ORIGINAL RESEARCH

PATIENT KNOWLEDGE AS DETERMINANT OF MEDICATION ADHERENCE IN TYPE 2 DIABETES MELLITUS AT SIMARMATA PRIMARY HEALTH CENTER, SAMOSIR REGENCY

Laura Mariati Siregar[1], Nurpina Simarmata[1], Vierto Irennius Girsang[1], Asima Sirait[1]

[1]Faculty of Pharmacy and Health Sciences, Sari Mutiara Indonesia University, Medan, North Sumatra, Indonesia

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Corresponding Author:
Vierto Irennius Girsang
Email: viertogirsang@gmail.com

Abstract

Background: Diabetes mellitus management includes dietary restrictions, increased physical activity, an appropriate medication regimen, regular medical follow-up, and periodic metabolic monitoring through laboratory examinations. Adherence of diabetes mellitus patients to therapy that has been indicated and prescribed by physicians will lead to positive therapeutic effects.

Purpose: The aim of this study is to identify the relationship between patient knowledge and medication adherence among type 2 diabetes mellitus patients at Simarmata Primary Health Center, Samosir Regency.

Methods: This study employed a quantitative research approach with a cross-sectional design. The population consisted of all diabetes mellitus patients who were undergoing routine medical follow-up at the health center, totaling 32 individuals. The sample was selected using a total sampling technique, resulting in 32 respondents.

Results: The study findings showed that 56.3% of respondents had good knowledge, with 34.4% demonstrating adherence to medication and 21.9% non-adherence. Respondents with moderate knowledge accounted for 37.5%, of whom 34.4% were non-adherent and only 3.1% adherent. The statistical test resulted in a significance value of Sig. = 0.001, which was lower than 0.005, indicating a significant relationship between knowledge and medication adherence.

Conclusion: It can therefore be concluded that there is a significant relationship between patient knowledge and medication adherence among people with type 2 diabetes mellitus. Respondents are encouraged to further improve their adherence to prescribed medication in order to increase the likelihood of successful treatment outcomes and achieve a higher rate of recovery.

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1. Introduction

Type 2 diabetes mellitus constitutes a major and growing global health burden. Epidemiological estimates indicate that approximately 9% of adults live with diabetes, and diabetes is associated with an estimated 1.5 million deaths annually; moreover, projections suggest diabetes may become one of the leading causes of death by 2030, underscoring its public health urgency (1). Contemporary clinical guidance emphasizes that diabetes care requires not only pharmacotherapy but also systematic monitoring and quality-of-care evaluation, reflecting the condition's chronic, complication-prone nature and the need for sustained management within health systems, including primary care settings (2).

Within this context, medication adherence is repeatedly identified as a pivotal determinant of outcomes in diabetes management. Evidence among newly diagnosed patients shows that lower medication adherence is associated with an increased risk of hospitalization, while adherence is linked to better glycemic control and reduced emergency and inpatient utilization, illustrating the clinical and health-system consequences of nonadherence (3). However, adherence is not merely a pharmacologic issue; it is intertwined with broader self-management behaviors and patient capability, such that glycemic control does not necessarily map perfectly onto overall self-management performance, motivating research that simultaneously considers adherence and patient level determinants such as knowledge (4). In rural and resource-constrained contexts, where barriers such as lower literacy and limited awareness may be more prominent, adherence challenges may be amplified and may contribute to preventable complications and avoidable care escalation (5).

Medication adherence is also a multidimensional behavior shaped by numerous determinants. Updated syntheses of systematic reviews indicate adherence is influenced by a wide spectrum of factors, supporting the need to identify at-risk patients and tailor interventions to underlying barriers rather than assuming a single cause explanation (6). Primary care based community interventions and reminder systems further indicate that adherence behaviors can be modified through structured support mechanisms, particularly for long-term therapies typical of T2DM (7,8). Collectively, these findings establish the significance of adherence as a modifiable driver of outcomes in diabetes care and justify focused investigation on determinants that can be addressed at the primary health care level (2,3,6).

Conceptually, patient knowledge can be framed as an individual's understanding of diabetes and its treatment requirements—an element consistently treated in the literature as central to diabetes self-management education and to the capacity to follow complex regimens (4). Empirical studies assessing diabetes knowledge commonly operationalize it via structured instruments or questionnaires capturing understanding of disease processes, treatment rationale, and self-care requirements (4). This conceptualization aligns with evidence that diabetes-related knowledge is often suboptimal in primary health care populations, reinforcing the relevance of explicitly measuring knowledge rather than assuming it (9).

Operationally, patient knowledge in the present study is measured using a structured questionnaire assessing comprehension of diabetes management and prescribed medication. This operational approach is consistent with prior work that directly measures disease knowledge alongside adherence outcomes to examine their relationship, including studies explicitly evaluating "disease knowledge" and its association with medication adherence among T2DM outpatients (10), as well as studies that separately assess medication knowledge and adherence as linked constructs in T2DM populations (11). The emphasis on a structured questionnaire is also consistent with intervention-oriented research that measures knowledge as a modifiable intermediate outcome alongside adherence, supporting the use of questionnaire-based assessment for both descriptive and analytic objectives in

primary care–relevant research designs (4,12).

Conceptually, medication adherence refers to the extent to which patients follow agreed recommendations regarding medication-taking as part of a therapeutic regimen. This definition is consistent with adherence conceptualizations used in chronic disease research, in which adherence encompasses medication-taking behaviors within a broader therapeutic plan agreed with health providers (13). Operationally, adherence is commonly measured via patient report, pharmacy-based indices, or structured adherence instruments; notably, studies caution that recall-based adherence estimates may overestimate true adherence, implying that adherence measurement must be interpreted with methodological care, especially in cross-sectional designs (6). Nonetheless, adherence measurement remains essential because it is repeatedly associated with clinically meaningful endpoints such as glycemic control and hospitalization (3).

The current state of evidence depicts adherence as a function of interacting patient, provider, therapy, and contextual factors. Overviews of systematic reviews emphasize that adherence is shaped by multiple domains and such evidence is explicitly used to support risk identification and tailored intervention design (6). Empirical T2DM studies likewise identify knowledge related and regimen related barriers: for example, limited knowledge of the disease, fear of side effects, and regimen burden are reported contributors to nonadherence among specific patient groups, whereas longer experience with disease management may increase awareness of the importance of glycemic control and complication prevention (14). These findings align with the broader proposition that adherence behavior is influenced by informational and cognitive factors that can plausibly be modified through education and structured support (6,14).

The provider–patient relationship and communication also emerge as significant correlates of adherence-relevant behavior. Multicenter evidence in chronic disease populations indicates that understanding patient adherence and associated factors enables personalized and culturally appropriate planning and that education and involvement in decision making are linked to improved adherence-supportive relationships (15). Complementary findings indicate that perceived support from physicians and effective patient-centered communication are associated with higher adherence, reinforcing that adherence is socially and communicatively embedded rather than purely individual (16). Qualitative and nursing-focused perspectives further suggest that distant or impersonal provider relationships can undermine individualized care, which is central to effective diabetes management support (17). Together, these studies locate patient knowledge within a broader ecosystem of health literacy, communication, and support that is particularly salient in primary health care environments (15–17).

A consistent thread across T2DM adherence research is that knowledge is associated with adherence and is amenable to intervention. Cross sectional evidence from primary health center–attending T2DM patients reports a positive correlation between diabetes knowledge and medication adherence, supporting the hypothesis that better informed patients tend to adhere more consistently (18). Related outpatient research similarly examines disease knowledge as a correlate of adherence and explicitly recommends educational interventions particularly pharmacist led education as a core component of pharmaceutical care to improve both knowledge and adherence (10). Studies focusing on medication knowledge in T2DM further support the presence of significant (even if sometimes weak) positive correlations between knowledge and adherence and indicate that poor knowledge can be associated with lower adherence rates (11). These convergent findings provide an evidence base for positioning knowledge not only as a determinant but also as a modifiable target for adherence improvement strategies (10,11,18).

The practical importance of knowledge is further reinforced by intervention research and systematic reviews on educational and digital support strategies. Randomized and pilot interventions measuring diabetes knowledge alongside adherence and other self-management outcomes demonstrate that knowledge is frequently treated as a measurable mechanism through which education might improve adherence behavior (4,19). Systematic reviews on mobile phone–assisted or text message–based self-management interventions also emphasize the potential for structured education and reminders to influence diabetes self-management behaviors, including adherence-relevant behaviors, though results may vary by outcome domain (8,12). Community-based primary care interventions that include reminders and follow up support similarly operationalize adherence improvement through sustained contact and reinforcement, consistent with the notion that knowledge and recall supports jointly shape long-term medication-taking behavior (7). This body of work collectively indicates that examining knowledge as a determinant is not only theoretically plausible but also programmatically actionable within primary health care systems (4,8,10,12).

Despite the breadth of adherence research, rural primary care contexts present distinct challenges and remain comparatively under evidenced in many settings. Rural studies highlight that limited awareness and lower literacy may contribute to patterns of compliance and self-management difficulties, suggesting that knowledge deficits may be especially consequential in remote communities (5). Community based research in rural areas among older adults with chronic conditions underscores that adherence to therapeutic regimens is critical yet difficult to sustain, reinforcing the importance of identifying modifiable correlates such as knowledge in rural settings (13). Evidence from decentralized diabetes care initiatives in rural health centers further indicates that strengthening primary health care capacity through training and mentorship can improve adherence to clinical protocols among providers, illustrating that primary level systems can be enhanced but also implying that patient-level determinants (including knowledge and adherence behavior) remain important complementary targets (20).

In Indonesia, primary health care based diabetes selfmanagement education research has concluded that lack of knowledge and correct information can hinder improvements and that non-compliance/non-adherence represents a key practical challenge, while also cautioning that knowledge alone may not automatically translate into action (9). This nuance strengthens the need for empirical studies that do not assume a deterministic relationship but rather test whether and how knowledge relates to adherence in specific service contexts (9). Additionally, qualitative perspectives on selfcare indicate that rigid or prohibitive recommendations can contribute to low adherence through discouragement when perceived benefits do not materialize, suggesting that the *content* and *delivery* of knowledge may matter as much as its presence (21). Therefore, while multiple studies associate knowledge with adherence and advocate educational strategies, there remains a clear need for locally grounded evidence particularly in rural primary health centers examining patient knowledge specifically as a determinant of medication adherence in defined populations (5,9,18). This study aims to analyze the relationship between patient knowledge and medication adherence among type 2 diabetes mellitus patients at Simarmata Primary Health Center, Samosir Regency.

2. Methods

2.1 Research design

This research used a quantitative approach with a cross-sectional design in which all variables were measured and observed at the same time, representing one point in time, and the study applied a correlational analytic perspective to examine the association between patient knowledge and medication adherence.

2.2 Setting and samples/participants

The study was conducted in Simarmata Primary Health Center Samosir Regency from October 2025 without specifying the study site name, and the target population included all 32 type 2 diabetes mellitus patients who were undergoing routine medical follow-up at a primary health care facility. Participants were recruited using a total sampling strategy in which the entire accessible population was taken as the research sample. Inclusion criteria were adults diagnosed with type 2 diabetes mellitus who were receiving prescribed medication and able to communicate effectively, while exclusion criteria were patients with severe illness or cognitive impairment that prevented completion of the questionnaire.

2.3 Intervention (applies to experimental studies)

This component was not applicable because the research did not employ an experimental or quasi-experimental intervention and no control group was included.

2.4 Measurement and data collection

Primary data were obtained directly from respondents through face-to-face interviews and self-administered questionnaires consisting of written questions and statements designed to capture participant responses. Medication adherence was assessed using a standardized instrument, the MMAS-8 Morisky Medication Adherence Scale-8, which has high reliability with a coefficient of 0.83 and demonstrates good sensitivity and specificity (20). The Diabetes Mellitus Knowledge Questionnaire was employed to evaluate the respondents' understanding of the disease and its treatment. Data collection was performed by the researchers in person to ensure that participants clearly comprehended every item.

2.5 Data analysis

Data were analyzed using non-parametric bivariat associative analysis with Spearman Rho test, and the statistical procedure was performed to determine the strength and direction of the relationship between knowledge level and adherence. The analysis showed a significance value of Sig. = 0.001 < 0.005, leading to the decision that a significant association existed between patient knowledge and medication adherence among type 2 diabetes mellitus patients.

2.6 Ethical considerations

The research followed general ethical principles for studies involving human participants, and informed consent was obtained from all respondents prior to interviews and questionnaire completion. A statement of approval from the health research ethics committee will be included in the manuscript once the official reference number is available, because this information was not provided in the source paragraph.

3. Results

This table presents the distribution of respondents based on their level of knowledge and medication adherence among type 2 diabetes mellitus patients who participated in the study in Simarmata Primary Health Center Samosir Regency.

Table 1. Distribution of Respondents' Knowledge and Medication Adherence at Simarmata Primary Health Center, Samosir Regency

Variable	Frequency	Percentage
	n	%
Knowledge Level		
Good	18	56.3
Moderate	12	37.5
Poor	2	6.2
Adherence		
Adherent	12	37.5
Non-adherent	20	62.5
Total	32	100

The table shows that most respondents had good knowledge, namely 18 people or 56.3 percent, while 12 respondents or 37.5% had moderate knowledge, and only 2 respondents or 6.2% had poor knowledge. In terms of medication adherence, 12 respondents or 37.5% were adherent to taking their medicines, whereas the majority, 20 respondents or 62.5%, were non-adherent.

Table 2. The Relationship between Patient Knowledge and Medication Adherence of Respondents at Simarmata Primary Health Center, Samosir Regency.

Knowledge Level	Adherence				Total		P Value
	Adherent		Nonadherent				
	f	%	f	%	f	%	
Good	11	34.4	7	21.9	18	56.3	0.001 (r_s = 0.550)
Moderate	1	3.1	11	34.4	12	37.5	
Poor	0	0	2	6.2	2	6.2	
Total	12	37.5	20	62.5	32	100	

The statistical analysis shows a strong, significant positive correlation between patient knowledge and medication adherence at Simarmata Primary Health. Patients with a "Good" level of knowledge demonstrated the highest rates of adherence, whereas those with "Moderate" to "Poor" knowledge were predominantly nonadherent. These results suggest that increasing patient literacy regarding their treatment is a critical factor in improving clinical compliance in Samosir Regency.

4. Discussion

The present findings indicate that most respondents demonstrated good knowledge of T2DM, yet overall medication adherence remained low. This pattern is consistent with evidence that knowledge and self-management behaviors do not always align, because individuals may understand recommended actions without consistently translating that understanding into sustained daily practices (4). Prior work in Indonesian primary health care similarly cautions that emphasizing knowledge alone is insufficient because patients may "know what to do" but fail to act on that knowledge, particularly when competing barriers affect implementation (9). Qualitative evidence on diabetes self-care also suggests that rigid recommendations can precipitate discouragement and a cycle of low adherence when perceived benefits are not achieved, reinforcing that knowledge is not automatically converted into consistent therapeutic behavior (21).

Despite the above, the statistically significant association observed in this study (p = 0.001) supports the interpretation that patient knowledge is meaningfully related to medication adherence. This result aligns with primary health center evidence showing a positive correlation between diabetes knowledge and medication adherence among patients with T2DM, indicating that better-informed patients are more likely to adhere to prescribed regimens (18). Additionally, outpatient research

emphasizes that disease knowledge is associated with adherence and that educational interventions are a rational avenue for improving both domains, particularly when education is systematically integrated into pharmaceutical care and counseling (10). Findings from studies examining medication knowledge likewise report positive relationships between knowledge and adherence and note that suboptimal knowledge can be linked to lower adherence rates, supporting the relevance of knowledge as a determinant in chronic disease management (11).

In this study, respondents with good knowledge showed higher adherence than those with moderate or poor knowledge. This gradient corresponds with evidence that knowledge is positively related to adherence in T2DM populations and can function as a practical enabler of correct medication-taking behavior (11,18). Education-focused approaches are recommended because they can strengthen patient understanding of treatment goals and medication use, thereby supporting adherence-related behaviors (9,10). In this sense, the observed group differences provide empirical support for positioning knowledge as one component of adherence support within primary health care, even while recognizing that it is not the sole determinant (4,9).

The proportion of non-adherent respondents in this study (62.5%) suggests the likely influence of additional barriers not captured by the present design. Prior research identifies limited knowledge as only one among multiple contributors; non-adherence has been linked to fear of side effects, regimen burden, and other patient-level constraints that can persist even when baseline knowledge exists (14). Communication and perceived support from clinicians also matter: patient centered communication characterized by supportive interactions, simplified essential information, and active listening has been associated with higher adherence, indicating that interpersonal and service delivery factors can shape adherence beyond knowledge alone (16). In rural contexts, structural conditions such as limited awareness and access-related constraints associated with remote residence and lower literacy have been suggested as potential contributors to variation in compliance, implying that adherence may be partly shaped by contextual barriers that extend beyond individual knowledge (5).

The particularly limited adherence observed within the moderate knowledge group implies that partial or incomplete understanding may be insufficient for consistent medication-taking. This aligns with recommendations that educational interventions should be strengthened and tailored, including more structured counseling as part of routine care to improve comprehension and practical application of treatment guidance (10). Evidence from Indonesian primary health care similarly supports diabetes self-management education as a necessary component of management, emphasizing that educational content must be paired with strategies that facilitate the enactment of knowledge in daily life (9). More broadly, systematic review evidence indicates that mobile phone–assisted health education can improve knowledge and adherence to self-care regimens, providing a plausible mechanism for delivering intensified, structured education in primary health care settings when resources permit (12).

This study's small sample size (n = 32) and cross-sectional design limit the strength of inference. Cross-sectional designs can identify associations, but they cannot establish temporal ordering and thus cannot confirm causality between knowledge and adherence; this limitation is consistent with broader cross-sectional evidence in chronic disease research cautioning against causal interpretation when exposure and outcome are measured at the same time point (22). Additionally, adherence measurement is often vulnerable to reporting bias; recall based adherence estimates may overestimate adherence levels, affecting the observed magnitude of association in cross-sectional analyses (6). These constraints suggest that the present findings

should be interpreted as evidence of association in this setting rather than proof of a causal pathway.

Taken together, the findings support the need for integrated strategies that go beyond knowledge improvement alone. Understanding adherence-related factors enables personalized and culturally appropriate planning, including education and patient involvement in decision-making, which can strengthen adherence in chronic disease care (15). Community-based interventions incorporating reminders and follow-up have been associated with improved adherence-related processes among older adults with T2DM in primary care clinics, highlighting the potential value of structured reinforcement alongside education (8). Additionally, evidence from systematic reviews suggests that mobile phone–assisted education can strengthen adherence to self-care regimens, implying that combining knowledge enhancement with behavioral supports is a feasible direction for primary health care adherence improvement, especially in settings where long-term medication use requires sustained reinforcement (12). In rural districts where awareness and access barriers may be more salient, combined approaches may be particularly relevant to improving adherence outcomes among T2DM patients managed at the primary care level (5).

5. Conclusion

The conclusions of this study indicate that the majority of respondents had a good level of knowledge, while most participants were non-adherent in taking their prescribed medication. There was a significant relationship between knowledge and medication adherence among people with type 2 diabetes mellitus at a primary health care facility in Samosir Regency.

6. References

1. Naseri MW, Esmat HA, Bahee MD. Prevalence of Hypertension in Type-2 Diabetes Mellitus. Annals of Medicine and Surgery. 2022;78.
2. Association AD. 1. Improving Care and Promoting Health in Populations: Standards of Medical Care in Diabetes—2021. Diabetes Care. 2020;44(Supplement_1):S7–14.
3. Lin LK, Sun Y, Heng BH, Chew DEK, Chong PN. Medication Adherence and Glycemic Control Among Newly Diagnosed Diabetes Patients. BMJ Open Diabetes Research & Care. 2017;5(1):e000429.
4. Abaza H, Marschollek M. SMS Education for the Promotion of Diabetes Self-Management in Low &Amp; Middle Income Countries: A Pilot Randomized Controlled Trial in Egypt. BMC Public Health. 2017;17(1).
5. Pal R, Verma RK, Singh NT, Dr T. Co-Morbidity Pattern Among Type-Ii Diabetes Mellitus Patients Attending Outpatient Department of a Rural Tertiary Care Institute of North India. Asian Journal of Medical Sciences. 2021;12(7):69–74.
6. Mitiku Y, Belayneh A, Tegegne BA, Kebede B, Abebe D, Biyazin Y, et al. Prevalence of Medication Non-Adherence and Associated Factors Among Diabetic Patients in a Tertiary Hospital at Debre Markos, Northwest Ethiopia. Ethiopian Journal of Health Sciences. 2022;32(4):755–64.
7. Gast A, Mathes T. Medication Adherence Influencing Factors—an (Updated) Overview of Systematic Reviews. Systematic Reviews. 2019;8(1).
8. Choi Y, Kim Y, Yi H suk, Lee SY, Lee W. Effects of Community-Based Interventions on Medication Adherence and Hospitalization for Elderly Patients With Type 2 Diabetes at Primary Care Clinics in South Korea. International Journal of Environmental Research and Public Health. 2021;18(7):3396.
9. Rusdiana R, Savira M, Amelia R. The Effect of Diabetes Self-Management Education on Hba1c Level and Fasting Blood Sugar in Type 2 Diabetes Mellitus

Patients in Primary Health Care in Binjai City of North Sumatera, Indonesia. Open Access Macedonian Journal of Medical Sciences. 2018;6(4):715–8.
10. Alshayban D, Naqvi AA, Alhumaid O, Alqahtani AS, Islam MdA, Ghori SA, et al. Association of Disease Knowledge and Medication Adherence Among Out-Patients With Type 2 Diabetes Mellitus in Khobar, Saudi Arabia. Frontiers in Pharmacology. 2020;11.
11. Haskani NHM, Goh HP, Wee DVT, Hermansyah A, Goh KW, Ming LC. Medication Knowledge and Adherence in Type 2 Diabetes Mellitus Patients in Brunei Darussalam: A Pioneer Study in Brunei Darussalam. International Journal of Environmental Research and Public Health. 2022;19(12):7470.
12. Akoit EE, Efendi F, Dewi YS, Tonapa SI, Apryadno Jose Al Freadman Koa. The Effects of Mobile Phone-Assisted Health Education Programs on Patients With Type 2 Diabetes Mellitus: A Systematic Review. Kontakt. 2024;26(3):267–75.
13. Jeyalakshmi K, Devi ES, Rao M, Shashidhara Y, Thunga G. Factors Associated With Dietary and Exercise Compliance Among Elderly With Chronic Conditions of Hypertension and Type 2 Diabetes Mellitus Residing in Rural Areas of Coastal Karnataka: A Community-Based Cross-Sectional Study. Journal of Education and Health Promotion. 2024;13(1).
14. Elsous A, Radwan M, Al-Sharif H, Mustafa AA. Medications Adherence and Associated Factors Among Patients With Type 2 Diabetes Mellitus in the Gaza Strip, Palestine. Frontiers in Endocrinology. 2017;8.
15. Al-Noumani H, Alharrasi M, Lazarus ER, Panchatcharam SM. Factors Predicting Medication Adherence Among Omani Patients With Chronic Diseases Through a Multicenter Cross-Sectional Study. Scientific Reports. 2023;13(1).
16. Albadrani M, Alharbi A, Aljohani SA, Harbi R, Alluhaybi T, Alammash E, et al. Medication Adherence Among Diabetic Patients in Madinah, Saudi Arabia: Interplay of Cultural Beliefs, Socioeconomic Status, and Clinical Determinants. Journal of Clinical Medicine. 2025;14(19):6717.
17. Bartkevičiūtė B, Riklikienė O, Kregždytė R, Lesauskaitė V. Individualized Care for Older Adults With Diabetes and Its Relationship With Communication, Psychosocial self-efficacy, Resources and Support for self-management And socio-demographics. Nursing Open. 2022;10(4):2560–71.
18. Alsaidan AA, Alotaibi S, Thirunavukkarasu A, ALruwaili BF, Alharbi R, Arnous MM, et al. Medication Adherence and Its Associated Factors Among Patients With Type 2 Diabetes Mellitus Attending Primary Health Centers of Eastern Province, Saudi Arabia. Medicina. 2023;59(5):989.
19. Asante E, Bam V, Diji AK, Lomotey AY, Boateng AO, Sarfo-Kantanka O, et al. Pilot Mobile Phone Intervention in Promoting Type 2 Diabetes Management in an Urban Area in Ghana: A Randomized Controlled Trial. The Diabetes Educator. 2020;46(5):455–64.
20. Ndayisaba A, Harerimana E, Borg R, Miller AC, Kirk CM, Hann K, et al. A Clinical Mentorship and Quality Improvement Program to Support Health Center Nurses Manage Type 2 Diabetes in Rural Rwanda. Journal of Diabetes Research. 2017;2017:1–10.
21. Teston ÉF, Sales CA, Marcon SS. Perspectives of Individuals With Diabetes on Selfcare: Contributions For Assistance. Escola Anna Nery. 2017;21(2).
22. Liu L, Qian X, Chen Z, He T. Health Literacy and Its Effect on Chronic Disease Prevention: Evidence From China's Data. BMC Public Health. 2020;20(1).