

Factors Related to Quality of Life Among Adults with Type 2 Diabetes: A Systematic Review of Gulf Countries

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ABSTRACT

To systematically review factors influencing health-related quality of life (HRQoL) among adults with type 2 diabetes mellitus (T2DM) in Gulf Cooperation Council (GCC) countries. Systematic review of quantitative studies. A comprehensive literature search was conducted in PubMed, MEDLINE, Web of Science, and the Saudi Digital Library from database inception to February 2025. Observational and interventional studies reporting associations between sociodemographic, clinical, behavioral, or socioeconomic factors and HRQoL among adults (≥ 18 years) with T2DM in GCC countries were included. Studies were required to use a validated HRQoL instrument. Study quality was assessed using the AXIS tool for cross-sectional studies and the CASP checklist for the case-control study. Fifteen studies published between 2008 and 2024 were included, most from Saudi Arabia ($n=11$), followed by Kuwait, Oman, and Qatar. Sample sizes ranged from 100 to 604 participants. HRQoL was generally reduced, particularly in physical and emotional domains. Female gender, older age, lower education, longer diabetes duration, and the presence of complications such as neuropathy, retinopathy, coronary artery disease, and hypertension were consistently associated with poorer HRQoL. Higher income, employment, good glycemic control, medication adherence, physical activity, and engagement in diabetes self-management education were linked with better HRQoL. Methodological limitations included predominantly cross-sectional designs, heterogeneity of measurement tools, and limited adjustment for confounders. HRQoL in adults with T2DM across GCC countries is influenced by demographic, clinical, socioeconomic, and behavioral factors. Interventions that enhance self-management practices, address psychosocial needs, and prioritize support for vulnerable groups may improve HRQoL outcomes in this population.

Keywords: Type 2 diabetes mellitus, Health-related quality of life, Gulf Cooperation Council, Sociodemographic factors, Behavioral determinants.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is the most prevalent type of diabetes worldwide and continues to increase due to significant lifestyle changes, such as decreased physical activity and higher consumption of high-calorie foods, which lead to overweight and obesity¹. These modifiable behavioral risks speed up the onset and progression of the disease and account for much of the global rise in T2DM cases². In the Gulf Cooperation Council (GCC) region, these factors are even more pronounced due to rapid socioeconomic growth, Westernized diets, and a largely sedentary lifestyle. For example, among Arab countries, the highest prevalence of T2DM in 2017 was found in the GCC region: Saudi Arabia (31.6%), Oman (29%), Kuwait (25.4%), Bahrain (25.0%), and the United Arab Emirates (25.0%)³. Compared to other regions, the GCC faces a greater diabetes burden due to a combination of lifestyle risks and strong family and genetic predisposition⁴. Collectively, these factors underscore the urgent need to better understand the determinants of health-related quality of life (HRQoL) in this region, where cultural norms, family structures, and healthcare systems differ significantly from those in other parts of the world⁵.

Quality of life (QoL) is a multidimensional concept that includes an individual's social, emotional, functional, and physical well-being.

In healthcare, QoL is usually assessed from the patient's perspective, offering important insights into the impacts of diseases, treatments, and medications. It also helps identify treatment side effects, the support needed for pain relief, and adverse outcomes that influence patients' health. Many factors affect QoL, such as medical conditions, mental health, psychological stress, financial status, and social support⁶.

Saudi Arabia (KSA), as a member of the GCC, exhibits a high and increasing prevalence of T2DM. A systematic review and meta-analysis of observational studies conducted between 2000 and 2020 reported a substantial burden of T2DM in the Saudi adult population, confirming a marked rise in prevalence over recent decades⁷. Contributing factors to the high prevalence of T2DM in Saudi Arabia include lifestyle-related risk factors such as physical inactivity and obesity, in addition to disease-related factors, including longer disease duration. Obesity represents a major determinant of T2DM in the country, with evidence indicating that more than 70% of individuals with T2DM are either overweight or obese⁸. Similar trends are observed in other GCC countries. In Qatar, modeling studies have projected a continued increase in T2DM prevalence in the coming years, reflecting the sustained impact of lifestyle-related risk factors⁹. Likewise, Oman has reported a rising burden of T2DM, with projections indicating a

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substantial increase in prevalence if current trends persist¹⁰. Finally, the national prevalence of T2DM was estimated at 16.3% in Bahrain, 15.4% in the United Arab Emirates, and 22.0% in Kuwait, with corresponding age-adjusted comparative prevalence rates of 15.6%, 16.3%, and 12.2%, respectively⁵.

There are a few global reviews examining factors related to QoL among adults with T2DM. However, the GCC has distinct cultural norms, religious practices, family structures, and health system/coverage arrangements that may modify determinants of HRQoL. Therefore, a comprehensive, region-specific synthesis is needed to inform context-appropriate interventions. This review represents the first effort to identify and synthesize evidence on HRQoL determinants among adults with T2DM across GCC countries, aiming to inform research, policy, and targeted programs to improve diabetes outcomes in the region.

METHODS

Search strategy: A comprehensive literature search was conducted from the inception of databases to February 2025 in PubMed, MEDLINE, Web of Science, and the Saudi Digital Library. Additionally, the reference lists of included articles and related reviews were manually searched. Filters were applied for human studies and the English language, and no date restrictions were imposed. If the full text of an article was unavailable online, the authors were contacted to request access. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines¹¹, ensuring a transparent and rigorous approach to study selection and reporting.

Study selection and eligibility criteria: Two reviewers independently screened the titles and abstracts of all identified studies. Then, two additional reviewers independently screened full-text articles. Any disagreements at either stage were resolved by discussion, and when consensus could not be reached, the first author made the final decision. During this stage, the PICO framework was structured as follows, with "Intervention" redefined as exposures/factors given the observational focus: (P) adults with T2DM residing in GCC countries; (E) sociodemographic, clinical, lifestyle, and socioeconomic factors (e.g., gender, age, education, duration, complications, physical activity); (C) not applicable, with subgroup contrasts where available; (O) HRQoL.

Eligible studies were observational (cross-sectional, cohort) or interventional (randomized controlled trials) that reported quantitative associations between prespecified exposures/factors and health-related quality of life (HRQoL) among adults (≥ 18 years) with type 2 diabetes mellitus (T2DM) residing in Gulf Cooperation Council (GCC) member states. They used a validated HRQoL instrument (e.g., EQ-5D, SF-36, SF-12, WHOQOL-BREF, DQoL). We excluded studies of type 1 diabetes, gestational diabetes, or mixed populations without separable T2DM data; participants < 18 years; non-GCC settings; qualitative designs; case reports/series, conference abstracts, and reviews/editorials; and studies lacking a validated HRQoL measure or quantitative data. Only English-language publications were considered, and no date restrictions were applied.

Data Extraction and Quality Assessment: We extracted the following information: country, design, aims, sample size, participant characteristics, HRQoL instrument(s), exposures/factors, and main findings (Table 1). Given that most studies were cross-sectional, we used the AXIS tool for cross-sectional studies and CASP for the single case-control study to summarize domain-level performance across studies¹²⁻¹³.

RESULTS

Search Outcomes

Database searches identified 1,481 records, and an additional 107 records were found through Google Scholar. After removal of 19 duplicates, 1,460 records were screened by title/abstract; 1,361 were excluded. Ninety-nine full texts were sought; 41 could not be retrieved. Eighty-nine full texts were assessed; 73 were excluded (wrong population, not T2DM, or not HRQoL). One study was added via citation searching. Fifteen studies met all criteria (Figure 1).

Study characteristics

Fifteen studies (published between 2008 and 2024) were included. Most were conducted in Saudi Arabia ($n = 11$), with Kuwait ($n = 1$), Oman ($n = 1$), and Qatar ($n = 2$) also represented. Thirteen studies were cross-sectional, and others used a case-control design. Sample sizes ranged from 100 to 604 participants, reflecting differences in study scope and setting. HRQoL instruments included EQ-5D ($n = 5$), SF-12 ($n = 3$), SF-36 ($n = 2$), WHOQOL-BREF ($n = 2$), DQoL ($n = 1$), RV-DQoL13 ($n = 1$), and the Nottingham Health Profile ($n = 1$)¹⁴⁻²⁸ (Table 1).

Quality assessment

Overall methodological quality was mixed. 4/15 studies (27%) met $\geq 80\%$ of AXIS criteria^{17,19,21,22}, 7/15 (60%) met 60–70%^{14-16,18,23,26,28}, and 4/15 (13%) scored $\leq 60\%$. Common shortcomings included lack of confounder adjustment (0/15), missing sample-size justifications (4/15)^{16,18,21,22}, limited reporting of response rates/non-responders (7/15)^{14-16,18,23,26,28}, limited reporting on instrument validity/reliability (9/15)^{14-16,18,20,23,26,28,29}, and unclear sampling procedures (5/15)^{15,16,18,21,22}.

HRQoL instruments and domains

Health-related quality of life (HRQoL) was assessed using various validated instruments across the included studies. The most frequently utilized tool was the EuroQol 5-Dimension (EQ-5D), employed in five studies^{15, 22, 24, 25, 29}. This was followed by the SF-12, used in three studies^{20,23,26}, and the SF-36, used in two studies^{16,21}. The World Health Organization Quality of Life – BREF (WHOQOL-BREF) was also applied in two studies^{19,28}. Additionally, one study employed the Diabetes Quality of Life (DQoL) instrument¹⁷, the Nottingham Health Profile¹⁸, and the revised version of the Diabetes Quality of Life Questionnaire (RV-DQoL13)¹⁴.

Thematic synthesis of GCC findings

Sociodemographic factors (gender, age, marital status, and education)

Female gender and older age were associated with lower HRQoL in multiple studies^{16,24,28}. Evidence on marital status was mixed, with three studies indicating higher HRQoL among unmarried individuals^{26,28,29}. Education showed a consistent positive gradient with HRQoL; lower educational attainment corresponded to poorer outcomes across several domains, while higher education was associated with improved HRQoL^{19,21-23,28}.

Disease-related factors (Duration of diabetes and complications)

Three studies found that the duration of DM significantly affects HRQoL^{15,21,26}. A prolonged duration of DM, specifically more than 10 years, was significantly associated with poorer HRQoL^{14,28}. Furthermore, a diabetes duration exceeding 15 years was linked to a higher risk of negatively impacting physical, emotional, and general health¹⁶. In contrast, patients with diabetes for less than five years reported better QoL outcomes¹⁷. However, three studies found no

significant effect of DM duration on HRQoL^{20,22,29}. Regarding the complications and their impact on HRQoL, it was found that the presence of one or more DM complications, such as coronary artery disease, hypertension, retinopathy, hyperglycemia, and neuropathy, significantly impacts HRQoL^{16,21,22,28}.

Other Factors (Socioeconomic, behavioural, and clinical management factors)

Higher income and stable employment correlated with better HRQoL^{14,15,22,23,28}. Medication adherence, physical activity, and structured health education exposure were associated with improved outcomes, as measured by specific metrics^{14,20,21}. Patients treated with

oral antidiabetic agents reported better HRQoL than those on insulin in one study, potentially reflecting lower treatment burden¹⁵.

DISCUSSION

This review synthesized evidence from studies conducted in GCC to identify factors associated with HRQoL among adults with T2DM. The findings align with global patterns but also reflect unique regional dynamics influenced by cultural, economic, and healthcare system variables.

When comparing the findings of this review with those of previous global reviews, several consistencies and notable differences emerge^{30,31}.

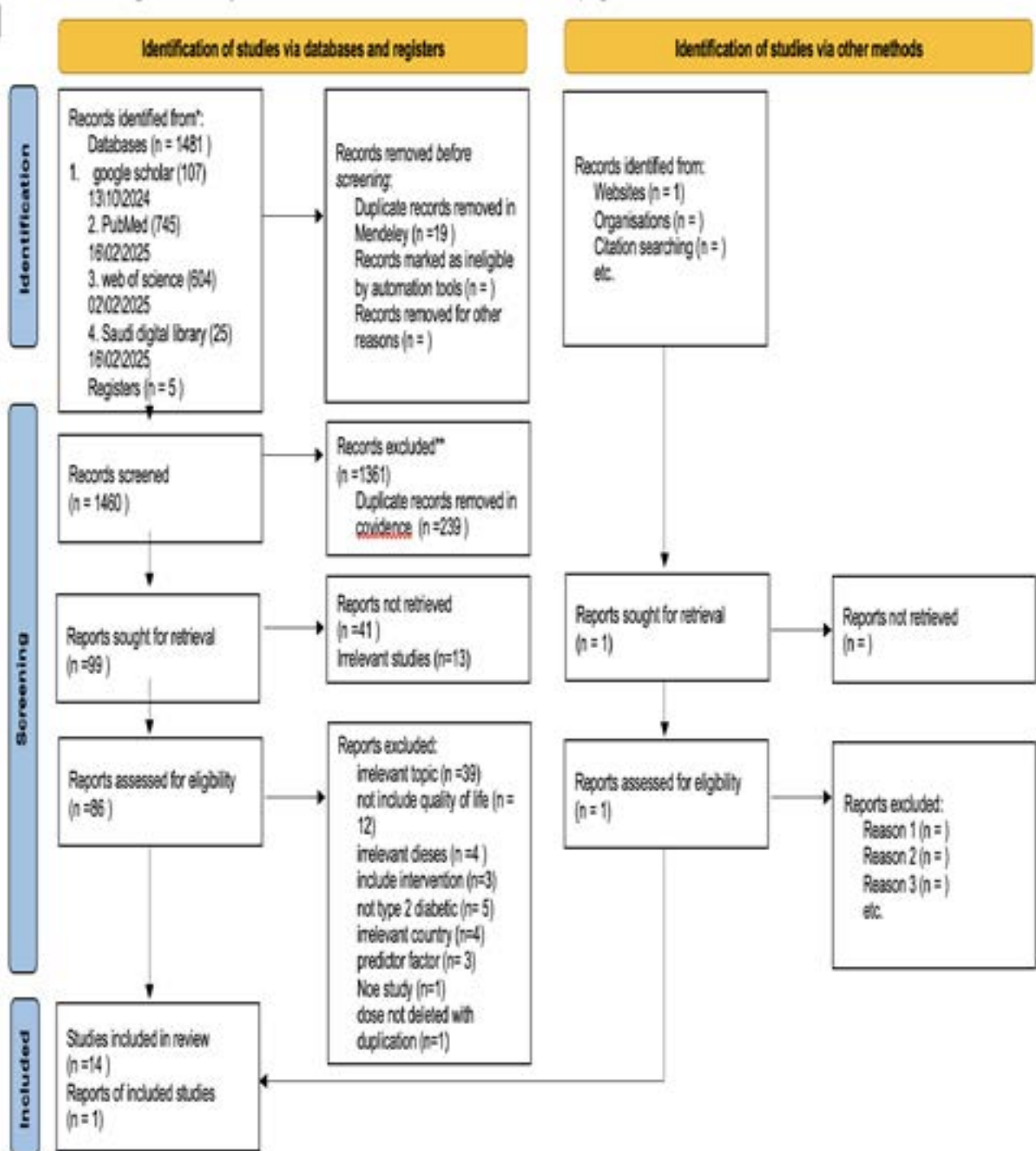


Figure 1. PRISMA 2020 flow diagram of study selection

Table 1. Characteristics of included studies assessed exposures/factors, main findings, and QoL domains most affected.

No.	Author(s)	Year	Country	Study Design	Aim	Participants (Age-Gender-N)	QoL Assessment Tool	Key Findings	Notes
1	Homady, Areej	2020	KSA	Cross-sectional	Evaluate HRQoL and predictors among T2DM patients in Samtah	≥18 yrs; M & F; 341 (269 M)	WHOQOL-BREF	Poor mental health & QoL; females worse; key predictors: sex, age, education, duration, HTN, complications, BMI; healthy diet + exercise improved HRQoL.	Broad HRQoL scale useful for primary care management.
2	D'Souza, M.S.	2016	Oman	Cross-sectional	Examine predictors and gender comparisons of QoL	≥18 yrs; M & F; 300	EQ-5D-5L, SDSCA	Poor glycemic control → lower QoL; self-care management model crucial; nurse-led interventions improve outcomes.	Emphasizes culturally specific self-care model.
3	Alshehri, H.M.H.	2022	KSA	Case-control	Assess HRQoL in Aseer region	Adults; M & F; 100	SF-12 (Arabic)	Lower HRQoL with older age, female, low education/income, unemployment, longer diabetes duration, high HbA1c.	Highlights socioeconomic disparities.
4	Alshammari, F.	2022	KSA	Cross-sectional	Assess HRQoL to guide policymaking	≥18 yrs; M & F; 400	EQ-5D-3L	Moderate HRQoL; pain & mobility problems; gender, marital status, age, education, employment, therapy type significant predictors.	Calls for multi-center nationwide study.
5	Alshammari, F.	2022	KSA	Cross-sectional	Examine link between self-care and HRQoL	≥18 yrs; M & F; 400	Modified EQ-5D	Non-adherence → poor QoL; education on self-management essential; health literacy improves outcomes.	Recommends multicenter community study.
6	Alsayed Hassan, D.	2022	Qatar	Cross-sectional	Explore DSM practices & QoL relationship	≥18 yrs; M & F; 105	SF-12	DSM education enhances literacy & improves QoL; programs must be culturally adapted.	Addresses gender gap in DSM.
7	Alramadan, M.J.	2019	KSA	Cross-sectional	Assess HRQoL & demographic/behavioral actors	≥18 yrs; M & F; 321	EQ-5D-5L	Pain/discomfort, mobility, depression/anxiety most affected; recommends patient-tailored interventions.	Nationwide studies suggested.
8	Almogbel, E.	2020	KSA	Cross-sectional	Measure HRQoL & related factors	≥30 yrs; M & F; 340	SF-36	Low HRQoL across domains; recommends educational programs & rehab services.	Suggests qualitative follow-ups.
9	Al-Shehri, A.H.	2008	KSA	Case-control	Assess HRQoL and influencing factors	≥18 yrs; M & F; 216	SF-12	HRQoL lower vs. controls; worse in females & uncontrolled diabetics.	Early Saudi evidence base.
10	Al-Matrouk, J.	2022	Kuwait	Cross-sectional	Assess QoL & predictors among Kuwaitis ≥45 yrs	≥45 yrs; M & F; 604	WHOQOL-BREF	Overall good QoL; lower in physical/environmental domains; predictors: region, treatment, education, marital status, BMI.	Suggests public-health action.

11	Al-Maskari, M.Y.	2011	Oman	Cross-sectional	Measure QoL & its correlates	≥18 yrs; M & F; 200	DQoL (60-item)	Moderate QoL; better with HbA1c < 8%; younger age → higher QoL.	Focus on glycemic control satisfaction.
12	Al-Adawi, S.	2011	Oman	Cross-sectional	Compare mood & HRQoL vs. controls	>20 yrs; M & F; 40	Nottingham Health Profile	Diabetics had poorer HRQoL & more distress; need to address mood dysfunction.	Highlights mental-health dimension.
13	Al Hayek, A.A.	2014	KSA	Cross-sectional	Assess factors linked to HRQoL	18–70 yrs; M & F; 283	SF-36 (Arabic)	Gender, income, treatment type, complications major predictors.	Informs clinical management & policy.
14	Abualhommos, A.K.	2022	KSA	Cross-sectional	Assess QoL of diabetic women in Al-Ahsa	≥18 yrs; women; 321	EQ-5D-5L	Pain/discomfort, mobility, anxiety/depression key problems; recommends tailored interventions.	Female-only sample.
15	Abualhamael, S.A.	2023	KSA	Cross-sectional	Investigate QoL & psychological correlates	25–65 yrs; M & F; 251	RV-DQoL13 & DASS-21	~50% had poor QoL; depression 49%, anxiety 72%, stress 50%; strong QoL-mental health correlation.	Recommends longitudinal studies.

All reviews, including the current review, identified common predictors of poor HRQoL in individuals with T2DM, including older age, female gender, lower education, longer disease duration, and the presence of complications. These shared findings underscore the global relevance of these determinants across diverse populations. However, while the international reviews emphasized psychosocial factors—particularly depression, anxiety, and emotional distress—as central predictors of HRQoL³¹, these were underexplored or absent in most studies from GCC countries. Similarly, another review gave greater weight to spiritual coping and mental health dimensions, which were again overlooked, mainly in the GCC literature³⁰.

Another significant difference lies in the health system context: both reviews discussed the roles of access to healthcare services, insurance status, and resource limitations^{30,31}, whereas few GCC studies explicitly addressed systemic or policy-level determinants of QoL, despite their likely influence. Furthermore, although religious and cultural influences are potentially significant in the GCC, they have rarely been investigated, whereas religion has been acknowledged as a protective factor in several global contexts³². These differences highlight both a need and an opportunity for future studies in the Gulf region to adopt a broader conceptualization of HRQoL that incorporates psychosocial, cultural, and structural determinants, better reflecting the lived experiences of individuals with T2DM.

Regarding demographic factors, this review found that female gender and older age consistently predicted lower HRQoL across GCC countries. These results are echoed in global studies, including those that found that female gender, older age, and lower education are among the strongest predictors of poor HRQoL^{30,31}. Regarding marital status, GCC studies indicated that being married was associated with better QoL. This finding also aligns with global reviews, though it is not universally emphasized.

In terms of socioeconomic factors, education level has a strong influence on HRQoL across GCC studies, with higher education consistently associated with better QoL outcomes. This association is reinforced in both global reviews, where lower educational attainment was linked to poorer diabetes self-management and lower health literacy³¹, contributing to diminished QoL³⁰. Furthermore, Income and

employment status also played significant roles in the GCC, where patients with higher income and stable employment had better HRQoL. Similarly, global evidence identified income and health insurance as predictors of better QoL, while patients without social protection schemes experienced worse QoL³⁰.

Regarding diabetes duration, longer duration, particularly over 10 years, was negatively associated with HRQoL in the GCC studies. This finding is consistent with global findings, which report a strong inverse relationship between diabetes duration and physical, emotional, and overall well-being^{30,31}. Longer disease duration often correlates with the accumulation of diabetes-related complications, which were consistently identified in all reviews as major contributors to diminished QoL. In the GCC studies, complications such as neuropathy, retinopathy, and coronary artery disease were particularly influential. Global reviews also confirmed that the presence of one or more complications significantly impaired QoL^{30,31}.

In terms of behavioral and clinical management factors, positive self-care behaviors, such as medication adherence, physical activity, and routine glucose monitoring, were associated with better QoL in GCC studies. These findings are consistent with global reviews, which have noted that high adherence to treatment regimens and active participation in self-management programs enhance QoL across multiple domains^{30,31}. Patients on oral antidiabetic medications reported better QoL than those on insulin, likely due to lower treatment burden and fewer side effects. Similar observations were made globally, where insulin users, particularly those with long-standing disease, often had lower HRQoL due to injection-related anxiety and treatment complexity³¹.

The alignment between GCC findings and global reviews highlights the universality of core HRQoL determinants in T2DM, specifically gender, age, education, complications, self-care behaviors, and socioeconomic status. However, some regional nuances are evident. While psychosocial and emotional predictors such as depression and anxiety were emphasized globally^{30,31}, these factors were less explicitly addressed in the GCC literature, suggesting an area for future research. The role of the health system structure, such as insurance coverage and access to specialized diabetes care, was emphasized in global reviews. However, only a few GCC studies examined health system

variables despite their likely relevance. Furthermore, religious coping and cultural beliefs - emerging as positive influences in global studies³² remain underexplored in GCC research, despite the strong role of religiosity in Gulf societies.

From a clinical and policy standpoint, the findings underscore the need for comprehensive diabetes management programs that incorporate psychosocial support, health education, and culturally tailored lifestyle interventions. The routine use of HRQoL assessment tools (e.g., EQ-5D, SF-36) can facilitate the early identification of individuals at risk and enable the provision of tailored support. Special attention should be given to vulnerable subgroups such as older adults, women, and low-income or less-educated individuals.

Strengths and limitations: This systematic review offers several strengths. First, it is the first known review to synthesize data exclusively from GCC countries on factors affecting HRQoL in adults with T2DM, filling a notable gap in regional evidence. Second, the study adhered to PRISMA 2020 guidelines, ensuring methodological transparency and reproducibility. Third, the review applied a comprehensive search strategy, spanning international and regional databases, supplemented by manual reference checks. The inclusion of 15 studies spanning various GCC settings enhances the regional relevance of the findings. Finally, by examining demographic, clinical, behavioral, and socioeconomic variables in parallel, the review provides a holistic perspective on the determinants of HRQoL.

However, the review is not without limitations. Most included studies were cross-sectional, which limits the ability to infer causality between identified predictors and QoL outcomes. Variation in measurement tools (e.g., EQ-5D, SF-36, WHOQOL-BREF, DQoL) hindered direct comparison of findings across studies and precluded meta-analysis. Additionally, several studies did not adjust for confounding variables or did not provide a clear sample-size justification, which may affect internal validity. Moreover, geographic representation across the GCC was uneven, with most studies conducted in Saudi Arabia and fewer in countries such as Bahrain, Kuwait, and Oman. This may limit the generalizability of the results to the entire region. Moreover, including only English-language publications could have introduced language bias and excluded relevant Arabic-language studies.

CONCLUSION

Across GCC countries, HRQoL in adults with T2DM is shaped by demographic (age, gender, education), clinical (disease duration, complications), socioeconomic (income, employment), and management-related (adherence, physical activity, treatment modality) factors. Longer disease duration and complications—particularly coronary artery disease, hypertension, and neuropathy—consistently reduced HRQoL across physical and emotional domains. Priorities for research and practice include integrating psychosocial and cultural determinants into HRQoL assessment and implementing culturally tailored, system-aware interventions to improve patient-centered outcomes.

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Competing Interest: None

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REFERENCE

1. Chandrasekaran P, Weiskirchen R. The role of obesity in type 2 diabetes mellitus: an overview. *Int J Mol Sci.* 2024;25(3):1882.
2. Institute for Health Metrics and Evaluation (IHME). Global burden of disease collaborative network. Seattle (WA): IHME; 2020.
3. Meo SA, Usmani AM, Qalbani E. Prevalence of type 2 diabetes in the Arab world: impact of GDP and energy consumption. *Eur Rev Med Pharmacol Sci.* 2017;21(6):1302–11.
4. Magliano DJ, Boyko EJ, IDF Diabetes Atlas 10th Edition Scientific Committee. IDF diabetes atlas. 10th ed. Brussels: International Diabetes Federation; 2021.
5. Aljulifi MZ. Prevalence and reasons of increased type 2 diabetes in Gulf Cooperation Council countries. *Saudi Med J.* 2021;42(5):481–90.
6. Fallowfield L. Quality of life: a new perspective for cancer patients. *Nat Rev Cancer.* 2002;2(11):873–9.
7. Jarrar MT, Abusalah MAH, Albaker W, et al. Prevalence of type 2 diabetes mellitus in the general population of Saudi Arabia, 2000–2020: a systematic review and meta-analysis of observational studies. *Saudi J Med Med Sci.* 2023;11(1):1–10.
8. Alzaheeb RA, Altemani AH. The prevalence and determinants of poor glycaemic control among adults with type 2 diabetes mellitus in Saudi Arabia. *Diabetes Metab Syndr Obes.* 2018;11:15–21.
9. Awad SF, O'Flaherty M, Critchley J, et al. Forecasting the burden of type 2 diabetes mellitus in Qatar to 2050: a novel modeling approach. *Diabetes Res Clin Pract.* 2018;137:100–8.
10. Awad SF, Al-Mawali A, Al-Lawati JA, et al. Forecasting the type 2 diabetes mellitus epidemic and the role of key risk factors in Oman up to 2050: mathematical modeling analyses. *J Diabetes Investig.* 2021;12(7):1162–74.
11. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ.* 2021;372:n71.
12. Downes MJ, Brennan ML, Williams HC, et al. Development of a critical appraisal tool to assess the quality of cross-sectional studies (AXIS). *BMJ Open.* 2016;6(12):e011458.
13. Critical Appraisal Skills Programme (CASP). CASP case control study checklist. Oxford: CASP UK; 2018.
14. Abualhamael SA, Baig M, Alghamdi W, et al. Quality of life, stress, anxiety and depression and associated factors among people with type 2 diabetes mellitus in the western region of Saudi Arabia. *Front Psychiatry.* 2023;14:1282249.
15. AbuAlhommos AK, Alturaifi AH, Al-Bin Hamdhah AM, et al. Health-related quality of life of patients with type 2 diabetes in Saudi Arabia. *Patient Prefer Adherence.* 2022;16:1233–45.
16. Al Hayek AA, Robert AA, Al Saeed A, et al. Factors associated with health-related quality of life among Saudi patients with type 2 diabetes mellitus: a cross-sectional survey. *Diabetes Metab J.* 2014;38(3):220–9.
17. Al-Maskari MY, Al-Shookri AO, Al-Adawi SH, et al. Assessment of quality of life in patients with type 2 diabetes mellitus in Oman. *Saudi Med J.* 2011;32(12):1285–90.
18. Al-Maskari MY, Petrini K, Al-Zakwani I, et al. Mood dysfunction and health-related quality of life among type 2 diabetic patients in Oman: preliminary study. *Int J Nutr Pharmacol Neurol Dis.* 2011;1(1):56–63.

19. Al-Matrouk J, Al-Sharbati M. Quality of life of adult patients with type 2 diabetes mellitus in Kuwait: a cross-sectional study. *Med Princ Pract.* 2022;31(3):238–45.
20. Al-Shehri AH, Taha AZ, Bahnassy AA, et al. Health-related quality of life in type 2 diabetic patients. *Ann Saudi Med.* 2008;28(5):352–60.
21. Almogbel E. Assessment of health-related quality of life among Saudi patients with type 2 diabetes mellitus in Qassim region, Saudi Arabia. *Age (Omaha).* 2020;42:68.
22. Alramadan MJ, Afroz A, Siddiquea BN, et al. Health-related quality of life for people with type 2 diabetes in Saudi Arabia: a cross-sectional study. *Saudi Med J.* 2019;40(4):363–71.
23. Alsayed Hassan D, Helaluddin F, Chahestani OH, et al. Diabetes self-management and health-related quality of life among primary care patients with diabetes in Qatar: a cross-sectional study. *Healthcare (Basel).* 2022;10(11):2235.
24. Alshammari F, Ansari M, Khan KU, et al. Health-related quality of life among people with diabetes: a cross-sectional study in Hail region, Saudi Arabia. *PLoS One.* 2024;19(5):e0299995.
25. Alshammari F, Hussain A, Khan K, et al. Diabetic self-care practice and quality of life among diabetes patients in the Hail region of Saudi Arabia. *Trop J Pharm Res.* 2024;23(4):715–21.
26. Alshehri HM, Alshehri AM, Alshehri SM, et al. Health-related quality of life of type 2 diabetic patients in Saudi Arabia. *World Fam Med.* 2021;19(3):41–8.
27. D'Souza MS, Venkatesaperumal R, Ruppert SD, et al. Health-related quality of life among Omani men and women with type 2 diabetes. *J Diabetes Res.* 2016;2016:8293579.
28. Homady A, Albasheer O, Bajawi A, et al. Health-related quality of life among type 2 diabetes patients in the southern province of Saudi Arabia using WHOQOL-BREF: a cross-sectional study. *Curr Diabetes Rev.* 2023;19(7):55–64.
29. Al-Aboudi IS, Hassali MA, Shafie AA, et al. A cross-sectional assessment of health-related quality of life among type 2 diabetes patients in Riyadh, Saudi Arabia. *SAGE Open Med.* 2015;3:2050312115610129.
30. Suniyadewi NW, Sufyanti Y, Kurniawati ND, et al. Quality of life in patients with type 2 diabetes mellitus: a systematic review. *J Pak Med Assoc.* 2023;73(2 Suppl):S140–7.
31. Teli M, Thato R, Rias YA. Predicting factors of health-related quality of life among adults with type 2 diabetes: a systematic review. *SAGE Open Nurs.* 2023;9:23779608231185921.
32. Sarwoko S, Agusman F, Nurhayati S. The role of religious coping in quality of life among people with chronic disease: a systematic review. *Int J Health Sci (Qassim).* 2022;6(Suppl 4):6352–63.