glucose (33.00%), the definition of a diabetes diet and identification of high-fat foods (27.00%), and the concept of “free foods” for individuals with diabetes (21.00%). Overall, respondents exhibited a moderate level of general diabetes knowledge ($M = 43.07$, $SD = 0.07$).

In terms of insulin knowledge, respondents demonstrated limited understanding of key concepts, including the signs of ketoacidosis, the mechanism of insulin action, and its physiological effects, with correct responses ranging from 23% to 30%. The overall insulin knowledge level was categorized as poor ($M = 31.67$, $SD = 16.06$). Overall diabetes knowledge was at a moderate level ($M = 38.61$, $SD = 12.08$). The level of diabetes knowledge among respondents is presented in Table 2.

3. Differences in Knowledge According to Demographic Variables

Table 3 presents the differences in total diabetes knowledge across respondents' demographic profiles. A one-way ANOVA showed no significant difference in total diabetes knowledge across age groups, $F(2, 96) = 0.74, p = .48$. Similarly, no significant difference was found in total diabetes knowledge based on educational attainment, $F(2, 96) = 1.03, p = .36$.

However, an independent-samples *t*-test revealed a significant difference in total diabetes knowledge between male and female respondents, $t(98) = 2.38, p = .02$. The effect size indicated a moderate difference (Cohen's $d = 0.55$; Hedges' $g = 0.55$), with an approximate 95% confidence interval ranging from 0.09 to 1.01. Male respondents ($M = 43.48, SD = 8.79, n = 25$) demonstrated higher knowledge scores compared to female respondents ($M = 36.99, SD = 12.63, n = 75$).

Table 1. Distribution of the Respondents based on Demographic Profile (N=100)

Variables	Frequency (n)	Percentage	
Age	60–65 years old	21	21.0%
	66–70 years old	66	66.0%
	≥71 years old	13	13.0%
Gender	Male	25	25.0%
	Female	75	75.0%
*Family History	Diabetes	69	69.0%
	Hypertension	35	35.0%
	Cancer	6	6.0%
*Vices/Lifestyle	Smoking	24	24.0%
	Drinking	33	33.0%
	Unhealthy diet	50	50.0%
Education	Elementary Level	24	24.0%
	High School Level	63	63.0%
	College Level	13	13.0%

*Multiple answers

Table 2. Level of Knowledge on Diabetes of the Respondents (N=100)

Indicators	Percentage of Correct Answer	Interpretation
1. Diabetes diet definition	27.0%	Poor
2. Foods highest in carbohydrate	34.0%	Moderate
3. Foods highest in fat	27.0%	Poor
4. Free food for diabetic	21.0%	Poor
5. Glycosylated hemoglobin (hemoglobin A1) test definition	35.0%	Moderate
6. The best method for testing blood glucose	42.0%	Moderate
7. Effect of unsweetened fruit juice on blood glucose	33.00%	Poor
8. Treatment of low blood glucose	37.0%	Moderate
9. Effect of exercise on blood glucose	62.0%	Moderate
10. Complications of infection on DM patients	57.0%	Moderate
11. The best way of self-care for diabetic patients' foot	66.0%	Moderate
12. Complications of eating fatty foods on DM	72.0%	Good
13. Causes of numbness and tingling in DM	51.0%	Moderate
14. Diabetes diet definition	39.0%	Moderate
Mean (±SD) General Knowledge Score	43.07 (0.07)	Moderate
15. Signs of ketoacidosis	27.0%	Poor
16. Management of flu in diabetic patients	20.0%	Poor
17. Action time of intermediate-acting insulin	30.0%	Poor
18. Action if diabetic patient forgot to take his/her insulin before breakfast	25.0%	Poor
19. Action if diabetic patient began to have an insulin reaction	23.0%	Poor
20. Causes of low blood glucose	23.0%	Poor
21. Effect of taking morning insulin without breakfast on blood glucose level	49.0%	Moderate
22. Causes of high blood glucose	45.0%	Moderate
23. Causes of insulin reaction	43.0%	Moderate

Indicators	Percentage of Correct Answer	Interpretation
Mean (\pm SD) Insulin Knowledge Score	31.67 (16.06)	Moderate
Mean Total Knowledge on Diabetes	38.61 (12.08)	Poor

Table 3. Differences in Total Diabetes Knowledge Across Respondents' Demographic Profiles (N=100)

Variables	Mean (SD)	Test Statistic	p-value	Effect Size	
Age	60–65 years old	39.34 (8.52)	$F(2, 96) = 0.74$.48	—
	66–70 years old	39.13 (13.34)			
	≥ 71 years old	34.78 (10.04)			
Gender	Male	43.48 (8.79)	$t(98) = 2.38$.02	0.55
	Female	36.99 (12.63)			
Education	Elementary Level	36.23 (8.17)	$F(2, 96) = 1.03$.36	—
	High School Level	38.79 (13.58)			
	College Level	42.14 (9.94)			

Note. F = one-way analysis of variance (ANOVA); t = independent-samples t-test; Effect size reported as Cohen's *d*.

DISCUSSION

The respondents' relatively high level of knowledge regarding the risks associated with high-fat diets is a positive finding. Awareness of the detrimental effects of unhealthy fat consumption is essential, as such diets contribute to elevated cholesterol levels and increase the risk of cardiovascular diseases, which are prevalent among individuals with diabetes (Wali et al., 2020). This awareness may reflect the effectiveness of public health campaigns emphasizing the risks of high-fat dietary patterns (Gonzalez-Nahm et al., 2020).

However, substantial knowledge gaps remain, particularly regarding the effects of unsweetened fruit juice on blood glucose levels. Despite being labeled "unsweetened," these beverages often contain high levels of natural sugars that can rapidly increase blood glucose (Pepin et al., 2019). Misconceptions in this area may lead to inappropriate dietary choices, highlighting the need for targeted educational interventions (Adu et al., 2019). Similarly, limited understanding of high-fat food consumption and its role in weight gain, cardiovascular risk, and insulin resistance further complicates effective diabetes management (Martins & Conde, 2022). In addition, the concept of "free foods," which have minimal impact on blood glucose levels, appears to be poorly understood, indicating gaps in meal planning and hunger management strategies (Maneesing, 2023).

Overall, the moderate level of diabetes knowledge observed among respondents suggests the presence of basic awareness; however, this knowledge remains insufficient for effective self-management. While the relatively low variability indicates consistency across respondents, it also reflects a uniformly limited depth of understanding. This highlights the need for comprehensive and targeted educational strategies to improve diabetes literacy, particularly in dietary management, which plays a critical role in preventing complications and improving quality of life (Sękowski et al., 2022).

Knowledge related to insulin use was particularly limited, especially in the context of managing comorbid conditions such as influenza. Illnesses can significantly affect blood glucose levels, requiring adjustments in medication, fluid intake, and monitoring practices (Hulme, 2020). The low mean score indicates insufficient understanding of insulin use and diabetes care (Priscilla et al., 2019). Although Type 2 diabetes is often initially managed through lifestyle modifications, insulin therapy may become necessary when glycemic control is not achieved through diet, exercise, and oral medications (Coetzee, 2023).

Addressing these knowledge gaps requires coordinated efforts in diabetes education. Healthcare professionals, including diabetes educators and nutritionists, should provide clear and practical guidance on dietary management, food labeling, and meal planning (Mphasha, 2024). Public health initiatives and advocacy programs can further support these efforts by increasing awareness through community-based interventions, workshops, and accessible digital resources (Kalra). Comprehensive education programs should also emphasize practical skills, such as insulin management, recognition of blood glucose fluctuations, and the influence of lifestyle factors on disease control (Simonsen et al., 2021).

The findings also underscore the critical role of nurses in diabetes education. Nurses are uniquely positioned to support patients in developing self-management skills, including recognizing symptoms of hypo- and hyperglycemia, administering insulin, and implementing appropriate dietary practices (AlHaqwi et al., 2023; Zhou et al., 2020). Effective diabetes education requires individualized approaches that consider patients' comprehension levels, cultural backgrounds, and lifestyle contexts (Fereidouni et al., 2019).

The absence of significant differences in diabetes knowledge across age groups and educational attainment suggests that educational interventions may be standardized without extensive

customization for these variables. This may simplify the development and dissemination of educational materials (BMC, 2023; Giguère et al., 2020; Mirzaei et al., 2023). However, the significant difference observed between male and female respondents indicates that gender-specific strategies may be necessary to ensure equitable knowledge acquisition (Shahzad et al., 20218). Understanding the underlying factors contributing to this disparity, including cultural, social, and psychological influences, is essential for improving the effectiveness of educational interventions (Huang et al., 2022). Tailored communication strategies may help address gender-specific learning needs and reduce disparities in diabetes knowledge (Camargo-Plazas et al., 2023). Continuous assessment of patients' knowledge and awareness is also necessary to evaluate and enhance the effectiveness of educational programs (Kumar et al., 2022).

Overall, while respondents demonstrate awareness of certain aspects of diabetes management, particularly dietary risks, critical misconceptions persist, especially regarding natural sugars, high-fat diets, and insulin-related care. These gaps may directly affect self-management practices and glycemic control. The findings emphasize the importance of transitioning from general awareness to practical, skills-based education that equips individuals with the knowledge necessary for effective diabetes management. Given that knowledge levels do not vary significantly by age or educational attainment but differ by gender, standardized education can be implemented broadly, while targeted strategies should be developed to address gender-specific barriers and promote equitable diabetes literacy.

Implications for Practice and Future Research

The findings of this study have important implications for clinical practice, particularly in the design and implementation of diabetes education programs for older adults. The presence of moderate yet insufficient knowledge, coupled with specific misconceptions related to dietary management and insulin use, highlights the need for more structured and practical educational interventions. Healthcare professionals, especially nurses, should prioritize patient-centered education that emphasizes real-life applications, such as interpreting food labels, understanding the effects of natural sugars, and managing insulin during illness. Given that knowledge levels did not significantly differ across age and educational attainment, standardized educational materials may be effectively implemented across diverse patient groups. However, the observed gender differences suggest that tailored communication strategies should be developed to address gender-specific learning needs and barriers.

For future research, further investigation is needed to explore the underlying factors contributing to persistent knowledge gaps, particularly in dietary

misconceptions and insulin management. Longitudinal studies may provide deeper insights into how knowledge evolves over time and how it influences self-management behaviors and clinical outcomes. Additionally, intervention-based studies are recommended to evaluate the effectiveness of culturally sensitive, gender-responsive, and skills-based educational programs in improving diabetes knowledge and patient outcomes. Expanding research to different geographical settings and larger populations would also enhance the generalizability of findings. Future studies may also examine the role of digital health tools and community-based interventions in strengthening diabetes education and supporting long-term disease management.

Limitations

The research is confined to two villages in Dagupan City and may not be representative of the broader demographic of older adults with Type 2 Diabetes Mellitus in the Philippines or other areas. This restricts the applicability of the results. However, since there is little information about the geographical location, this study could add to the dearth in the literature. A cross-sectional design enables the examination of data at a single point in time but does not allow for inferences about cause-and-effect relationships. This approach cannot be used to evaluate changes in knowledge over time or due to interventions. The study notes that participants had not been subjected to any educational intervention regarding T2DM conducted by the researchers. Previous education or information sessions attended by participants are not accounted for, potentially impacting their knowledge levels.

CONCLUSION

Overall, the study emphasizes the need to identify and address knowledge gaps in diabetes treatment among older adults. The research highlights the importance of tailored, culturally sensitive, and gender-specific educational programs in enhancing diabetes awareness among older adults. Nurses have a key role in delivering these interventions, which could have a substantial influence on diabetes control and the quality of life for this group.

Author Contributions

Conceptualization: Jhancy Ico, Jhamina Kim Aviles, April Joy Carretero, Annacil De Guzman, Joan Maricon Domantay, Maxeene Jomaira Repollo, Jordan Llego; Methodology: Jhancy Ico, Jhamina Kim Aviles, April Joy Carretero, Annacil De Guzman, Joan Maricon Domantay, Maxeene Jomaira Repollo, Jordan Llego; Data Collection: Jhancy Ico, Jhamina Kim Aviles, April Joy Carretero, Annacil De Guzman, Joan Maricon Domantay, Maxeene Jomaira Repollo;

Analysis: Jhancy Ico, Jhamina Kim Aviles, April Joy Carretero, Annacil De Guzman, Joan Maricon Domantay, Maxeene Jomaira Repollo, Jordan Llego; Writing – Original Draft: Jhancy Ico, Jhamina Kim Aviles, April Joy Carretero, Annacil De Guzman, Joan Maricon Domantay, Maxeene Jomaira Repollo; Writing – Review & Editing: Jhancy Ico, Jhamina Kim Aviles, April Joy Carretero, Annacil De Guzman, Joan Maricon Domantay, Maxeene Jomaira Repollo, Jordan Llego.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Conflict of Interest

The authors declare no conflicts of interest.

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