

BMJ Open Diabetes-related distress and its associated factors among people with type 2 diabetes in Southeast Ethiopia: a cross-sectional study

Mulugeta Adugnew ¹, Deriba Fetene,¹ Tesfaye Assefa,¹ Sana'a Kedir,¹ Kidist Asmamaw,¹ Zegeye Feleke,¹ Degefa Gomora,² Hailye Mamo¹

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¹Nursing, Madda Walabu University, Goba, Ethiopia

²Midwifery, Madda Walabu University, Goba, Ethiopia

Correspondence to

Mulugeta Adugnew;
mulugetaadugnew@gmail.com

ABSTRACT

Background Diabetes-related distress lowers the motivation for self-care, often leading to lowered physical and emotional well-being, poor diabetes control, poor medication adherence and increased mortality among individuals with diabetes.

Objective To assess factors associated with diabetes-related distress among people living with type 2 diabetes in Southeast Ethiopia.

Design Institution-based cross-sectional study was conducted.

Setting Six diabetic follow-up care units at public hospitals in Southeast Ethiopia.

Participants All adult people living with type 2 diabetes from the diabetic follow-up clinic.

The main outcome measures Diabetes Distress Scale-17 questionnaire was used to assess diabetes-related distress.

Results Out of the total 871 study participants intended, 856 participated in the study with a response rate of 98.3%. The findings showed that about 53.9% (95% CI 50.4% to 57.2%) of the patients have diabetes-related distress. Physical activity (adjusted OR, AOR 2.22; 95% CI 1.36 to 3.63), social support (AOR 4.41; 95% CI 1.62 to 12.03), glycaemic control (AOR 2.36; 95% CI 1.35 to 4.12) and other comorbidities (AOR 3.94; 95% CI 2.01 to 7.73) were factors that significantly associated with diabetes-related distress at $p < 0.05$.

Conclusion This study demonstrated that more than half of the participants had diabetes-related distress. Therefore, the identified factors of diabetes-related distress need to be a concern for health institutions and clinicians in the management of people living with type 2 diabetes.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a leading cause of non-traumatic amputations, blindness, stroke and end-stage renal disease. These can be prevented or delayed by strict adherence to prescribed medications and a variety of self-management behaviours. Many people with T2DM may become emotionally overwhelmed, frustrated and discouraged by the threat of developing complications

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ As a strength, this study looked at a large sample size (N=856), the findings were interpreted appropriately and had a high response rate.
- ⇒ Since there is no similar study conducted in the area, it can contribute a lot as baseline information for future studies.
- ⇒ The data on diabetes-related distress were collected through self-reporting, and therefore, there may be recall bias.
- ⇒ The use of a cross-sectional design limits the generalisability of its findings outside of the population from which the study sample was drawn.

and the challenges of the complicated set of self-care activities.¹ This condition is termed diabetes-related distress (DRD).

DRD is a unique emotional problem that is directly related to the diagnosis, the threat of complications, self-management, burdens, worries of living with T2DM and concerns about support and access to care.^{1 2} The emotional subscale of DRD can be divided into four types: (1) emotional burden (the patients feel anger, fear and depression when thinking about their diabetes), (2) physician-related distress (the patients feel that health workers do not understand their current condition and set unrealistic targets for therapy related to their diabetes), (3) regiment-related distress (the patients feel unable and unconfident in doing therapy or self-care related to their diabetes) and (4) interpersonal distress (the patients assume that their family or caretaker cannot support their therapy and understand the difficulties of living with diabetes).³

DRD lowers the motivation for self-care, often leading to lowered physical and emotional well-being, poor diabetes control, poor medication adherence and increased mortality among individuals with diabetes.⁴

Patients with DM experience psychological difficulties related to their chronic DM and are worried about the risk of complications.⁵

Currently, Ethiopia has been challenged by the growing magnitude of non-communicable diseases such as diabetes and is among the top four countries with the highest adult diabetic populations aged 20–79 years in sub-Saharan Africa.⁶ As information obtained from the Health Bureau, hospital-based patient attendance rates and medical admissions related to patients with diabetes in hospitals have been rising. This requires a shift in healthcare provider systems by incorporating psychological factors such as DRD in the treatment of patients with diabetes.⁷

DRD is a prevalent psychological comorbid condition among patients with T2DM.^{5, 8} Recent studies demonstrated that 60.5 %² and 35.6%⁹ of people with T2DM experience DRD. In Ethiopia, the few available studies indicated that 44.4%¹⁰ and 36.8 %¹ of people with type 2 DM experience DRD. However, a study conducted in the Amhara region, Ethiopia had limitations and missed important clinical and diabetic-related variables that might be associated with DRD. Therefore, further studies are recommended to incorporate these variables to better understand DRD among people with T2DM in Ethiopia.¹⁰

High levels of diabetes distress have a significant impact on medication-taking behaviours, lower self-efficacy, and poorer dietary and exercise behaviours.¹¹ High levels of DRD are a significant contributor to low levels of physical activity and non-adherence to diet and prescribed medications which in turn leads to poor glycaemic control.¹² Maintaining appropriate glycaemic control is important to prevent complications of diabetes. The American Diabetes Association (ADA) guidelines¹³ recommend that a reasonable HbA1c goal for patients with T2DM is <7%, but many people do not meet the treatment goal.¹⁴ The study done by Fiseha *et al* revealed that 70.8% had poor status glycaemic control.¹⁵ Emotional distress made the required self-management of the disease more difficult and limited the patients' management of self-care activities necessary to achieve adequate glycaemic control.¹⁴ When compared with patients with diabetes alone, patients with diabetes and comorbid DRD have poorer glycaemic control. Uncontrolled glycaemia is also associated with various serious complications including heart disease, stroke, blindness, kidney failure and lower-limb amputation.¹ Moreover, adults with both DRD and diabetes are more likely to have poorer self-management behaviours and a higher risk of morbidity and mortality than those with only diabetes.¹⁶ The constant behavioural demands of diabetes self-management and the potential or actuality of disease progression are directly associated with reports of diabetes distress.¹⁷

In general, addressing DRD improves diabetes self-care, diabetes self-efficacy, glycaemic control and quality of life.¹ It is, therefore, imperative to assess DRD among people living with DM early and intervene on time.

The ADA recommends people with diabetes should be routinely monitored for DRD.¹⁷ However, from the review of the relevant literature, information regarding DRD is limited in Ethiopia. In addition, less is known about the factors that contribute to DRD and which could be targeted for intervention in the country. Therefore, this study aimed to assess the prevalence of DRD and its associated factors among people living with type 2 diabetes attending hospitals in Southeast Ethiopia.

METHODS

Study design and setting

An institution-based cross-sectional study was conducted at six hospitals found in Bale and East Bale zones Administration, Southeastern Ethiopia from March to April 2023. The Bale and East Bale zones are found in Oromia regional state and are located (430 km and 555 km, respectively) southeast of Addis Ababa, the capital city of Ethiopia. There are six hospitals delivering care including care for patients with diabetes in the zones, where six of them have diabetic follow-up care services. There are a total of 1863 patients with type 2 diabetes on treatment follow-up in these six hospitals.

Population

The study population was adult people living with type 2 diabetes from the diabetic follow-up clinic during the study period at six Bale and East Bale zones public hospitals (Robe Hospital, Goba Hospital, Delomena Hospital, Madda Walabu Hospital, Goro Hospital and Ginnir Hospital), Southeast Ethiopia. All adult people living with type 2 diabetes from the diabetic follow-up sampled and who volunteered to participate were the study populations.

Sample size determination and sampling techniques

The sample size was determined using a formula for single population proportion by taking p value from a previous study, and double population formula using Epi Info V.7 menu statically for individual factors to DRD using the assumption of 80% power and 1:1 ratio of exposed to non-exposed. After adding a non-response rate of 10%, the final sample size was 871. All people living with type 2 diabetes aged ≥ 18 years who have at least 6 months follow-up and come into diabetic clinics were used as criteria of inclusion, whereas individuals with gestational diabetes, patients who were unable to communicate, and newly diagnosed patients with T2DM were excluded from the study by reviewing their medical records.

Sampling

The number of study participants from the Southeast, Ethiopia public hospitals was determined from the current total number of people living with type 2 diabetes who are on follow-up care in six hospitals. Samples were allocated to each selected hospital based on proportional allocation to sample size. The lists of respondents or

sampling frames were obtained from the updated registration books on each follow-up clinic of the hospitals. After establishing the sampling frames of respondents, a simple random sampling technique was used to identify the study unit to be included in the study. The people living with type 2 diabetes who met the inclusion criteria were recruited for the study until the required sample size was achieved.

Data collection procedure

Data were collected by eight trained nurses using a structured pretested questionnaire and the whole activities of the data collection were followed by a supervisor. A face-to-face interviewer-administered validated questionnaire was used to measure DRD, which was contextualised to the study area. Before data collection, we took measures to ensure meaning equivalence between the original English version of the questionnaire and the versions in the local languages. In this regard, the questionnaire was translated from English to Afaan Oromo and Amharic language by a bilingual translator and then back-translated to English by another bilingual translator (online supplemental files 1–3). The validity of the data collection tool was checked by doing a pretest on 44 adult patients with type 2 diabetes who were excluded from the final analysis and relevant modifications were done before the actual data collection period. A reliability test (Cronbach's $\alpha=0.98$) was performed to check the reliability of the questionnaire items. Data on selected people living with type 2 diabetes sociodemographics, personal factors, diabetic-related distress and some clinical data were collected using a questionnaire by a trained interviewer while some clinical data (comorbidities, complications and fasting blood sugar) were collected from the patient's medical record card. Complications and comorbidities were confirmed diagnoses by physicians, and they were written on the patient's medical card. DRD was measured by the Diabetes Distress Scale (DDS-17), which is a widely used and well-validated 17-item questionnaire that measures different diabetes-related stressors.¹ Each question has six answer choices: (1) no problem, (2) slight problem, (3) moderate problem, (4) a somewhat serious problem, (5) a serious problem and (6) a very serious problem. The questionnaire contains four domains: emotional burden (5 items: questions 1, 3, 8, 11 and 14); physician-related distress (4 items: questions 2, 4, 9 and 15); regimen-related distress (5 items: questions 5, 6, 10, 12 and 16) and interpersonal-related distress (3 items: questions 7, 13 and 17).¹⁰ An overall mean score of DRD (four domains) less than 2.0 was considered as little to no distress, a score between 2.0 and 2.9 was considered moderate distress, and a score of 3.0 or higher was considered a high level of distress.¹⁰ The Oslo Social Support Scale-3 was used to measure the social support status of the respondents. Out of the sum of the raw scores that range from 3 to 14; a score of 3–8 was classified as poor support, a score of 9–11 as moderate support, and a score of ≥ 12 as strong support.¹⁸ The smoking status of study

participants was assessed by asking them to smoke at least one cigarette per day or smoking at least 100 cigarettes in a lifetime.¹⁹ Alcohol consumption: Individuals were asked to report how often they consumed alcohol in the last 12 months. This variable was categorised as a binary variable that took on a value of one if the individual reported never consuming alcohol or consuming alcohol up to four times a month and a value of two when individuals reported consuming alcohol more than 4 times a week.²⁰ Participants' fasting blood glucose (FBG) readings for at least 4 months were recorded for computing the mean blood glucose level, and poor glycaemic control was operationally defined if the FBG level was above 130 mg/dL.¹⁵

Study variables

Dependent variable

DRD.

Independent variables

Sociodemographic: Sex, age, residence, marital status, educational status, occupation. Clinical: Duration with dm, comorbidities, mode of current treatment, hypoglycaemia event in the last 3 months, education related to DM, DM-related complications, glycaemic control, body mass index (BMI). Personal factors: Routine physical activity, social support, drinking alcohol, cigarette smoking.

Operational definitions

Diabetic distress

It refers to a negative emotional reaction that the patient experiences as a result of having and living with diabetes.¹⁰

Diabetic-related distress

The DDS-17 was used to measure each patient's DRD. Categorisation was done using the overall mean scores as a score of less than 2.0 was considered as little to no distress, a score between 2.0 and 2.9 was considered moderate distress, and a score of 3.0 or higher was considered a high level of distress.¹⁰

Data analysis

The collected data were checked for their completeness. Then, data were coded, entered and cleaned using Epi Data V.3.1 software and finally exported into SPSS V.25.0 software for analysis. Summary statistics were done for the outcome and independent variables. The model was tested using the Hosmer-Lemeshow goodness-of-fit test. The statistical significance and strength of the association between independent variables and an outcome variable were measured using the bivariate logistic regression model. The multicollinearity test was carried out to examine the correlation between independent variables using variable inflation factor and none was found. Variables with $p \leq 0.25$ in the bivariate logistic regression analysis were entered into multivariable logistic regression. Finally, significant factors were identified based on a 95% confidence level adjusted OR (AOR) and $p \leq 0.05$.

Then, the results of the study were presented using tables, figures and texts based on the data obtained.

Patient and public involvement

There was no involvement of patients in the design, recruitment, data collection, analysis, interpretation and conduct of the study. The study results will not be distributed to the individual participants, but the published paper will be available in the participating hospitals.

RESULTS

Sociodemographic and personal characteristics of study participants

A total of 856 (98.3% response rate) people living with type 2 diabetes participated. This study indicated that 481 (56.2%) of the participants were male, the mean age of the participants was 48.6 ± 11.1 years, and 493 (57.6%) of them were in the range of 41–60 years. Of the respondents, 643 (75.1%) were married, 224 (26.2%) had no formal education, 585 (68.3%) were from urban settings, 361 (42.2%) had not received education related to diabetes, 501 (58.5%) have not performed routine physical activities and 412 (48.1%) had poor social support regarding living with diabetes. The majority 817 (95.4%) of the participants were non-smokers, and 735 (85.9) had no history of alcohol consumption (table 1).

Clinical-related characteristics of study participants

The study indicated that the mean duration of living with type 2 diabetes was 3.5 ± 2.26 years with a minimum of 1 and a maximum of 20 years. Of the total study participants, 299 (34.9%) had other comorbidities, and 135 (15.8%) developed diabetes-related complications. Regarding diabetic medications, 68.3% (585) of respondents were taking oral medication. The study also revealed that 431 (50.4%) of the study participants had poor glycaemic control (table 2).

Prevalence of DRD

As depicted in figure 1, the total prevalence of DRD was 53.9% of which the majority 358 (41.8%) were in high distress. In addition, as illustrated in figure 2, a high percentage of distress was found in emotional and regimen-related distress with 58.1% (497) and 56.0% (479), respectively. Two important emotions contributed to the high percentage of emotional DRD. The first emotion was feeling that the diabetes is taking up too much mental and physical energy every day and the second emotion was feeling angry, scared and/or depressed when he/she thinks about living with diabetes (online supplemental file 4).

Factors associated with DRD among patients with type 2 diabetes

Logistic regression analysis was conducted to identify factors associated with DRD. In the bivariate analyses, variables such as the age of participants, marital status, residence, educational status, occupation, duration with

Table 1 Sociodemographic and personal characteristics of study participants with type 2 diabetes mellitus (DM) attending hospitals in Southeast Ethiopia, 2023 (n=856)

| Variables | Categories | Frequency | Per cent |
|--------------------------------------|---------------------|-----------|----------|
| Sex | Male | 481 | 56.2 |
| | Female | 375 | 43.8 |
| Age | 18–40 | 235 | 27.5 |
| | 41–60 | 493 | 57.6 |
| | ≥61 | 128 | 15.0 |
| Marital status | Married | 643 | 75.1 |
| | Single | 75 | 8.8 |
| | Divorced | 87 | 10.2 |
| | Others | 51 | 6.0 |
| Level of education | No formal education | 224 | 26.2 |
| | Primary (1–8) | 254 | 29.7 |
| | Secondary (9–12) | 253 | 29.6 |
| | Diploma | 76 | 8.9 |
| | Degree and above | 49 | 5.7 |
| Residence | Rural | 271 | 31.7 |
| | Urban | 585 | 68.3 |
| Occupation/employment | Farmer | 132 | 15.4 |
| | Merchant | 590 | 68.9 |
| | Governmental | 134 | 15.7 |
| Hypoglycaemia event in last 3 months | Yes | 235 | 27.5 |
| | No | 621 | 72.5 |
| Education related to DM | No | 361 | 42.2 |
| | Yes | 495 | 57.8 |
| Routine physical activity | No | 501 | 58.5 |
| | Yes | 355 | 41.5 |
| Social support | Poor | 412 | 48.1 |
| | Moderate | 414 | 48.4 |
| | Strong | 30 | 3.5 |
| Taking alcohol | Yes | 121 | 14.1 |
| | No | 735 | 85.9 |
| Smoking Status | Yes | 39 | 4.6 |
| | No | 817 | 95.4 |

diabetes, other comorbidities, treatment regiment, hypoglycaemia event in the last 3 months, education related to DM, routine physical activity, social support, taking alcohol, smoking status, diabetic-related complication, glycaemic control and BMI were identified factors associated with DRD at $p \leq 0.25$.

In multivariate analysis, routine physical activity (AOR 2.22; 95% CI 1.36 to 3.63), social support (AOR 4.41; 95% CI 1.62 to 12.03), glycaemic control (AOR 2.36; 95% CI 1.35 to 4.12) and other comorbidities (AOR 3.94; 95% CI 2.01 to 7.73) were factors that significantly associated with DRD at $p < 0.05$ (online supplemental table 1).

Table 2 Clinical-related characteristics of study participants with type 2 diabetes mellitus attending hospitals in Southeast Ethiopia, 2023 (n=856)

| Variables | Categories | Frequency | Per cent |
|--------------------------------|--------------------------|-----------|----------|
| Duration with diabetes | <5 | 703 | 82.1 |
| | >5 | 153 | 17.9 |
| Other comorbidities | Present | 299 | 34.9 |
| | Absent | 557 | 65.1 |
| Treatment regiment | Oral | 585 | 68.3 |
| | Insulin or combination | 271 | 31.7 |
| Diabetes-related complications | Present | 135 | 15.8 |
| | Absent | 721 | 84.2 |
| Glycaemic control | Uncontrolled (>130mg/dL) | 431 | 50.4 |
| | Controlled (<130mg/dL) | 425 | 49.6 |
| BMI (kg/m ²) | Normal | 645 | 75.4 |
| | Overweight | 168 | 19.6 |
| | Obesity | 43 | 5.0 |

BMI, body mass index.

DISCUSSION

The current study was conducted to assess the level of DRD and its associated factors among people living with type 2 diabetes in Southeast Ethiopia. The study showed that the overall prevalence of DRD (mean DDS-17 score ≥ 2) was 53.9% (95% CI 50.4% to 57.2%) of which most of the participants were screened positive for high DRD 358 (41.8%).

This finding was relatively high in comparison with previous studies conducted in China (42.15%),¹⁴ India (19.6%),⁴ Saudi Arabia (35.6%),⁹ Ghana (44.7%)¹² and Oromia region, Southwest Ethiopia (36.8%).¹ This discrepancy might be due to variations in the type of tool used to measure the level of DRD, sociocultural variation, lower level of education, poor quality of diabetes care service, a lack of DRD screening services and other forms of stressors. For instance, in the study conducted

in Ghana,¹² DRD was assessed using the Problem Areas in Diabetes questionnaire. Additionally, it might be due to differences in sample size. The study was conducted in Ghana,¹² China,¹⁴ Saudi Arabia,⁹ India (19.6%)⁴ and the Oromia region¹ was a small sample size, whereas in our study relatively large.

On the contrary, our finding was lower than the study conducted in Indonesia (60.5%),² and Amhara region, Ethiopia (87.6%).¹⁰ This discrepancy between the previously reported DRD magnitude and the current prevalence was supported by previous studies conducted in Indonesia (60.5%),² and in Vietnam,²¹ which documented that diabetes distress varies widely in different countries and healthcare settings and it is not also similar in terms of demographics, clinical characteristics in each geographical region and cultural backgrounds. Additionally, it might be due to variations in the study time and variations in social support implemented to societies.

In this study, for respondents who have not performed routine physical activities, the odds of DRD were 2.22 times higher than those who performed routine physical activities. This study finding provided further evidence for the findings of a study conducted in the Amhara region, Ethiopia,¹⁰ which showed that those who didn't have any planned physical exercise experienced more diabetes distress than those who had twice-weekly planned physical exercise. The possible reason might be those who did not perform routine physical activities may think they are not sticking closely enough to their supportive self-care management, which can cause high regimen-related distress.

For respondents who had poor social support regarding living with diabetes, the odds of having DRD were 4.41 times higher than that of respondents who had strong social support. Similar findings were reported in the study conducted in Indonesia,² and Southwest Ethiopia.¹

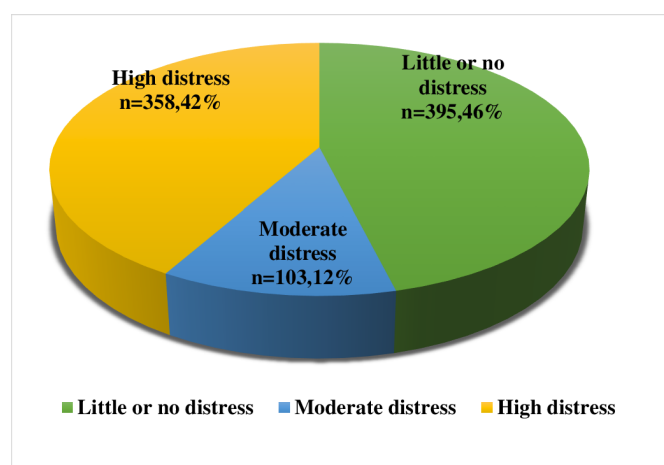


Figure 1 Levels of diabetes-related distress among patients with T2DM attending hospitals in Southeast Ethiopia, 2023 (n=856). T2DM, type 2 diabetes mellitus.

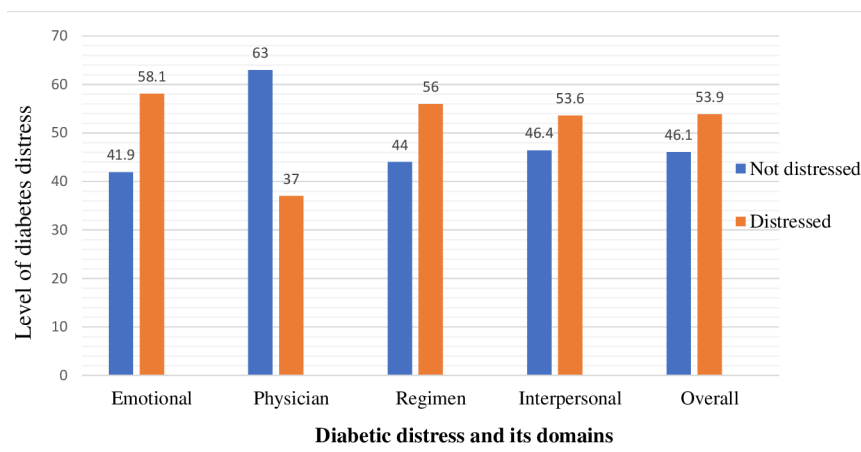


Figure 2 Prevalence of diabetes-related distress and its domains among study participants with type 2 diabetes mellitus attending hospitals in Southeast Ethiopia, 2023 (n=856).

The possible reasons for this could be social support from family or friends as a form of emotional, informational or financial can help the patient to cope with problems and give emotional strength.

In contrast to previous study findings, having other comorbidities was a major factor for DRD scores as compared with patients who didn't have other comorbidities in this study.¹² This could be explained by the fact that living with DM and other comorbidities can experience more feelings of anger, scared and /or depression when they think about living with DM and other comorbidities.

This study also revealed that study participants who had poor glycaemic control were 2.36 times more likely to have DRD than their counterparts. This result corresponds with the study findings in South India,⁸ Vietnam²² and Ghana.¹² However, some prior studies have found no association between having glycaemic control and DRD.¹²

The study has limitations. Since the data on DRD were collected through self-reporting, and therefore, there may have been recalled bias and social desirability bias. Additionally, the use of a cross-sectional design limits the generalisability of its findings outside of the population from which the study sample was drawn.

Implications for clinical practice

These study findings are significant for understanding DRD and its associated factors among individuals with type 2 diabetes. Based on the results, it is recommended to promote physical activity and glycaemic control, provide social context-specific interventions to address DRD and offer health education on lifestyle, exercise and healthy diet for individuals with diabetes. Health professionals should receive intensive training on counselling techniques to improve their patients' counselling and handling skills. Additionally, a counselling centre should be established within hospitals to support and assist individuals with diabetes who experience DRD during the onset or treatment period.

CONCLUSION

Despite addressing diabetes distress improves diabetes self-care, diabetes self-efficacy, glycaemic control and quality of life, a substantial number of participants had DRD especially emotional and regimen-related distress, which causes the required self-management of the disease more difficult and limited the patients' management of self-care activities necessary to manage diabetes. Routine physical activity, social support, other comorbidities and glycaemic control were found to be factors of DRD.

Emotional well-being is an important part of patients' management of self-care activities necessary to manage diabetes. DRD is a common consequence of living with diabetes and impairs diabetes self-care behaviour and glycaemic control, clinicians should be aware of this.

The hospital administration should emphasise active screening for DRD, and it should be an integral part of diabetes care to successfully manage T2DM. Therefore, the identified factors of DRD need to be a concern for health institutions and health professionals in the management of people living with type 2 diabetes.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and this study was approved by the Research and Ethics Committee, of Madda Walabu University Goba Referral Hospital with a Ref Number of /01/2/18818. Participants gave informed consent to participate in the study before taking part.

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Data availability statement Data are available on reasonable request. All data relevant to the study are included in the article or uploaded as online supplemental information. The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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ORCID iD

Mulugeta Adugnew <http://orcid.org/0000-0001-5280-8536>

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