INTERNATIONAL CONFERENCE
ON LIFESTYLE DISEASES AND NATURAL MEDICINE (ICOLIFEMED)
Nomor ISSN: 3124-1115

Socioeconomic and clinical factors associated with quality of life among diabetic patient

Nurhalimah Siregar[1], Putranto Manalu[2], Ermi Girsang[2], Suhartina[3]
[1]Master Programme in Clinical Medicine, Universitas Prima Indonesia, Indonesia
[2]Department of Public Health and Preventive Medicine, Universitas Prima Indonesia, Indonesia
[3]Department of Family Medicine, Universitas Prima Indonesia, Indonesia

E-mail: putrantomanalu@unprimdn.ac.id

ABSTRACT

The global impact of type 2 diabetes is considerable, profoundly affecting patients' quality of life. This study aimed to assess the quality of life among T2DM patients receiving care at Royal Prima Hospital and to identify factors influencing it. A quantitative, cross-sectional design was employed, involving 97 T2DM patients selected through convenience sampling. Data were collected via structured questionnaires and analyzed using the Chi-square test. The results indicated that the majority of patients (60.8%) experienced a poor quality of life. Significant factors associated with lower quality of life included older age ($p < 0.001$), lower educational attainment ($p < 0.001$), income below the minimum wage ($p < 0.001$), longer duration of T2DM ($p < 0.001$), and the presence of complications ($p < 0.001$). Among these, income and complications were identified as the strongest predictors. No significant association was found between gender and quality of life. These findings highlight the importance of adopting a holistic approach to T2DM management that integrates socioeconomic and psychological support, particularly for high-risk populations.

Keywords: ***T****ype 2 diabetes mellitus, quality of life, demographic factors, socioeconomic factors, complications.*

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) has emerged as one of the most significant global public health challenges of the 21st century (International Diabetes Federation, 2021; Ogurtsova et al., 2022). This chronic metabolic disorder is characterized by persistent hyperglycemia, which results from two primary defects: reduced insulin secretion by pancreatic beta cells and/or impaired responsiveness of target cells to insulin, commonly referred to as insulin resistance (Chatterjee et al., 2017; El Sayed et al., 2024). T2DM accounts for approximately 90% of all diabetes cases and becomes clinically apparent only when pancreatic beta cells can no longer produce sufficient insulin to overcome chronic insulin resistance (Decroli, 2019; Kahn et al., 2014). In 2021, IDF reported that around 537 million adults between the ages of 20 and 79 had diabetes, with most cases being type 2. This number is expected to grow significantly, reaching 643 million by 2030 and 783 million by 2045. The IDF also noted that over 80% of adults with diabetes live in low- and middle-income countries. Furthermore, type 2 diabetes is a major cause of death worldwide, accounting for an estimated 6.7 million deaths in 2021, which translates to one death every five seconds (International Diabetes Federation, 2021).

Remarkably high prevalence rates of type 2 diabetes mellitus (T2DM), reaching up to 35%, have been documented in populations undergoing epidemiological transitions and experiencing drastic lifestyle changes. Notable examples include several nations in Micronesia and Polynesia, the Pima Indian population in the United States, individuals of Mexican descent in the United States, and the Creole communities in South America. Significant increases in T2DM prevalence have also been reported in Malta, Saudi Arabia,

Nomor ISSN: 3124-1115

the Indian diaspora in Canada, and ethnic Chinese populations in Mauritius, Singapore, and Taiwan (Ramachandran, 2012; Soelistijo et al., 2019). In Asia, data from the International Diabetes Federation (IDF, 2021) indicate that approximately 90 million adults—equivalent to about one in eleven—were living with T2DM in 2021. This number is projected to rise to 113 million by 2030 and 151 million by 2045. Alarmingly, more than half of adults with T2DM in Asia remain undiagnosed, and the disease was responsible for approximately 747,000 deaths in the region in 2021 (International Diabetes Federation, 2021).

In Indonesia, data from the 2018 Basic Health Research (RISKESDAS) survey indicated that the national prevalence of type 2 diabetes mellitus (T2DM) had reached 10.9%, with projections suggesting a continued increase in the coming years. Furthermore, an analysis of the 2018 RISKESDAS data revealed a 1.6% rise in the number of T2DM patients over the five-year period from 2013 to 2018. This increase corresponds to an estimated 4 million individuals living with T2DM in Indonesia as of 2018 (Kementerian Kesehatan Republik Indonesia, 2018). In 2019, the Medan City Health Office reported 27,075 T2DM cases, of which 85% were patients aged over 55 years, and 70% were female. These patients were identified across 39 public health centers throughout Medan City. These findings underscore the high prevalence of T2DM in North Sumatra (Dinas Kesehatan Kota Medan, 2020).

T2DM, as a chronic disease, substantially impacts the quality of life of affected individuals (Garg & Duggal, 2022; Trikkalinou et al., 2017). Health-related quality of life (HRQoL) refers to an individual's subjective perception of how their health status and medical interventions affect their physical, psychological, and social functioning in daily life (Karimi & Brazier, 2016). Consequently, improving patient quality of life is a critical objective in T2DM management and serves as a key indicator of treatment success (Tan et al., 2023).

The impact of T2DM on quality of life is multidimensional, encompassing physical, psychological, social, and environmental domains (Amin et al., 2022). Patients often experience a reduced quality of life, even without complications, because their condition worsens over time and requires constant self-care (Azami et al., 2021; Megari, 2013). Several factors contribute to the reduced quality of life in T2DM patients, including the necessity for long-term care, symptoms related to glycemic dysregulation, risks of chronic complications (e.g., neuropathy, retinopathy, nephropathy, cardiovascular disease), potential sexual dysfunction, and heightened vulnerability to psychological disorders such as depression and anxiety (Albai et al., 2024; Jing et al., 2018; Martino et al., 2019; Timar et al., 2016).

Multiple studies have consistently demonstrated lower HRQoL scores among individuals with T2DM. Evidence indicates that patients with T2DM generally experience poorer HRQoL, with women reporting a disproportionately greater burden (Alwhaibi, 2024; Zurita-Cruz et al., 2018). Anxiety and depression are significantly correlated with reduced HRQoL in this population (Alwhaibi, 2024; Derakhshanpoor et al., 2015). The presence of comorbidities, particularly when three or more chronic conditions coexist, further diminishes HRQoL scores, especially impacting physical quality of life (Adriaanse et al., 2016). Additionally, demographic and clinical factors such as age, marital status, occupation, and duration of T2DM influence HRQoL (Zurita-Cruz et al., 2018). Socioeconomic status, employment, education level, and engagement in regular physical activity have also been identified as significant determinants of HRQoL among T2DM patients (Alwhaibi, 2024). These findings highlight the necessity for early identification and comprehensive management of mental health issues and comorbidities to enhance overall quality of life in individuals with T2DM. Considering the high prevalence of T2DM and its significant impact on patients' daily functioning, this study aims to assess the quality of life among individuals with T2DM undergoing treatment at Royal Prima Hospital.

METHODS

Nomor ISSN: 3124-1115

This quantitative, cross-sectional study was conducted at Royal Prima Hospital. It began with a preliminary survey in August 2023, followed by the main data collection phase from November to December 2024. The Health Research Ethics Committee at Universitas Prima Indonesia provided ethical approval for this study, documented under approval number: 157/KEPK/UNPRI/IV/2025.

The study population comprised all 211 patients diagnosed with Type 2 Diabetes Mellitus (T2DM) who received treatment at Royal Prima General Hospital between May and September 2024. The sample size was calculated using the Lemeshow formula for proportion estimation, which indicated a minimum requirement of 97 participants. Participants were selected based on predefined inclusion and exclusion criteria. The inclusion criteria were outpatients diagnosed with T2DM who were fully conscious, capable of effective communication, and provided informed consent. Exclusion criteria included patients without a T2DM diagnosis, inpatients, individuals who were unconscious or cognitively impaired, those with communication barriers, and patients who declined to participate. Accidental sampling was employed, whereby researchers directly administered questionnaires to conveniently accessible patients at Royal Prima General Hospital during the data collection period.

The study collected data through questionnaires, observations, and document analysis. It examined several variables, including patient age, categorized into three groups; patient gender, classified as male or female; patient education level, ranging from elementary school to a master's degree; and patient income, compared against the 2024 Medan City Minimum Wage. Additionally, the duration of diabetes mellitus was assessed and categorized as less than one year, one to five years, or more than five years. The presence of diabetes mellitus complications was also recorded as either present or absent. The primary outcome measured was the quality of life among patients with Type 2 Diabetes Mellitus, assessed through self-reported health and well-being via a standardized questionnaire. A total score exceeding 50% was interpreted as indicating a "good" quality of life, whereas a score below 50% was considered "not good."

The data analysis was conducted in two primary phases. First, a univariate analysis was performed to describe the characteristics of each variable, typically presented as frequency distributions and percentages. Subsequently, a bivariate analysis was carried out to explore the relationships between the independent and dependent variables. The Chi-square test was employed to assess these associations.

RESULTS

Table 1 provides a detailed overview of the characteristics of 97 individuals diagnosed with T2DM. The data offer insights into the demographics, socioeconomic backgrounds, medical histories, and quality of life of the patients in this study cohort. A significant portion of the patients were over 45 years old, comprising nearly half of the cohort at 48.5% (47 patients). Younger age groups were also represented, with 27 patients (27.8%) falling between 26 and 35 years old, and 23 patients (23.7%) between 36 and 45 years old. This indicates that while T2DM is often associated with older age, a considerable number of younger adults are also affected. In terms of gender, there was a notable disparity, with a strong female predominance. Females accounted for 71.1% of the patients (69 individuals), while males made up the remaining 28.9% (28 individuals). This suggests that females might be more susceptible to or more frequently diagnosed with T2DM within this specific study population.

Nomor ISSN: 3124-1115

Table 1. Patient characteristics (n=97)

Variable	n	%
Age (year)		
26 – 35	27	27,8
36 – 45	23	23,7
> 45	47	48,5
Gender		
Male	28	28,9
Female	69	71,1
Education		
Secondary	27	27,8
Tertiary	70	72,2
Income		
Below Minimum Wage	57	58,8
At or Above Minimum Wage	40	41,2
Duration of T2DM (year)		
< 1	33	34,0
1 – 5	21	21,6
> 5	43	44,3
T2DM Complications		
Yes	63	64,9
No	34	35,1
Quality of Life for T2DM Patients		
Poor	59	60,8
Good	38	39,2

The educational background of the patients leaned heavily towards tertiary education, with 70 patients (72.2%) having completed higher education. The remaining 27 patients (27.8%) had secondary education. This distribution could reflect the socioeconomic profile of the study participants or indicate a correlation between educational attainment and T2DM diagnosis within this context. Regarding income, the majority of patients, 57 individuals (58.8%), reported an income below the minimum wage. Conversely, 40 patients (41.2%) earned at or above the minimum wage. This suggests that a substantial portion of the T2DM patient population in this study faces economic challenges.

The duration of living with T2DM varied among the patients. The largest group, 43 patients (44.3%), had been diagnosed for more than 5 years, indicating a significant proportion of individuals with long-standing disease. A substantial 33 patients (34.0%) were relatively newly diagnosed, having had T2DM for less than 1 year, while 21 patients (21.6%) had been living with the condition for 1 to 5 years. Furthermore, the presence of T2DM complications was common, affecting nearly two-thirds of the patients. Sixty-three individuals (64.9%) reported experiencing complications, highlighting the chronic and progressive nature of the disease. Only 34 patients (35.1%) reported no complications. Finally, the quality of life for these T2DM patients was largely perceived as poor. A considerable majority of 59 patients (60.8%) rated their quality of life as poor, while only 38 patients (39.2%) considered it good. This underscores the significant impact that T2DM, especially with its associated complications, can have on an individual's overall well-being.

Table 2 presents the statistical analysis examining the relationship between various sociodemographic and clinical variables and the quality of life among the respondents. A highly statistically significant relationship was observed between age group and quality of life ($p = 0.000$). A clear pattern emerged, indicating that older age was associated with a greater likelihood of poorer quality of life. The majority of respondents over 45 years old (46.4% of the total respondents) reported a poor quality of life, whereas only a small proportion of this group (2.1%) reported a good quality of life. Conversely, the younger age

Nomor ISSN: 3124-1115

group (26–35 years) was predominantly comprised of individuals reporting a good quality of life (25.8%).

In contrast, gender did not show a statistically significant association with quality of life (p = 0.636). Although a higher absolute number of females (44.3%) reported poor quality of life compared to males (16.5%), this difference was not statistically significant. A risk ratio (RR) of 0.917, with a 95% confidence interval of 0.634–1.327 (which includes 1), further confirms that gender is not a determining factor for quality of life in this population.

Table 2. Predictors of Quality of Life

Variable	Quality of Life					RR
	Poor		Good			
Age (year)						
26 – 35		,1	5	5,8		
36 – 45	2	2,4	1	1,3	,000	-
> 45	5	6,4		,1		
Gender						
Male	6	6,5	2	2,4	,636	0,917 (0,634– 1,327)
Female	3	4,3	6	6,8		
Education						
Secondary	4	4,7		,1	,000	1,778 (1,358– 2,328)
Tertiary	5	6,1	5	6,1		
Income						
Below Minimum Wage	4	5,7		,1	,000	7,579 (3,331– 7,246)
At or Above Minimum Wage		,2	5	6,1		
Duration of T2DM (year)						
< 1			3	4,0		
1 – 5	6	6,5		,2	,000	-
> 5	3	4,3				
T2DM Complications						
Yes	9	0,8		,1	,000	0,063 (0,025– 0,164)
No			4	5,1		

Last educational attainment, however, demonstrated a highly significant association with quality of life (p = 0.000). Respondents with secondary education were more likely to report a poor quality of life (24.7%) compared to those reporting good quality of life (3.1%). Conversely, among respondents with higher education, the distribution of good and poor quality of life was nearly balanced (36.1% each). An RR of 1.778 indicates that respondents with secondary education had a 1.78 times higher risk of experiencing poor quality of life compared to those with higher education.

Income emerged as a highly significant determinant of quality of life in patients with Type 2 Diabetes Mellitus (T2DM) (p = 0.000). A striking disparity was observed: the vast

Nomor ISSN: 3124-1115

majority of respondents with income below the regional minimum wage (UMR) reported a poor quality of life (55.7%). Conversely, most respondents earning at or above the UMR (≥ UMR) reported a good quality of life (36.1%). The calculated Relative Risk (RR) of 7.579 is remarkably high, indicating that respondents with income below the UMR were at an almost 7.6-fold increased risk of experiencing a poor quality of life compared to those with income at or above the UMR.

The duration of living with T2DM also demonstrated a highly significant association with quality of life ($p = 0.000$). A clear and linear pattern was evident: all respondents with a disease duration of less than one year reported a good quality of life (34.0%). In contrast, all respondents who had been living with T2DM for more than five years reported a poor quality of life (44.3%). This suggests that a longer duration of T2DM is strongly associated with a progressive decline in quality of life.

The presence of complications due to T2DM was identified as an exceptionally strong and significant predictor of quality of life ($p = 0.000$). Nearly all respondents with complications (60.8%) reported a poor quality of life. Conversely, all respondents without complications (35.1%) reported a good quality of life. The very low RR of 0.063 (well below 1) signifies that the absence of complications acts as a robust protective factor. This implies that respondents without T2DM complications had only a 6.3% risk of experiencing a poor quality of life compared to those with diabetic complications.

In summary, this study concludes that the quality of life in T2DM patients is profoundly influenced by multiple factors. Older age, lower educational attainment, income below the minimum standard, longer duration of diabetes, and the presence of disease complications were all significantly associated with poorer quality of life. Among these factors, income and the presence of complications emerged as the most powerful predictors of diminished quality of life. Notably, gender was not found to be a significant influencing factor in this study.

DISCUSSION

This study aimed to identify the demographic, socioeconomic, and clinical factors associated with quality of life (QoL) in 97 individuals diagnosed with Type 2 Diabetes Mellitus (T2DM). The primary finding revealed that the majority of patients reported a poor quality of life. Further analysis confirmed that older age, lower educational attainment, income below the regional minimum wage, longer duration of T2DM, and the presence of complications were significant predictors of poorer QoL. Conversely, gender did not exhibit a statistically significant association with QoL. Similarly Zoungas et al. (2014) identified an association between the duration of diabetes and both macrovascular and microvascular complications, whereas age was associated solely with macrovascular complications and mortality. Nanayakkara et al. (2018) demonstrated that macrovascular complications were independently associated with patients' current age, age at diabetes diagnosis, and disease duration. In contrast, microvascular complications were solely associated with the duration of diabetes. Venkataraman et al. (2013) further confirmed that diabetic complications adversely affect health-related quality of life.

Socioeconomic factors, particularly education and income, emerged as potent predictors in this study. The finding that respondents with secondary education were 1.78 times more likely to report poor quality of life compared to those with higher education is notable. Sonhaji et al. (2024) suggest that higher educational attainment enhances patients' knowledge and awareness of diabetes self-management, thereby positively impacting QoL. Furthermore, several studies corroborate that socioeconomic factors, especially education and income, are strong predictors of quality of life in T2DM patients (Fahmi et al., 2022; Jusoh et al., 2018). Age and insulin use have also been identified as significant predictors of quality of life, with older patients demonstrating better adaptation to their condition (Jusoh et al., 2018). Self-care activities, particularly physical activity, are associated with improved quality of life (Masriadi et al., 2022). Research also indicates that T2DM patients

Nomor ISSN: 3124-1115

experiencing complications (whether acute (e.g., ketoacidosis, diabetic coma, hypoglycemia, hyperglycemia) or chronic (e.g., retinopathy, nephropathy, diabetic foot, cardiovascular disease)) tend to have poorer quality of life compared to those without complications (Daryaman et al., 2025; Hariani et al., 2020). Differences in quality of life based on gender have also been observed, with women often reporting lower quality of life (Jusoh et al., 2018).

However, the most striking finding was the profound influence of income. The nearly 7.6-fold higher risk of poor quality of life among participants earning below the regional minimum wage is a highly significant discovery. This underscores that economic burden represents a major barrier to effective T2DM management. Other studies have also identified low economic status as the strongest predictor of poor quality of life. Low income directly restricts patients' access to quality healthcare services, the ability to regularly purchase medications, availability of healthy food options (diabetes diet), and even the capacity to engage in regular physical activity (Bakan et al., 2017; International Diabetes Federation, 2021; Whittemore et al., 2019). Recent studies highlight the significant impact of income on health outcomes in individuals with diabetes. Sustained low income and income reduction have been shown to correlate with increased mortality risk in T2DM patients and a higher risk of developing T2DM itself (H. S. Lee et al., 2023; Park et al., 2023). A study in the Dominican Republic revealed that lower household income correlated with less insurance coverage, limited access to diabetes management supplies, and less frequent glycemic monitoring in patients with Type 1 Diabetes Mellitus (Martinez et al., 2021).

An intriguing finding from this study was the absence of a significant association between gender and quality of life ($p = 0.636$), despite the sample being predominantly female (71.1%). This female predominance aligns with national prevalence data in Indonesia, where women exhibit a slightly higher incidence of T2DM compared to men (Kementerian Kesehatan Republik Indonesia, 2018). Although some studies report that women with diabetes tend to have lower quality of life due to factors such as dual burden (work and household responsibilities) and higher propensity for depression, this study did not observe such differences (da Rocha et al., 2014; K. H. Lee et al., 2020). This could be attributed to specific sample characteristics or the local cultural context, where family support for women with illness might be stronger, thereby neutralizing potential gender-based differences in QoL. Another possibility is that other factors (such as complications and income) exert a far more powerful influence, overshadowing any potential gender-related disparities.

The results of this study carry important practical implications. Healthcare professionals should not only focus on clinical management, such as blood glucose control, but also screen for socioeconomic and psychosocial factors in patients. Elderly patients, those with low income, and individuals with long duration of diabetes represent high-risk groups requiring more intensive attention and intervention, including simplified education, counseling on affordable nutritional options, and psychological support (Agustin & Kurniasari, 2023; Agustini et al., 2024). However, it is crucial to acknowledge the limitations of this research. The cross-sectional study design can establish associations but not causal relationships. Additionally, the sample, drawn from a single specific location, may not be fully generalizable to the entire T2DM patient population in Medan City or across Indonesia.

CONCLUSION

The findings indicate that a substantial proportion of patients with T2DM experience a reduced quality of life, which is significantly influenced by several key factors. Specifically, older age, lower educational attainment, income below the regional minimum wage, longer diabetes duration, and the presence of disease-related complications were all significantly associated with poorer quality of life. Among these factors, income level and the presence of complications emerged as the strongest predictors, underscoring the critical impact of socioeconomic status and disease progression on patient well-being. Notably, gender did not have a significant effect in this study. These results emphasize the need for comprehensive

patient management strategies that extend beyond glycemic control to incorporate socioeconomic and psychosocial support, particularly for high-risk populations such as elderly individuals, low-income groups, and patients with longstanding diabetes or complications. Future research employing longitudinal designs is warranted to establish causal relationships and to develop targeted interventions addressing the multifaceted determinants of quality of life in T2DM patients.

ACKNOWLEDGEMENT

We sincerely thank all research participants for their invaluable time and essential data contributions, which were pivotal to the successful completion of this study.

REFERENCES

Adriaanse, M. C., Drewes, H. W., van der Heide, I., Struijs, J. N., & Baan, C. A. (2016). The impact of comorbid chronic conditions on quality of life in type 2 diabetes patients. *Quality of Life Research*, *25*(1), 175–182. https://doi.org/10.1007/s11136-015-1061-0

Agustin, S., & Kurniasari, R. (2023). Literature Review: Pengaruh Konseling Gizi Terhadap Kepatuhan Diet Pasien Diabetes Mellitus Tipe-2. *Jurnal Gizi Dan Kuliner*, *4*(1), 9–14.

Agustini, S., Jumiyati, & Kusdalinah. (2024). Konseling Gizi Dapat Menurunkan Kadar Gula Darah dan Asupan Karbohidrat pada Penderita Diabetes Melitus. *Jurnal Vokasi Keperawatan*, *7*(1), 63–72.

Albai, O., Braha, A., Timar, B., & Timar, R. (2024). Predictive Factors for Altered Quality of Life in Patients with Type 2 Diabetes Mellitus. *Journal of Clinical Medicine*, *13*(15), 4389. https://doi.org/10.3390/jcm13154389

Alwhaibi, M. (2024). Depression, Anxiety, and Health-Related Quality of Life in Adults with Type 2 Diabetes. *Journal of Clinical Medicine*, *13*(20), 6028. https://doi.org/10.3390/jcm13206028

Amin, M. F., Bhowmik, B., Rouf, R., Khan, M. I., Tasnim, S. A., Afsana, F., Sharmin, R., Hossain, K. N., Khan, M. A. S., Amin, S. M., Khan, M. S. S., Pathan, M. F., & Hasan, M. J. (2022). Assessment of quality of life and its determinants in type-2 diabetes patients using the WHOQOL-BREF instrument in Bangladesh. *BMC Endocrine Disorders*, *22*(1), 162. https://doi.org/10.1186/s12902-022-01072-w

Azami, G., Kim Lam, S., Shariff-Ghazali, S., Mohd Said, S., Aazami, S., & Mozafari, M. (2021). Predictors of Diabetes Self-Management Behaviors in Type 2 Diabetes Patients. *Iranian Journal of Diabetes and Obesity*, *12*(4). https://doi.org/10.18502/ijdo.v12i4.5180

Bakan, G., Azak, A., & Özdemir, Ü. (2017). Diabetes and socio-cultural approach. *Kesit Akademi*, *12*(12), 180–195. https://doi.org/10.18020/kesit.1350

Chatterjee, S., Khunti, K., & Davies, M. J. (2017). Type 2 diabetes. *The Lancet*, *389*(10085), 2239–2251. https://doi.org/10.1016/S0140-6736(17)30058-2

da Rocha, N. S., Schuch, F. B., & de Almeida Fleck, M. P. (2014). Gender differences in perception of quality of life in adults with and without chronic health conditions: The role of depressive symptoms. *Journal of Health Psychology*, *19*(6), 721–729. https://doi.org/10.1177/1359105313478644

Daryaman, U., Amalia, I. N., & Jauharotun, M. (2025). Perbandingan Kualitas Hidup Pasien Diabetes Mellitus Tipe 2 dengan Komplikasi dan Tanpa Komplikasi. *Kisi Berkelanjutan: Sains Medis Dan Kesehatan*, *2*(1), 1–6.

Decroli, E. (2019). *Diabetes melitus tipe 2*. Pusat Penerbitan Bagian Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Andalas.

Derakhshanpoor, F., Farsinia, M., & Shahini, N. (2015). Relationship between Anxiety Disorders and life Quality in Type Two Diabetic Patients. *Journal of Research Development in Nursing and Midwifery*, *12*(1), 94–102. http://nmj.goums.ac.ir/article-1-716-en.html

Dinas Kesehatan Kota Medan. (2020). *Profil Kesehatan Kota Medan Tahun 2019*. Dinas

Kesehatan Kota Medan.

El Sayed, N. A., Aleppo, G., Bannuru, R. R., Bruemmer, D., Collins, B. S., Ekhlaspour, L., Gaglia, J. L., Hilliard, M. E., Johnson, E. L., Khunti, K., Lingvay, I., Matfin, G., McCoy, R. G., Perry, M. Lou, Pilla, S. J., Polsky, S., Prahalad, P., Pratley, R. E., Segal, A. R., … Gabbay, R. A. (2024). 2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2024. *Diabetes Care*, *47*(Supplement_1), 20–42. https://doi.org/10.2337/dc24-S002

Fahmi, R. N. H. H., Bumi, C., & Sandra, C. (2022). Factors Affecting The Quality of Life of Diabetes Mellitus Type 2 Patients: Literature Review. *Indonesian Journal of Health Sciences Research and Development*, *4*(2), 1–11. https://doi.org/10.36566/ijhsrd/Vol4.Iss2/128

Galicia-Garcia, U., Benito-Vicente, A., Jebari, S., Larrea-Sebal, A., Siddiqi, H., Uribe, K. B., Ostolaza, H., & Martín, C. (2020). Pathophysiology of Type 2 Diabetes Mellitus. *International Journal of Molecular Sciences*, *21*(17), 6275. https://doi.org/10.3390/ijms21176275

Garg, P., & Duggal, N. (2022). Type 2 diabetes mellitus, its impact on quality of life and how the disease can be managed-a review. *Obesity Medicine*, *35*, 100459. https://doi.org/10.1016/j.obmed.2022.100459

Hariani, Hady J, A., Jalil, N., & Putra, S. A. (2020). Hubungan lama menderita dan komplikasi DM terhadap kualitas hidup pasien dm tipe 2 di wilayah Puskesmas Batua Kota Makassar. *Jurnal Ilmiah Kesehatan Diagnosis*, *15*(1), 56–63.

International Diabetes Federation. (2021). *IDF Diabetes Atlas* (10th ed.). International Diabetes Federation.

Jing, X., Chen, J., Dong, Y., Han, D., Zhao, H., Wang, X., Gao, F., Li, C., Cui, Z., Liu, Y., & Ma, J. (2018). Related factors of quality of life of type 2 diabetes patients: a systematic review and meta-analysis. *Health and Quality of Life Outcomes*, *16*(1), 189. https://doi.org/10.1186/s12955-018-1021-9

Jusoh, Z., Tohid, H., Omar, K., Muhammad, N. A., & Ahmad, S. (2018). Clinical and Sociodemographic Predictors of the Quality of Life among Patients with Type 2 Diabetes Mellitus on the East Coast of Peninsular Malaysia. *Malaysian Journal of Medical Sciences*, *25*(1), 84–95. https://doi.org/10.21315/mjms2018.25.1.10

Kahn, S. E., Cooper, M. E., & Del Prato, S. (2014). Pathophysiology and treatment of type 2 diabetes: perspectives on the past, present, and future. *The Lancet*, *383*(9922), 1068–1083. https://doi.org/10.1016/S0140-6736(13)62154-6

Karimi, M., & Brazier, J. (2016). Health, Health-Related Quality of Life, and Quality of Life: What is the Difference? *PharmacoEconomics*, *34*(7), 645–649. https://doi.org/10.1007/s40273-016-0389-9

Kementerian Kesehatan Republik Indonesia. (2018). *Riset Kesehatan Dasar 2018 (2018 Basic Health Research)*.

Lee, H. S., Park, J. C., Chung, I., Liu, J., Lee, S.-S., & Han, K. (2023). Sustained Low Income, Income Changes, and Risk of All-Cause Mortality in Individuals With Type 2 Diabetes: A Nationwide Population-Based Cohort Study. *Diabetes Care*, *46*(1), 92–100. https://doi.org/10.2337/dc21-2305

Lee, K. H., Xu, H., & Wu, B. (2020). Gender differences in quality of life among community-dwelling older adults in low- and middle-income countries: results from the Study on global AGEing and adult health (SAGE). *BMC Public Health*, *20*(1), 114. https://doi.org/10.1186/s12889-020-8212-0

Martinez, A. G., Peña, C. N. V., Almonte, D. C., Castro, N. E. R., Arias, F. A. C., & Júnior, S. G. (2021). Costs and economic impacts of type-1 diabetes from the Dominican patient perspective. *Principles and Practice of Clinical Research Journal*, *7*(2), 1–16. https://doi.org/10.21801/ppcrj.2021.72.1

Martino, G., Catalano, A., Bellone, F., Russo, G. T., Vicario, C. M., Lasco, A., Quattropani, M. C., & Morabito, N. (2019). As Time Goes by: Anxiety Negatively Affects the

Perceived Quality of Life in Patients With Type 2 Diabetes of Long Duration. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.01779

Masriadi, M., Alam, R. I., Junaidin, J., Firdaus, E. K., Asnaniar, W. O. S., Padhila, N. I., Maryani, L., Agus, A. I., Amir, H., Hidayat, R., & Fitriani, F. (2022). Predictors that affect the Quality of Life Patient with Diabetes Mellitus: A Systematic Review. *Open Access Macedonian Journal of Medical Sciences*, *10*(F), 340–344. https://doi.org/10.3889/oamjms.2022.8887

Megari, K. (2013). Quality of life in chronic disease patients. *Health Psychology Research*, *1*(3), 27. https://doi.org/10.4081/hpr.2013.e27

Nanayakkara, N., Ranasinha, S., Gadowski, A., Heritier, S., Flack, J. R., Wischer, N., Wong, J., & Zoungas, S. (2018). Age, age at diagnosis and diabetes duration are all associated with vascular complications in type 2 diabetes. *Journal of Diabetes and Its Complications*, *32*(3), 279–290. https://doi.org/10.1016/j.jdiacomp.2017.11.009

Ogurtsova, K., Guariguata, L., Barengo, N. C., Ruiz, P. L.-D., Sacre, J. W., Karuranga, S., Sun, H., Boyko, E. J., & Magliano, D. J. (2022). IDF diabetes Atlas: Global estimates of undiagnosed diabetes in adults for 2021. *Diabetes Research and Clinical Practice*, *183*, 109118. https://doi.org/10.1016/j.diabres.2021.109118

Park, J. C., Nam, G. E., Yu, J., McWhorter, K. L., Liu, J., Lee, H. S., Lee, S.-S., & Han, K. (2023). Association of Sustained Low or High Income and Income Changes With Risk of Incident Type 2 Diabetes Among Individuals Aged 30 to 64 Years. *JAMA Network Open*, *6*(8), e2330024. https://doi.org/10.1001/jamanetworkopen.2023.30024

Ramachandran, A. (2012). Trends in prevalence of diabetes in Asian countries. *World Journal of Diabetes*, *3*(6), 110. https://doi.org/10.4239/wjd.v3.i6.110

Soelistijo, S. A., Lindarto, D., Decroli, E., Permana, H., Sucipto, K. W., Kusnadi, Y., Budiman, Ikhsan, M. R., Sasiarini, L., & Sanusi, H. (2019). *Pedoman Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 Dewasa di Indonesia 2019*. PB PERKENI.

Sonhaji, S., Hani, U., & Rahmani, R. (2024). Pengaruh Pendidikan Kesehatan Tentang Manajemen Diri Terhadap Tingkat Kepatuhan Pasien Diabetes Mellitus Di Kabupaten Semarang. *Jurnal Manajemen Asuhan Keperawatan*, *8*(1), 25–31. https://doi.org/10.33655/mak.v8i1.180

Tan, M. H. P., Ong, S. C., Bujang, M. A., Shah, S. A., & Mustafa, N. (2023). Evaluation of the health-related quality of life of patients with type 2 diabetes in relation to macrovascular and microvascular complications. *Acta Diabetologica*, *60*(12), 1735–1747. https://doi.org/10.1007/s00592-023-02164-2

Timar, R., Velea, P. I., Timar, B., Lungeanu, D., Oancea, C., Roman, D., & Mazilu, O. (2016). Factors influencing the quality of life perception in patients with type 2 diabetes mellitus. *Patient Preference and Adherence*, *10*, 2471–2477. https://doi.org/10.2147/PPA.S124858

Trikkalinou, A., Papazafiropoulou, A. K., & Melidonis, A. (2017). Type 2 diabetes and quality of life. *World Journal of Diabetes*, *8*(4), 120. https://doi.org/10.4239/wjd.v8.i4.120

Venkataraman, K., Wee, H. L., Leow, M. K. S., Tai, E. S., Lee, J., Lim, S. C., Tavintharan, S., Wong, T. Y., Ma, S., Heng, D., & Thumboo, J. (2013). Associations between complications and health-related quality of life in individuals with diabetes. *Clinical Endocrinology*, *78*(6), 865–873. https://doi.org/10.1111/j.1365-2265.2012.04480.x

Whittemore, R., Vilar-Compte, M., De La Cerda, S., Marron, D., Conover, R., Delvy, R., Lozano-Marrufo, A., & Pérez-Escamilla, R. (2019). Challenges to diabetes self-management for adults with type 2 diabetes in low-resource settings in Mexico City: a qualitative descriptive study. *International Journal for Equity in Health*, *18*(1), 133. https://doi.org/10.1186/s12939-019-1035-x

Zoungas, S., Woodward, M., Li, Q., Cooper, M. E., Hamet, P., Harrap, S., Heller, S., Marre, M., Patel, A., Poulter, N., Williams, B., & Chalmers, J. (2014). Impact of age, age at diagnosis and duration of diabetes on the risk of macrovascular and microvascular

Nomor ISSN: 3124-1115

complications and death in type 2 diabetes. *Diabetologia*, *57*(12), 2465–2474. https://doi.org/10.1007/s00125-014-3369-7

Zurita-Cruz, J. N., Manuel-Apolinar, L., Arellano-Flores, M. L., Gutierrez-Gonzalez, A., Najera-Ahumada, A. G., & Cisneros-González, N. (2018). Health and quality of life outcomes impairment of quality of life in type 2 diabetes mellitus: a cross-sectional study. *Health and Quality of Life Outcomes*, *16*(1), 94. https://doi.org/10.1186/s12955-018-0906-y