



Health-related Quality of Life and Risk Factors Among Type II Diabetic Mellitus Patients Attending Public Hospitals in Harari Regional State, Ethiopia

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Abstract

Background: Diabetes mellitus is a complex chronic disease requiring continuous medical care and multifactorial risk reduction strategies beyond glycemic control. Continuous patient self-management, education, and support are essential to prevent acute complications and reduce the risk of long-term complications. **Objective:** To assess health-related quality of life and its associated factors among type 2 diabetes mellitus patients attending public hospitals in Harari region, Ethiopia, 2021. **Methods:** An institution-based cross-sectional study design was employed, from June 15 to July 15, 2021. The simple random sampling technique was used to select the participants. Epi Data version 3.1 was used for data entry and Stata version 16 was used for analysis. Simple linear regression was done and variables with a p-value less than 0.25 were included in multivariable linear regression. For the goodness of model fit, all linear regression assumptions. Multicollinearity was checked. A p-value of less than 0.05 was considered an independently associated factor in multivariable linear regression. **Result:** The mean health-related quality of life (HRQOL) score was 0.714 (± 0.201). Factors such as older age, female gender, unemployment, widowhood, and the presence of complications were significantly associated with lower HRQOL. **Conclusion:** The overall health-related quality of life among type 2 diabetic patients was low. Old age, female gender, unemployed occupation, being widowed, and complications were inversely associated with health-related quality of life. Therefore, giving special attention to elderly diabetes mellitus patients, improving gender identity, breaking the cycle of low occupational status through creating job opportunities, and giving health education for changing attitudes might enhance the quality of life for type 2 diabetic patients.

Keywords

Diabetes; Euro quality of life 5-dimension 3 level; Health-related quality of life

1. Introduction

Diabetes mellitus (DM) is a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism resulting from defects in insulin secretion, insulin action,

or both [1, 2]. It is a complex, chronic illness requiring continuous medical care with multifactorial risk reduction strategies beyond glycemic control [1, 3]. Ongoing patient self-management education and support are critical to preventing acute complications and reducing the risk of long-term complications [1].

Quality of life is an individual's perception of their position in life in the context of the culture and value systems in which they live and concerning their goals, expectations, standards, and concerns [4, 5]. Health-related quality of life (HRQOL) is the physical, psychological, and social domains of health that are influenced by a person's experiences, beliefs, expectations, and perceptions; therefore, healthcare providers should strive to understand the physical, emotional, and social impact of chronic diseases such as DM [3-5]. Therefore, measuring health-related quality of life is important, because they predict the individual's capacity to manage the disease and maintain long-term health and well-being. It is also increasingly recognized as an important health outcome in its own right, representing the ultimate goal of all health interventions.

Studies also indicated that the HRQOL of patients with DM is decreased by different domains of quality of life such as role limitation, emotional disturbances, pain, and fatigability. Besides these factors like socio-demographics and economic status, behavioral, clinical, and social-related factors also affect HRQOL [3, 6]. Depression was also the major determinant factor in HRQOL concerning physical and psychological domains in developed and low-income countries [7, 8]. Diabetes mellitus negatively affects health-related quality of life [9, 10].

In Ethiopia, several studies have assessed the HRQOL of type 2 DM patients using the World Health Organization QOL. However, there is a paucity of studies that employ tools such as the Euro Quality of Life 5 Dimensions 3 Level (EQ-5D) that incorporate societal preference and provide effective means to assess the impact of the disease across different health states. Although previous studies have assessed HRQOL among diabetic patients globally, there is limited research focusing on Ethiopian populations, particularly in the Harari region. This study addresses this gap by evaluating the HRQOL among type 2 diabetic patients in public hospitals and identifying region-specific factors that impact their quality of life. To this effect, the current study assessed the HRQOL and determined health state utility values and factors that influence the values among type 2 DM patients attending public hospitals of Harari Region, Ethiopia.

2. Methods and Materials

2.1 Study area and period

This study was conducted at two public hospitals, Hiwot Fana Specialized University Hospital and Jugal Hospital, in Harar town. Harar town is the capital city of the Harari region located 526 km away from Addis Ababa. In the town, there are 45 health facilities (34 health posts, 8 health centers, 3 hospitals). There are a total of 285 type 2 DM patients who were active on follow-up in Hiwot Fana Specialized University Hospital. In Jugal Hospital 250 type 2 DM patients were active on follow-up. The study was conducted from June 15 – July 15, 2021.

Study design: Institution-based cross-sectional study was conducted.

Source of population: All type 2 diabetic patients who visit public hospitals in the Harari region.

Study population: All selected type 2 diabetic patients who visit public hospitals in the Harari region during the study period.

2.2 Eligibility criteria

All selected type 2 diabetic patients who visited public hospitals in the Harari region during the study period were included. However, patients aged less than 18 years old, seriously ill during data collection, newly diagnosed in the last three months, and mothers with gestational DM were excluded.

2.3 Sample size determination

The sample size was calculated by using a single mean formula, by considering the following assumptions: mean and standard deviation of overall HRQOL among type 2 DM patients was 52.6 ± 12.1 [11], the margin of error was decided to be 1.2 and 95% ($z_{\alpha/2} = 1.96$) confidence interval (CI) with 10% non-response rate and computed as follows.

$$n = \frac{(z_{\alpha/2})^2 x s^2}{E^2} = \frac{(1.96)^2 x (12.1)^2}{(1.2)^2} = 391$$

Then, by adding a 10% non-response rate the final sample size was 430.

Where n = minimum required to sample for the study.

Z = standard normal distribution ($z = 1.96$) with a confidence level of 95%.

S = standard deviation ($SD = 12.1$).

E = is the tolerable margin of error ($E = 1.2$).

2.4 Sampling procedure

The hospitals in the Harari region were included in the study and the number of type 2 DM patients in each hospital was identified 285 type 2 DM patients attending treatment units at Hiwot Fana Specialized University Hospital and 250 type 2 DM patients attending treatment units at Jugal hospital. Then, proportional allocation was used to determine the required number of patients in each hospital. As a result, 229 were from Hiwot Fana Specialized University Hospital and 201 from Jugal Hospital. Finally, a simple random sampling technique was used by considering the registration book as a sampling frame to include study participants (Figure 1).

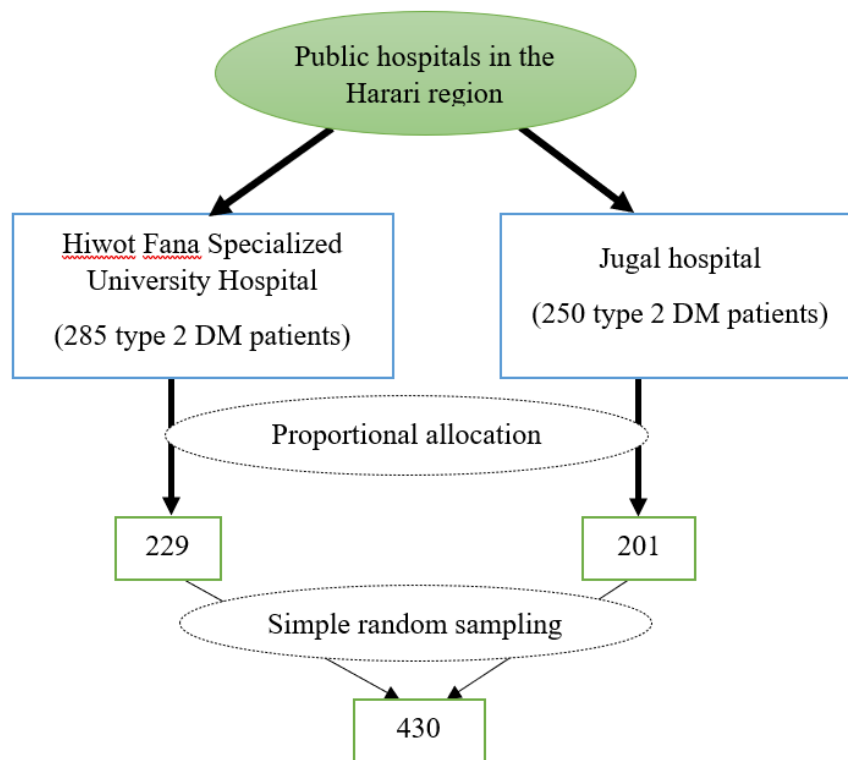


Figure 1. Sampling procedure for health-related quality of life and its associated factors among type 2 diabetes mellitus patients attending public hospitals of Harari region, Ethiopia, 2021.

2.5 Study variables

Dependent variable

Health-related quality of life.

Independent variable

Sociodemographic factors: age, sex, marital status, educational status, and income level.

Clinical factors: disease duration, DM complication, BMI, and duration of therapy and Health service factors (accessing distance, waiting time for service).

2.6 Operational definition

Health-related quality of life; The values for each dimension according to the Zimbabwe general population health states time trade-off by the EQ 5D 3L calculated. The mean utility was calculated by the multiplicative assumption

theory [11-13].

2.7 Data collection instrument

The EQ-5D-3L tool was used to assess health-related quality of life. This tool includes five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension was rated on a three-level scale, and the responses were converted into a weighted index using the Zimbabwean value set [13].

2.8 Data collection procedures

The questionnaire was translated from the English version to Amharic (the official work language of Ethiopia) and Afan Oromo (the local language of the Harari region). Data were collected using an interviewer-administered questionnaire. Some of the clinical information was corroborated by patient records. Interviewer-administered structured questionnaires were collected by four diploma nurses and supervised by two epidemiologists.

2.9 Data quality control

The questionnaire was translated into Amharic and Afan Oromo languages and translated back to English again to ensure its consistency. The training was given to data collectors and supervisors about how to use questionnaires, the ethical principle of confidentiality, and data management before data collection. The pre-test was done on 5% of the sample size, at Bisidimo primary hospital a week before data collection. Based on the findings of the pretest data, the questionnaire was checked for its clarity, simplicity, and understandability. The data collection was supervised daily and the filled questionnaires were checked daily by the supervisors and researchers for completeness.

2.10 Data processing and analysis

The data were entered by using Epi Data version 3.1 and exported to the Stata version for analysis. Descriptive statistics of numeric variables were presented in means and standard deviations and presented using frequency and percentage. The HRQOL utility scores (index values) were calculated using the Zimbabwean value set data due to the lack of utility score data for the Ethiopian population. Simple and multivariable linear regression was performed to identify factors associated by using the overall index mean as the dependent variable. Only variables responsible for significant variation ($p < 0.25$) in the simple linear regression analyses were included in multivariable linear regression. For the goodness of model fit, all linear regression assumptions, adjusted R-squared, residual plots (p-p, q-q), SEs, and outliers were considered. Multicollinearity was checked and the maximum variable inflation factor reported was 1.54, which indicates that there was no multicollinearity threat. A p-value less than 0.05 was considered as an independently associated factor in multivariable linear regression.

3. Results

3.1 Socio-demographic characteristics of respondents

From a total sample of 430 study participants, 414 participated in the study, giving a response rate of 96%. The mean age was (56.6 ± 10.4) years and about half of the participants 209(50.5%) were females. Most of the participants (79.5%) were living in urban and about 98(23.7%) participants were retired on occupation. A little over half, 213(51.5%) of the study participants were married and the average estimated monthly income was 2500 Ethiopian birr (Table 1).

3.2 Diabetes and health service-related characteristics of the participants

Nearly half of (46.4%) the participants were on oral diabetic medication, duration of the therapy of the study participants median was 6 years. About half of the participants (50.0%) reported developing complications. About (30.7%) of type 2 diabetic patients had traveled 2.5-5 kilometers to access the health service facilities. To get service patients waiting time median was 2 hrs. By standard classification of BMI, more than half of them (54.0%) were normal (Table 2).

Table 1. Basic Socio-demographic characteristics of type 2 DM patients attending public hospitals in Harari region, Ethiopia, 2021

| Variable (n = 414) | Category | Frequency | Percent |
|--|-----------------------|------------------|---------|
| Age (mean \pm SD) in years | | 56.6 \pm 10.37 | |
| Sex | Male | 205 | 49.5 |
| | Female | 209 | 50.5 |
| Residence | Urban | 329 | 79.5 |
| | Rural | 85 | 20.5 |
| Marital status | Single | 51 | 12.3 |
| | Married | 213 | 51.5 |
| | Widowed | 72 | 17.4 |
| | Divorced | 78 | 18.8 |
| Occupation | Unemployed | 77 | 18.6 |
| | Gov't or NGO-employed | 66 | 15.9 |
| | Merchant | 46 | 11.1 |
| | Private | 70 | 16.9 |
| | Farmer or housewife | 57 | 13.8 |
| | Retired | 98 | 23.7 |
| Average monthly income (media with 50 th IQR) | | 2500 | |

Table 2. Diabetes and health service-related characteristics of type 2 DM patients attending public hospitals at Harari region, Ethiopia, 2021

| Variable (n = 414) | Category | Frequency | Percent |
|--|-------------|-----------|---------|
| Current treatment | Oral | 192 | 46.4 |
| | Injection | 75 | 18.1 |
| | Both | 147 | 35.5 |
| DM complication | Yes | 207 | 50.0 |
| | No | 207 | 50.0 |
| Distance health facilities in Kilometers. | 1-2.5 | 104 | 25.6 |
| | 2.5-5 | 127 | 30.7 |
| | 5-7.5 | 92 | 22.2 |
| | > 7.5 | 89 | 21.5 |
| | Underweight | 33 | 7.8 |
| BMI | Normal | 223 | 53.9 |
| | Overweight | 122 | 29.5 |
| | Obese | 36 | 8.7 |
| Duration of therapy (median 50 th IQR) year | | 6 | |
| Waiting time (median, 50 th IQR) in hr. | | 2 | |

3.3 Diabetic complications among patients

Out of the 414 patients, 201(48.6%) had diabetic complications. However, 213(51.4%) did not have diabetic complications (Figure 2).

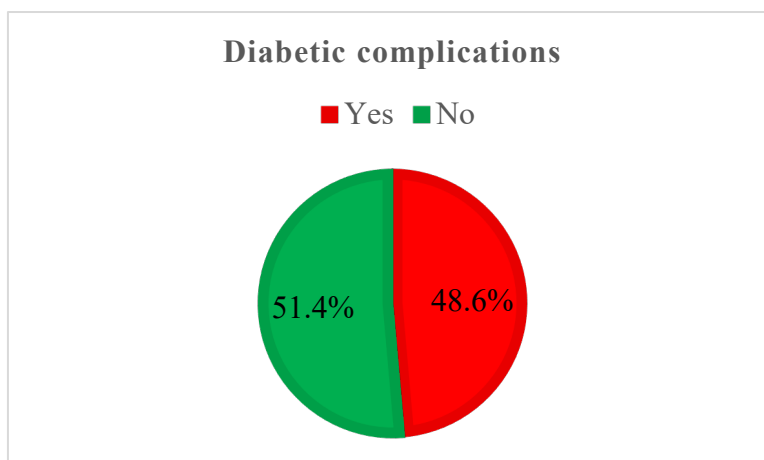


Figure 2. Diabetic complications of type 2 DM patients attending public hospitals in Harari Region, Ethiopia, 2021 (n = 414).

3.4 Types of diabetic complications among patients

Out of the 201 patients who had diabetic complications, 154(76.6%) had hypertension, 1(0.5%) had nephropathy, 21(10.4%) had neuropathy, 26(12.9%) had retinopathy, 21(10.4%) had foot ulcer, and 29(14.5%) had diabetic related heart diseases (Figure 3).

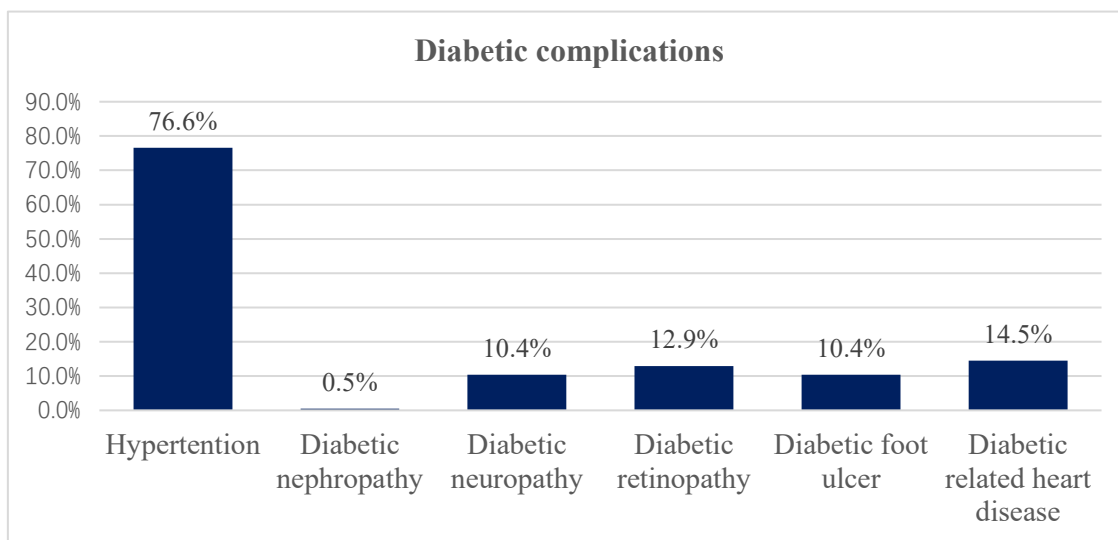


Figure 3. Types of diabetic complications of type 2 DM patients attending public hospitals in Harari Region, Ethiopia, 2021 (n = 201).

3.5 Health-related quality of life among participants using Euro Quality of Life 5 Dimensions 3 Level utility scores

Out of 414 participants, 23(5.6%) had an extreme problem regarding mobility dimension, 46(11.1%) had an extreme problem regarding self-care dimension, 43(10.4%) had an extreme problem regarding activity dimension, 52(12.6%) had an extreme problem regarding pain or discomfort dimension, and 34(8.2%) had an extreme problem regarding anxiety and depression dimension (Figure 4).

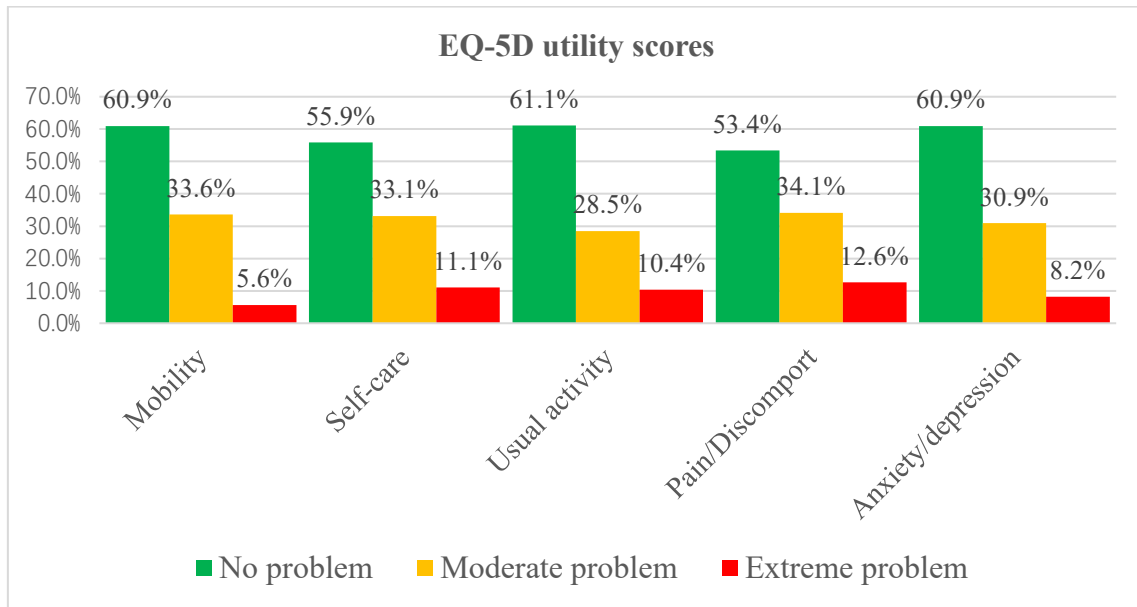


Figure 4. The frequency distributions of problems within the health-related quality of life dimensions among type 2 DM patients attending public hospitals in Harari Region, Ethiopia, 2021 (n = 414).

3.6 Factors associated with health-related quality of life among type 2 DM patients

3.6.1 Simple linear regression analysis

From factors entered; age, sex, residence, marital status, occupation, income, and marital status, occupation, waiting time, complication, treatment regimens, and body mass index were significantly associated with health-related quality of life (Table 3).

3.6.2 Multivariable linear regression analysis

Table 4 summarizes the multivariable linear regression results, showing that older age (B = -0.005, 95% CI: -0.006 to -0.003), female gender (B = -0.067, 95% CI: -0.105 to -0.029), and the presence of diabetic complications (B = -0.058, 95% CI: -0.097 to -0.020) were significantly associated with lower HRQOL (Table 4).

4. Discussion

The findings of this study show that the overall average health-related quality of life score was 0.714 (\pm 0.204) in patients with type 2 diabetes mellitus. It was relatively low to the norm of the Zimbabwean population which was 0.842 [12]. The observed variations may have been expected as the Zimbabwean study used the general population, which was not necessarily sick, while this study used type 2 diabetic patients. Regional differences in socioeconomic and healthcare systems may play an important role. In developing and resource-limited countries such as Ethiopia, some people with diabetes remain undiagnosed until complications occur. Thus, such delays in seeking medical care, in large part because of limited income and ignorance, can harm the quality of life of these individuals [12, 14].

The finding of this study was also compared with the previous studies which used the EQ 5D 3L scale to determine health-related quality of life among type 2 DM patients. Studies conducted in various parts of the world were consistent with this finding [9, 15-17]. This may be due to the poor socio-economic status, and sociocultural status of the study populations. However, the finding of health-related quality of life score in this study was slightly higher than other studies [10, 18-20]. This difference may be due to socio-demographics, sampling technique, sample size, sociocultural difference, and tool level use by others.

This study shows that age has an inverse association with health-related quality of life. The health-related quality of life decreases when age increases by one unit. It was in line with other studies that revealed that age was inversely associated with health-related quality of life [21-28]. Such findings may reflect that younger people are more likely to enjoy better health than the elderly. This might be because of the biological alteration of the patients as they got older and older, increasing cell degeneration, decreasing the immunity system, decreasing muscular fitness,

increasing muscular atrophy, and increasing cognitive impairment.

Table 3. Simple linear regression analysis of factors associated with health-related quality of life among type 2 diabetic patients attending public hospitals in Harari region, Ethiopia, 2021

| Variable (n = 414) | Category | HRQOL Mean | B | 95% CI |
|---|-------------------------------------|------------|--------|-------------------|
| Age in years ^C | | 0.714 | -0.006 | (-0.007, -0.004)* |
| Sex | Male | 0.748 | 1 | 1 |
| | Female | 0.681 | -0.067 | (-0.106, -0.029)* |
| Residence | Urban | 0.720 | 1 | 1 |
| | Rural | 0.690 | -0.030 | (-0.018, -0.078)* |
| Marital status | Single | 0.768 | 1 | 1 |
| | Married | 0.739 | -0.029 | (-0.237, -0.098) |
| | Widowed | 0.633 | -0.134 | (-0.206, -0.064)* |
| Occupation | Divorced | 0.683 | -0.085 | (-0.154, -0.015)* |
| | Employed | 0.728 | 1 | 1 |
| | Unemployed | 0.709 | -0.019 | (-0.084, -0.046) |
| | Merchant | 0.779 | 0.070 | (0.005, 0.145) |
| Distance of health facility | Self-employed | 0.727 | -0.018 | (-0.049, 0.085) |
| | Farmer/housewife | 0.740 | 0.031 | (-0.039, 0.102) |
| | Retired | 0.650 | -0.059 | (-0.122, -0.003)* |
| | 1-2.5km | 0.709 | 1 | 1 |
| Diabetic complication | 2.5-5 | 0.727 | 0.018 | (-0.034, 0.070) |
| | 5-7.5 | 0.723 | 0.014 | (-0.043, 0.0702) |
| | >7.5 | 0.692 | -0.017 | (-0.074, -0.040) |
| Current treatment | Yes | 0.673 | -0.082 | (-0.120, -0.043)* |
| | No | 0.214 | 1 | 1 |
| Body mass index | Oral | 0.734 | 1 | 1 |
| | Injection | 0.737 | 0.003 | (-0.051, 0.056) |
| | Both | 0.675 | -0.060 | (-0.103, -0.017)* |
| Duration of therapy type 2 diabetes mellitus ^C | Normal | 0.740 | 1 | 1 |
| | Underweight | 0.673 | -0.067 | (0.140, 0.006)* |
| | Overweight | 0.681 | -0.059 | (-0.103, -0.015)* |
| Average monthly income ^C | Obese | 0.703 | -0.037 | (-0.107, 0.034) |
| | Waiting time in hour ^C | 0.741 | 0.002 | (-0.002, 0.005) |
| | Average monthly income ^C | 0.714 | 0.018 | (0.007, 0.043)* |
| | | | 0.004 | (0.006, 0.025)* |

HRQOL: health-related quality of life, C: Continuous variable, *: value < 0.25.

Table 4. Multiple linear regression analysis on factors associated with health-related quality of life among type 2 diabetic patients attending public hospitals in Harari region, Ethiopia, 2021

| Variable (n = 414) | Category | HRQOL Mean | B | 95% CI |
|--------------------|---------------------------------------|------------|--------|--------------------|
| | Age in years ^C | 0.714 | -0.005 | (-0.006, -0.003)** |
| Sex | Male | 0.748 | 1 | 1 |
| | Female | 0.681 | -0.067 | (-0.105, -0.029)** |
| Residence | Urban | 0.720 | 1 | 1 |
| | Rural | 0.690 | -0.042 | (-0.091, 0.006) |
| Marital status | Single | 0.768 | 1 | 1 |
| | Married | 0.739 | -0.017 | (-0.075, 0.041) |
| | Widowed | 0.633 | -0.083 | (-0.151, -0.014)** |
| Occupation | Divorced | 0.683 | -0.044 | (0.111, 0.023) |
| | Employed | 0.728 | 1 | 1 |
| | Unemployed | 0.709 | -0.034 | (-0.104, -0.037)** |
| | Merchant | 0.779 | -0.035 | (-0.037, 0.106) |
| | Self-employed | 0.727 | -0.003 | (-0.061, 0.067) |
| | Farmer/housewife | 0.740 | -0.025 | (-0.043, 0.093) |
| | Retired | 0.650 | -0.022 | (-0.090, 0.047) |
| | Monthly income ^C | 0.714 | 0.005 | (0.006, 0.002) |
| | Waiting time in an hour. ^C | 0.174 | 0.024 | (-0.003, 0.048) |
| DM complication | Yes | 0.673 | -0.058 | (-0.097, -0.020)** |
| | No | 0.214 | 1 | 1 |
| Current treatment | Oral | 0.734 | 1 | 1 |
| | Injection | 0.737 | 0.035 | (-0.015, 0.085) |
| | Both | 0.675 | -0.014 | (-0.067, -0.039) |
| Body mass index | Normal | 0.740 | 1 | 1 |
| | Underweight | 0.673 | -0.035 | (-0.104, 0.034) |
| | Overweight | 0.681 | -0.027 | (-0.069, 0.016) |
| | Obese | 0.703 | -0.012 | (-0.056, 0.081) |
| | Constant | | 1.007 | (0.865, 1.149) |

HRQOL: health-related quality of life, **C:** Continuous variable, **: value <0.05, **R²** = 21.6%.

The finding of the study also showed that being a female patient has an inverse relationship with HRQOL, which was consistent with other studies [16, 24]. This might be related to the sociocultural conditions that the community gives to the females.

Patients with type 2 diabetes who are widowed had also lower health-related quality of life than those who are single. This relationship between marital status and health-related quality of life is also observed in previous studies [29]. The possible explanation for the finding is that being widowed may increase social isolation by the population, feeling lonely, and lack of confidence in the community, family health instability, and economic crisis.

Unemployed type 2 diabetes patients had lower health-related quality of life as compared with those patients who are employed. Another study reported a significant association between employment and health-related quality of

life of patients with type 2 DM [30]. Possible explanation Patients who are not employed will develop stress and they could be psychologically and emotionally disturbed.

The current study has also observed an inverse association between the presence of complications and health-related quality of life among DM patients. It has demonstrated that patients with type 2 DM who have developed any DM complication have worse health-related quality of life. The negative effect of DM complications on health-related quality of life of patients with DM has been reported in previous studies [19, 21, 26, 31-33]. This may be due to patients who develop complications living under the double crisis, they feel unhappy being patients with diabetes and they would be under psychological, physical, emotional, social, and spiritual pain.

The inverse association between complications and HRQOL suggests that improving complication management in diabetic care could significantly enhance patient well-being. Policymakers should consider introducing more regular screenings for complications and integrating psychosocial support into diabetes management programs.

5. Limitations of the Study

The finding might be prone to interviewee bias that the data were collected using an interviewer-administered questionnaire and fluctuations are likely to occur as the data were collected at a point in period.

6. Conclusion

This study demonstrates that HRQOL among type 2 diabetic patients in the Harari region is significantly influenced by socio-demographic factors and complications. To improve HRQOL, healthcare providers should focus on tailored interventions for older adults, women, and those with complications. Future research should explore the impact of long-term care interventions on HRQOL in diabetic populations.

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