



Graduate Study Program

Department of Public Health

Assessment of Quality of Life and its associated factors among Children and Adolescents with Type-I Diabetes Mellitus on follow-up at Pediatrics Endocrine Clinics of Specialized teaching Hospitals, Addis Ababa, Ethiopia

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Addis Ababa, Ethiopia

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List of Abbreviations

DM: Diabetes Mellitus

DRQoL: Disease specific health related quality of life

FBS: Fasting Blood Sugar

GCS: Generic Core Scale

HgA1c: Hemoglobin A1C

HRQoL: Health Related Quality of Life

IDF: International Diabetes Federation

PedsQL[™]: Pediatric quality of life inventory

QoL: Quality of Life

RBS: Random Blood Sugar

SPHMMC: St. Paul's Hospital Millennium Medical College

T1DM: Type 1 Diabetes Mellitus

TASH: Tikur Anbessa Specialized Hospital

TBH: Tirunesh Beijing Hospital

WHO: World Health Organization

Y12MC: Yekatit 12 Medical College

ZMH: Zewditu Memorial Hospital

Abstract

Background: Diabetes Mellitus is one of the most common chronic diseases during childhood and adolescence affecting approximately 96,000 children under 15 years annually worldwide with an overall annual increase of around 3%. It is serious disease associated with acute and chronic complications that threaten health and endanger life with important consequences for physical and emotional development of the child and adolescent.

Objective: The study aimed at assessment of the quality of life and its associated factors among children and adolescents with Type-I Diabetes Mellitus on follow-up at Pediatrics Endocrine clinic of selected public hospitals in Addis Ababa from 25 February to 25 April 2021.

Methods: A hospital-based cross-sectional study was carried out among 379 Type-I Diabetes Mellitus patients at endocrine clinic. Participants were selected by simple random sampling technique. A structured questionnaire was used to collect the data using the Pediatric quality of life inventory 4.0 generic core scales and inventory 3.2 diabetes modules, which is a modular approach to measure quality of life. Continuous variables are expressed in mean and standard deviation and mean scores of sociodemographic and clinical characteristics of children and adolescent's mean score of quality of life were compared using independent group *t*-tests and one-way ANOVAs. Paired sample *t*-test was used to compare children and adolescents self-report and caregiver's report. Multivariable linear regression is used to explore the real difference in mean score and to identify significant predictor factor of quality of life of children and adolescents. A P-value of ≤ 0.05 was considered to declare statistically significant association between independent and the outcome variables.

Results: Total mean scores on the PedsQL™ 4.0 Generic Core Scale were found to be 88.42 ± 10.82 out of 100 as reported by the children and adolescents themselves and the total mean scores were 82.17 ± 12.65 as reported by primary care givers. The total score of the PedsQL Diabetes Module self-report were found to be 82.19 ± 12.36 for the children and adolescents. Total mean scores of parent proxy reports for total PedsQL™ 3.2 Diabetes Module scoring was 78.13 ± 12.66 . In general, Age, mothers' and fathers' educational status, fathers' occupation, and frequency of monitoring of blood glucose, the type of individual

administering insulin medication, attending diabetes health education and mean fasting blood sugar level were influencing factors for quality-of-life scoring of children and adolescents with type 1 diabetes mellitus.

Conclusions: This study found that there was lower score in Generic Core Scale and Diabetes Module report by primary care givers than children and adolescents self report. Improving education status of parents, inclusive health education program about diabetes mellitus and frequent monitoring of blood glucose level with a minimum of twice daily to interfere early is recommended to improve quality of life.

Keyword: Quality of Life, Children, Adolescents, Type-I Diabetic Mellitus, PedsQL, Addis Ababa, Ethiopia

1. Introduction

1.1. Background of the study

Diabetes Mellitus (DM) is one of the most common chronic diseases in childhood and adolescence, which is a complex metabolic disorder characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action or both. Inadequate insulin secretion and or diminished tissue response to insulin in the complex pathways of hormone action on target tissues, which leads to abnormalities of carbohydrate, Fat and Protein metabolism. Impaired insulin secretion and/or action may coexist in the same patient (1,2).

According to International Diabetes Federation (IDF), overall, approximately 96,000 children under 15 years are estimated to develop Type-I Diabetes Mellitus (T1DM) annually worldwide (3). Type-I Diabetes Mellitus most commonly is observed in childhood, but one-fourth of the cases are also diagnosed in adults. Type-I Diabetes Mellitus remains the most common form of diabetes in childhood, accounting for approximately two-thirds of new diagnoses of diabetes in patients' ≤ 19 years of age in the United States, despite the increasing rate of type 2 diabetes (4). In addition, the IDF estimates that 1.1 million children and adolescents aged 14–19 years have T1DM. It is estimated that the incidence of type 1 diabetes among children and adolescents is increasing in many countries particularly in those aged less than 15 years. The overall annual increase is estimated to be around 3% with strong indications of geographic differences (3).

In a study at a hospital in Ethiopia from July 2013 to January 2014 on children's aged 7–12 years presented with complaints other than symptoms of diabetes mellitus has shown that prevalence of diabetes mellitus was 2.81/1000 cases (5).

Type-I Diabetes Mellitus is an endocrine-metabolic disorder of childhood and adolescence with important consequences for physical and emotional development. Like other chronic illness, diabetes can deteriorate quality of life (QoL) of children and adolescent. It is an important cause of blindness, kidney failure, lower limb amputation and other long-term consequences that impact significantly on quality of life. It is a life-end illness which has major effects on physical and mental health. Children and adolescents with diabetes need a

lifesaving and lifelong treatment, daily monitoring of blood glucose level and careful eating habit. This hurts and, interferes with daily life of children and their parents (2).

Type-I diabetes Mellitus affects the psychological and emotional wellbeing of children, adolescents and their families. It has been shown children and adolescents with diabetes have reduced health related quality of life (HRQoL) compared with the general population, and that poor HRQoL in children and adolescents is associated with adverse outcomes, including increased mortality (6). Psychological health may be difficult to quantify and so measuring QoL is one of useful tool in the evaluation of the well-being of children's and adolescents with DM (7).

A large number of factors might be responsible for the negative impact of diabetes on QoL in children and adolescents, such as fear of hypoglycemia or of secondary complications, future worries on stigmatization, loss of flexibility, poor self-image, overprotection, age, economic class, education, ethnicity, knowledge regarding the disease and the daily demands of diabetes therapy (i.e. insulin therapy, blood glucose monitoring) (8,9).

Quality of life is a frequently employed construct in studies of children and adolescents with diabetes, and is critical for evaluating health outcomes in clinical trials and for decision-making in healthcare. Measurement of the construct varies in specific dimensions, but includes aspects of physical, emotional, and social well-being. In the course of assessing QoL among children with diabetes, either a generic or a disease-specific approach could be employed. A generic approach allows making comparisons between children with diabetes and healthy children, or children with other conditions. However, a disease-specific approach allows assessing dimensions that are uniquely relevant to the lives of children with diabetes, and therefore may be more sensitive to change or between-group differences. Therefore, assessment of both generic and diabetes-specific dimensions of QoL is often advocated. The Pediatric Quality of Life Inventory (PedsQL) measurement model includes both generic core scales, as well as disease-specific modules. This is well-suited for a direct comparison between generic and disease-specific aspects of QoL among children with diabetes (10).

1.2. Statement of the problem

Type 1 Diabetes Mellitus of childhood and adolescence which is serious chronic disease associated with acute and chronic complications that threaten health and endanger life with important consequences for physical and emotional development of the child has become health related emergency of the 21st century (11).

The prevalence of T1DM is increase towards younger people and it imposes its burden on future generations. The burden of diabetes is not only in the increment numbers of people with diabetes, but also increasing in number of premature deaths due to diabetes (12). In total, 1,110,100 children and adolescents younger than 20 years are estimated to have Type-I diabetes globally. It is estimated that around 96,000 children and adolescents under the age of 15 years are diagnosed with type 1 diabetes annually and this estimated number increases to 128,900 when the age range extends to under 20 years (3).

In a study done in an institution in Ethiopia, prevalence of diabetes mellitus in children and adolescents aged 7-12 was 2.81/1000 cases and Impaired fasting glucose/impaired glucose tolerance was detected in 8.43/1000 cases found in a study done at an institution level. In Ethiopia, like most other African countries, national data on the prevalence and incidence of T1DM are lacking (3).

Living with T1DM presents numerous daily challenges associated with disease management to children, adolescent and family and includes such challenges as - serious life style alterations with intensive therapeutic exogenous insulin regimes, need for dietary restrictions, regular exercise, and frequent monitoring of biochemical markers. In addition, Disease Related Quality of Life (DRQoL) of children and adolescents with T1DM is known to affect and be affected by communication, treatment barriers and adherence, and Worries domains. Furthermore, HRQoL has been reported to be lower in T1DM children and adolescents compared to healthy counterparts. Adolescents in particular are known to have unique needs based on the significant developmental changes that occur during this transitional period in life (6).

In another way, all quality-of-life related problems have negative impact on life saving treatment and outcome of diabetes. Previous research showed that most of the time, children

and adolescents who have poor glycemic control have a low score on quality of life. Generally, evaluation of quality of life and addressing its determining factor should be one part of diabetes management for better outcome in addition to medical management. Previous study showed that factors related to quality of life of children and adolescents were sociodemographic, family-related and poor glycemic control and duration diabetes (6,13,14).

Traditionally, the mainstay of T1DM management has focused on achieving good metabolic (glycemic) control in order to prevent the long-term complications of the disease, which is being practiced in current hospital care system of Ethiopia (15). But Medical practice has shifted, recognizing the importance of treating all dimensions of patient health and not merely the clinical parameters or markers of disease. As such, more attention has to be given to assessing and addressing the general and disease related HRQoL of patients in terms of physical, psychological (emotional and cognitive), and social functioning which will have a positive impact on the process of improving health care (16).

Studies on the general HRQoL and DRQoL in children and adolescents with T1DM are limited nationwide in our country. There is insufficient data and there are limited published studies on the quality of life of Adults with DM let alone children and adolescents with T1DM. Taking into consideration that in children with diabetes large number of factors might be responsible for the negative impact of DM on QoL, such as fear of hypoglycemia or of secondary complications, future worries on stigmatization, loss of flexibility, poor self-image, overprotection, age, economic class, education, ethnicity, knowledge regarding the disease and the daily demands of diabetes therapy. This study is going to be done with the aim of assessing the General QoL and HRQoL in pediatric patients in selected governmental hospitals of Addis Ababa and to investigate the associated factors affecting the quality of life in children's with T1DM.

1.3. Significance of the study

Assessment of quality of life needs to be incorporated with the medical management of diabetes mellitus for children and adolescents. Quality of life implicates valuable information about disease progress and impact of treatment on children and adolescents with T1DM.

Although the number of children's with T1DM in Ethiopia is high and increasing in incidence, apart from the medical treatment on the glycemic control and prevention of the chronic complications the generic and disease related health related quality of life has been neglected and not well studied in our country.

This study will give some information on the QoL in children with T1DM and associated factors that affect the HRQoL to understand the magnitude of the problem and also it can be used as starting point for future studies on this topic in the hospitals and also nationwide to further study the problem. The result can be used as an evidence to give to the community and hospital-based educations on T1DM and to strengthen the follow up and glycemic control in those children's with T1DM so that to improve the generic and disease related QoL.

This study will also alarm health professionals to consider the general health perception of patients in conjunction with medical management, help them to develop specific management programs with respect to a patient's condition, think broadly to identify negative impact of other comorbidities on metabolic controlling, predict disease progress and prioritization of health resources.

2. Literature review

2.1. Magnitude of diabetes mellitus among children and adolescents

Diabetes is found in every population in the world and in all regions, including rural parts of low and middle-income countries. The number of children and adolescents with diabetes is steadily rising. International Diabetes Federation estimates that 1.1 million children and adolescents aged 14–19 years have T1DM. It is estimated that the incidence of T1DM among children and adolescents is increasing in many countries particularly in those aged less than 15 years. The overall annual increase is estimated to be around 3% with strong indications of geographic differences (3).

T1DM most commonly is observed in childhood, but one-fourth of the cases are also diagnosed in adults. T1DM remains the most common form of diabetes in childhood, accounting for approximately two-thirds of new diagnoses of diabetes in patients' ≤ 19 years of age in the United States, despite the increasing rate of type 2 diabetes (4).

In most western countries, T1DM accounts for over 90% of childhood and adolescent diabetes. There are big regional and national differences in the number of children and adolescents with type 1 diabetes. The Europe and North American and Caribbean regions have the largest number of children and adolescents with Type-I diabetes under 20 years. More than one quarter (28.4%) of children and adolescents with type 1 diabetes live in Europe, and more than one fifth (21.5%) live in North America and Caribbean. The United States, India and Brazil have the largest incidence and prevalence of children with type 1 diabetes under the both age groups below 15 and 20 years (17).

The highest reported incidences of T1DM occur in Finland and Sardinia (37 - 45 / 100,000 children younger than the age of 15 years). Girls and boys are almost equally affected, but there is a modest female preponderance in some low-risk populations and there is no apparent correlation with socioeconomic status. Peaks of presentation occur in 2 age groups, i.e. at 5-7 years of age and at the time of puberty (11).

In a systematic review conducted in eight African countries, namely Algeria, Ethiopia, Ghana, Libya, Nigerian Igbo and North-West Nigeria region, Sudan, Tanzania, and Tunisia

about the incidence and prevalence of T1DM, both prevalence and incidence of T1DM in Algeria were 0.27/1 000 and 8.1/100 000 respectively, and in Sudan the incidence of T1DM in age between 0-14 years were 10.1/100,000 and the prevalence were reported in different age group between 7-14 years were 0.95/1000. In Ethiopia, Libya and Tanzania only incidence was reported that 2.1/100,000 at age between 0-18 years, 7.8/100,000 at age between 0-14 years and 1.5/100,000 in age between 0-19 years respectively. Prevalence of T1DM in Ghana and in two Nigerian regions at Nigerian Igbo and North-West Nigeria were 0.75/1000, 0.25-0.46/1000 at age between 5-17 years and 3.1/1000 presented at age 10 $\pm$ 4.5 years respectively (5).

Studies on incidence and prevalence of T1DM in Africa are few; due to this the contribution of African continent for the estimation of global T1DM incidence is low. A report on the incidence of T1DM in children less than 14 years were 6.4/100,000 new case per year in the African region had been reported (18).

In Ethiopia it is estimated that there are around 2.6 million people with diabetes mellitus. But the true prevalence of specific type of DM and age distribution is not known (19).

A Cross-sectional descriptive study conducted at Tikur Anbessa Specialized Hospital (TASH) from July 2013 to January 2014 at pediatrics OPD on children's aged 7–12 years presented with complaints other than symptoms of diabetes mellitus that prevalence of diabetes mellitus was 2.81/1000 cases (5).

2.2. Quality of life (QoL) of children and adolescents with Type-I Diabetes Mellitus

The concept of QoL is formed from the physical environment and a combination of social, emotional and school-related functions, and can be affected by factors such as the age of onset of diabetes, and the child's age and sex. The parents' views on illness, achieving glycemic control, and the lifestyle of their children is also very important. For this reason, child-family-illness-focused approaches are necessary in order to make decisions on the management of T1DM (10,20).

The health-related quality of life of children and adolescents with T1DM has been reported by both children and their parents to affect several domains, including school functioning, emotional well-being and physical and social aspects. Adolescents in particular have unique needs based on the significant developmental, hormonal and psychosocial changes that occur during this transitional period in life resulting in more psychosocial problems with increased risk of chronic psychosocial stress, higher rate of behavioral difficulties, depression & lower social competency resulting in poor metabolic control & HRQoL. Therefore, it is important to improve the quality of life and well-being in order to prevent secondary morbidities and achieve good metabolic control during the management of diabetes. QoL is considered to be a significant indicator of disease prognosis (21).

T1DM is often considered to be a disease of the family rather than just the individual affected, due to the integral “role of family relationships and parental support”. Parental reporting of HRQoL is considered important given the young age of patients. Studies have reported association between poor adolescent glycemic control with poor adolescent self-management which results in high levels of family conflict and distress. Scientific literature reports a negative association between parents who are less responsive toward their adolescent (communication of affection), over reactive in discipline, have low family income and high levels of parental depression with metabolic control and HRQoL for their adolescent with T1DM(22). However, most of the studies on diabetes and HRQoL have been conducted in type 2 diabetic patients, and data in developing countries are still limited (11).

In a global TEENs study on factors associated with diabetes specific health-related quality of life in youth with type 1 diabetes mellitus done in 2013 on 5,887 children and adolescents from 5 continents using PedsQL diabetes module 3.0 to identify the main factors associated with quality of life, it was found that across all age groups, females with T1DM reported lower DRQoL than males with T1DM (66.2 vs. 70.2). Health related quality of life was significantly related to HbA1c ($P < 0.001$). Level of parental education was significantly related to DRQoL (13).

Another multidimensional study was done in Italy on quality of life in children with T1DM on 33 patients (18 male; age 6-14 years) on follow up at Diabetic Center of the Pediatric

Department of Catholic University in Rome. The Health related quality of life is lower in both Physical and psychosocial perspective compared to the healthy children's with significantly lower value ($p < .0000$) (23).

Similarly, another study was done in Turkey to assess QoL & factors affecting it in children with T1DM in 2012. The study was conducted on 64 children (age 8-12 years; 26 males with mean HbA1c 9.65 ± 2.39) and 85 adolescents (age 13-18 years; 38 males with mean HbA1c 9.53 ± 2.57) and their parents. As a result, the total scores of PedsQL were 79.91 ± 13.60 for the children and 79.89 ± 14.87 for adolescents. Scores on social function were high, while scores on affective function & school function were low (14).

Quality of Life of children and adolescents with T1DM assessment was also done in Kuwait on 436 patients with the age of 2-18 years having T1DM and 389 healthy controls. Children with T1DM reported lower total generic QoL (75.6 ± 8.9) than controls (83.5 ± 9.5 , $p = 0.001$). The QoL scores were lower for physical (75.1 ± 11.6 vs. 84.2 ± 9.3 , $p < 0.05$) and emotional (72.7 ± 10.4 vs. 84.1 ± 9.1 , $p < 0.001$) domains. There was no difference in the school (73.5 ± 9.3 vs. 73.7 ± 8.1 , $p = 0.15$) and social (83.2 ± 8.8 vs. 83.7 ± 8.4 , $p = 0.13$) QoL scores between patients and controls (24).

There is a significant gap of assessment of quality of life of children with Diabetes mellitus in Africa. There is limited number of studies concerning HRQoL of T1DM patients. It is important noting that there is a paucity of data with regard to the burden of disease, prevalence of undiagnosed diabetes, healthcare and acute and chronic complications and the health related quality of life (25).

In an observational study on predictors of quality of life in patients with diabetes mellitus in two tertiary health institutions in Ghana and Nigeria using Strengthening The reporting of observational studies in epidemiology (STROBE) consensus checklist, a total of 198 patients in Ghana and 203 patients in Nigeria were involved in the study and it was found that there was an overall low QOL score in both countries as compared to other studies: 56.19 ± 8.23 in Ghana and 64.34 ± 7.34 in Nigeria (26).

In a cross-sectional study on Health-related quality of life among children with Type I diabetes, Assiut city, Egypt in 2017, More than 60% of children with diabetes had

uncontrolled glycemic level and 60% of them were in low socio-economic level. Children with diabetes had significantly lower HRQoL than healthy children in all domains. Age, glycemic control status and birth order of the diabetic children showed no significance difference regarding the QoL (27).

In another study on the effect of free diabetes care on metabolic control and on health-related quality of life among youths with type 1 DM in Cameroon, one hundred and four patients (51 female) were included. The mean age was 16 ± 2 years, the mean duration of diabetes was 5 ± 3 years, and the mean HbA1C level was $11.4\% \pm 2.7\%$. There was no observation of any significant difference in the total HRQoL score ($p=0.66$) (28).

In a cross-sectional study done at three governmental hospitals in Ethiopia it has been found that the mean score for HRQoL of children and adolescents were 78.8 ± 15.6 reported by children and adolescents and 61 ± 7.9 reported by parents. The mean score for DRQoL children and adolescents were 78.3 ± 14.6 reported by children and adolescents and were 60.5 ± 7.9 reported by parents. About 35.5% mean score of school function and 35.8% mean score of emotional function of children and adolescents fell more than one standard deviation (>1 SD) below the mean of HRQoL of children and adolescents of self-reports. About 37.6% mean score of treatment barriers, 34.9% mean score of communication and 34.5% mean score of worry of children and adolescents fell more than one standard deviation (>1 SD) below the mean of DRQoL of children and adolescents of the self-reports (15).

2.3. Factors affecting QoL among Children and Adolescents with T1DM

2.3.1. Quality of life and age

There are mixed study results on quality of life and Age of children and adolescents with T1DM. In a cross sectional study on Health related quality of life among children with Type I diabetes, Assiut city, Egypt in 2017, age and birth order of the diabetic children showed no significance difference regarding the QOL (27). In contrast, QoL of children and adolescents with T1DM assessment done in Kuwait on 436 patients with the age of 2-18 years has showed, total QoL scores increased with age throughout the age groups ($p < 0.05$)(24). Also a cross sectional study conducted Saud Arabia has shown younger adolescents in younger

aged 13–15 years had higher QoL scores compared to older adolescents aged 16–18 years ($\beta = -7.62$, $p = 0.0002$) (9).

2.3.2. *Quality of life and gender*

Different studies have implicated different effects of gender on QoL on children and adolescents with T1DM. In a study done in Kuwait male sex was associated with better QoL ($p < 0.05$) (24). This study is supported by a result of a study done in Saudi Arabia (9). In a study done in Addis Ababa, Ethiopia, female had significantly lower HRQoL scores in sub scale of social functioning ($\beta = -3.944$, $p < 0.05$), school function ($\beta = -4758$, $p < 0.01$) and in a total HRQoL score ($\beta = -3.643$, $p < 0.05$) than male participant (15).

A review conducted on 33 articles showed that girls with T1DM reported lower generic and disease-specific QoL than boys with T1DM. Three studies show boys have better generic score of QoL than girls. The rest two of studies reported that boys and girls have no significant differences in generic QoL scoring. And other ten studies report about disease specific differences of QoL girls and boys of these eight studies shows girls are worried about diabetes and had lower overall disease-specific QoL than boys. And only one study reported that absence of gender related differences in diabetes-related QoL (29).

On the other side, in another cross sectional study done in Assiut city, Egypt, females showed significantly higher score regarding school functioning (27).

2.3.3. *Quality of life and Education level of parents*

In a cross sectional study on Health related quality of life among children with Type I diabetes, Assiut city, Egypt in 2017, social ($p=0.004$), school ($p=0.03$) and the total QoL ($p=0.02$) scores were significantly higher among children with highly educated mothers while father's education affected the emotional ($p=0.008$), school ($p=0.04$) and total QoL scores ($p= 0.003$) (27). Inversely research conducted at Greek show that parents education level had no significant on QoL of children and adolescents with diabetes (30).

2.3.4. *Quality of life and glycemic control (HBA1c level)*

Several studies have consistently reported that level of HBA1c is inversely proportional to QoL. This indicates having well controlled glycemic control will result in better QoL. In a

global TEENs study on factors associated with diabetes specific health-related quality of life in youth with T1DM done in 2013, HRQoL was significantly related to HbA1c ($P < 0.001$)(13). Likewise, multidimensional study done in Italy showed the general health is inversely related to the HgbA1c & last HbA1c (23). Factors that make up a child's psychosocial health, i.e. child's feelings, social relationships and school success are negatively affected by blood glucose control in a cross sectional study done in Turkey(14). In addition, in a retrospective, cross-sectional, multicenter study was performed by the Brazilian Type 1 Diabetes Study Group by analyzing EuroQoL scores from 3,005 (1305 male) participants with T1DM the most significant correlation was observed between QoL and HbA1c ($p < 0.001$). As the value of HgA1c increased the pediatrics QoL decreases (8).

A study done by Laffel and coworkers in USA has found no significant correlations at baseline or after 1 year between total quality of life reported by either child or parent with glycemic control (HBA1c level). Which is supported by a study done in Egypt (27).

2.3.5. Quality of life and duration of diabetes

A cross sectional study done in Egypt in 2017 has reported disease duration affected the emotional function of the QoL($p=0.03$)(27). SEARCH for diabetes youth study has also revealed that duration of diabetes was significantly associated with QoL domain of school functioning subscale ($P=.02$); youths with longer diabetes duration had better school functioning(31). Furthermore, study conducted in Kuwait shows children and adolescents with diabetics for longer duration have significantly poor QoL ($p < 0.001$) (24). In contrary, a study done in Saudi Arabia revealed that disease duration have no significant association with quality of life (9).

2.3.6. Quality of life, treatment and number of injections per day

Several studies have shown significant effect of number of injections per day, treatment regimen and general diabetes management to quality of life of children and adolescents with T1DM. In a global TEENs study three diabetes management factors were significantly related to HRQoL: among methods used to measure food intake, advanced diet methods; more frequent daily blood glucose monitoring & physical activity more days per week was related to better HRQoL ($P < 0.001$) (13). Likewise, a comparative cross-sectional study

conducted Kuwait there was a significant relationship between insulin regimen and QoL in all age groups. Patients using insulin pumps, even those less than 4 years old, had better QoL compared to children taking multiple daily insulin injection and children and adolescents having multiple daily injections was associated with worse QoL in the younger age group (2–4 years, $p < 0.05$) (24).

On the contrary, a multidimensional study done in Italy no correlation was found between number of daily injections of insulin, insulin-units/kg, snacks, BMI, hypoglycemia symptoms and HRQoL (23).

2.3.7. Economic status of family

In a cross sectional study on Health related quality of life among children with Type I diabetes, Assiut city, Egypt in 2017, children in the middle and high social class showed significantly higher scores regarding social, school and total QOL(27). Similarly higher monthly income of parents and had significant positive association to HRQoL scoring of children in a study done in Ethiopia (15).

2.3.8. Family setting

A study was done in Turkey to assess QoL and factors affecting it in children with T1DM in 2012 the total scores of PedsQL with result showing statistically significant negative relationship with number of children in the family ($P < 0.05$) (14). This negative relationship was also seen in a study done in Ethiopia ($p < 0.05$) (15).

2.3.9. Family history of diabetes

A study conducted in Egypt revealed that presence of diabetic parent positively affected the social functioning while had negative effect on the school function of children with type I diabetes (27).

2.4. Conceptual Framework

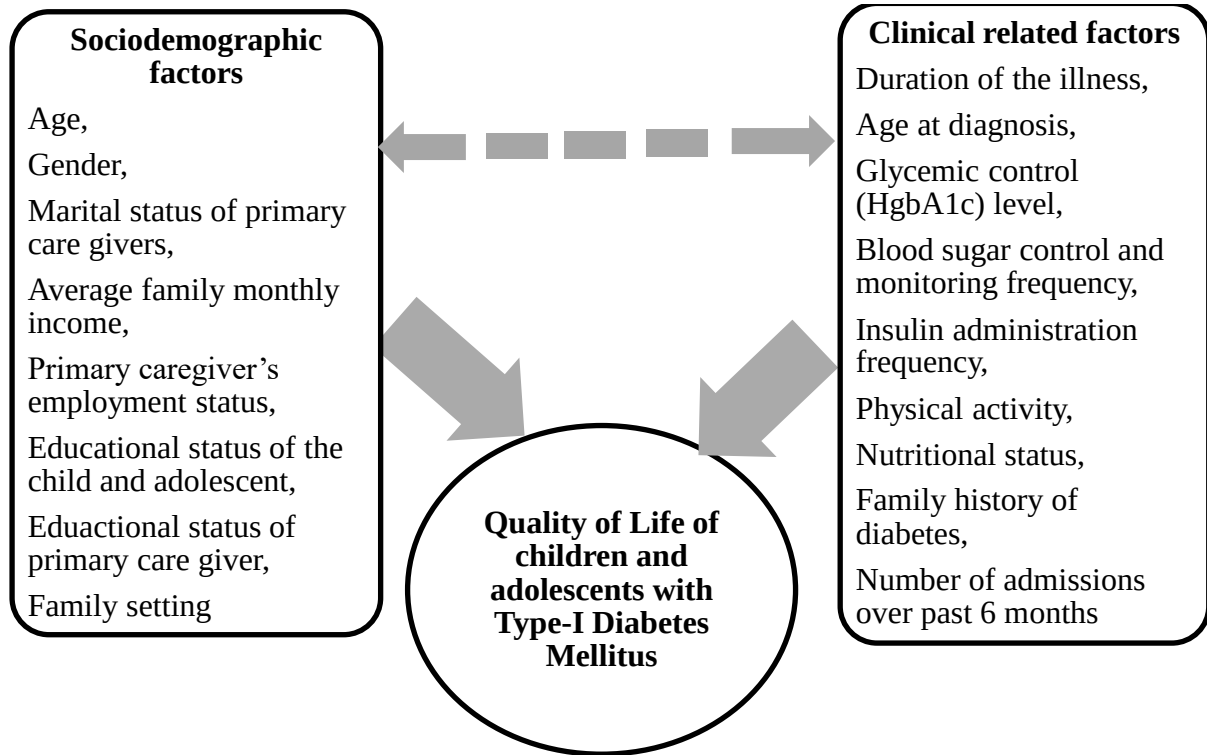


Figure 1: Conceptual framework for the studying quality of life among children and adolescents with Type-I Diabetes Mellitus in selected governmental hospitals in Addis Ababa, October 2020.

The above conceptual framework presents sociodemographic factors like age of the child, gender of the child, child's educational status, parent's educational status, marital status of caregiver, average monthly income and clinical factors as they related to DM such as duration of disease, glycemic control, number of admission and drug regime, family history of diabetes as determinants of quality of life of children and adolescent with type-I diabetes Mellitus which are included in this study. Factors like behavioral risks (coping, depression or other psychiatric states) and health service related are not included in this study because it is difficult to measure those factors in our situation.

Source: Adapted from a framework for health related quality of life among children with type I diabetes, Egypt, 2017 (27)

3. Objectives of the study

3.1. General objective

The aim of this study was to assess quality of life and its associated factors among children and adolescents with Type-I Diabetes Mellitus on follow-up at Pediatrics Endocrine clinic of selected Public Hospitals in Addis Ababa, Ethiopia from 25 February 2021 to 25 April 2021.

3.2. Specific objectives

- To assess the level of health-related quality of life among children and adolescents with T1DM at selected public hospitals in Addis Ababa.
- To assess the level of disease-related quality of life among children and adolescents with T1DM at selected public hospitals in Addis Ababa.
- To identify the associated factors of health related and disease related quality of life in children and adolescents with T1DM at selected public hospitals in Addis Ababa.

4. Materials and methods

4.1. Study setting and period

The study was conducted from 25 February 2021 to 25 April 2021 in selected public hospitals in Addis Ababa, Ethiopia. There are a total of 52 hospitals in Addis Ababa including three nongovernmental (NGOs) hospitals, three hospitals owned by Defense force and police, and 35 private hospitals. Besides, there are 11 public hospitals in Addis Ababa; six hospitals under administration of Addis Ababa Regional Health Bureau (AARHB), 5 under the administration of the federal government. Addis Ababa is the capital city of Ethiopia and located at 2355 meters above sea level. Based on the population projection of the Central Statistical Agency of Ethiopia (CSA) in 2019, Addis Ababa has a total population of 3,603,000 of whom 1,703,000 are men (32).

Of the governmental hospitals, five of them namely St. Paul's Hospital Millennium Medical College (SPHMMC), Tikur Anbessa Specialized Hospital (TASH), Tirunesh Beijing Hospital (TBH), Yekatit 12 Medical College (Y12MC) and Zewditu Memorial Hospital (ZMH) are providing service for pediatric endocrinology and has Pediatrics Endocrine outpatient clinics. Of these, four of the hospitals are chosen purposefully for this study, namely SPHMMC, TASH, Y12MC and ZMH, and TBH was used for the pretest study.

The Pediatrics endocrine clinic of SPHMMC is an outpatient follow-up unit of pediatric patients with various Endocrine disorders including DM. The clinic works 2 days per week on Monday and Friday. There were a total of 199 children and adolescents with T1DM on follow up at this clinic over two months visit. Currently, around 100 T1DM patients attend the clinic per month and around 25 patients are seen per day according to the monthly audit report.

Tikur Anbessa Specialized hospital's pediatrics outpatient endocrine clinic works 2 days per week on Wednesday and Thursday. Currently around 300 children and adolescents with T1DM are attending the clinic per month and among them around 215 of them are T1DM patients and around 34 patients are seen per visit day.

Similarly, one of pediatrics endocrinology clinic of Y12MC hospital works 1 day per week on Thursday. There are a total of 183 children and adolescents with T1DM on follow-up at the clinic and around 30 patients are seen per day.

Moreover, ZMH is one of the general hospitals under the administration of AARHB having pediatrics endocrinology service. The clinic of this hospital works 1 day per week on Wednesday for Diabetic patients. Currently there are 97 children and adolescents with T1DM on follow up at the clinic. An average 15 patients visit the clinic per week.

In the Four of the hospitals, there are total of **694** children and adolescents with T1DM on follow up at pediatrics endocrine clinics.

4.2. Study design

A hospital-based analytic cross-sectional study was conducted to assess the quality of life and its associated factors among children and adolescents with Type-I DM on follow-up at Pediatrics Endocrine clinic of Selected Public Hospitals in Addis Ababa.

4.3. Population

Source population

All care-givers of children and adolescents with T1DM and children and adolescents with T1DM visiting the selected hospitals' outpatient pediatrics endocrine clinic were the source population.

Study population

Selected children and adolescents with T1DM and their care-givers who came to the outpatient departments during the study period were the study population.

Study Unit

An individual (child or adolescent) with T1DM who presented at pediatrics endocrine clinics and his/her primary care-giver was the study unit.

4.4. Eligibility Criteria

Inclusion criteria (33,34)

Diabetic children and adolescents from 5 up to 18 years old who had been on follow up for at least 3 or more month at the selected hospitals were included into the study.

Exclusion criteria

Children and adolescents who had known comorbid chronic medical illness in addition to type I diabetic disease were excluded from the study.

4.5. Sample size Determination and Sampling Procedures

4.5.1. Sample size determination

The Sample size was calculated using single population proportion formula by considering the following assumptions: the prevalence of level of health-related quality of life among children and adolescents with T1DM score was 41.9% for school functioning, and 43.7% for emotional functioning. Also level of disease-related quality of life among children and adolescents with T1DM was 37.6% for treatment barriers and 34.9% for communication (15) from similar study conducted at governmental hospital in Addis Ababa Ethiopia since 2018; 5% marginal error and at 95% confident level.

$$n = \frac{Z_{\alpha/2}^2 p(1-p)}{d^2}$$

Where, Z = Confidence level (1.96)

d = Margin of error (0.05)

P = Proportion of children and adolescents with low specific quality of life domain
(0.419, 0.437, 0.376, 0.349)

Table 1: Sample size determination for the study at selected public hospitals in Addis Ababa using single population equation, October 2020.

No	Description	Domains	Previous study proportion(P)	CI	Margin of error (d)	Calculated sample size
1.	Level of HRQoL among children and adolescents with T1DM	School functioning	41.9%	95%	5%	374
		Emotional functioning	43.7%	95%	5%	378
2.	Level of DRQoL among children and adolescents with T1DM	Treatment barriers	37.6%	95%	5%	361
		Communication	34.9%	95%	5%	347

The sample size is calculated using higher proportion result domains of HRQoL and DRQoL. Therefore, taking the highest sample size and adding 10% non-respondent rate of 38 samples, the final calculated sample size becomes $(378+38) = \mathbf{416}$. Therefore, the final sample size becomes **416** children and adolescents with T1DM and their caregivers. In order to maximize the sample size, we didn't consider the population correction formula during the sample size calculation.

4.5.2. Sampling Technique and procedures

A total of 694 children and adolescents with T1DM are on follow-up at the selected hospitals. From the total number of children and adolescents who are in follow-up, 215 of them are from TASH, 199 of them from SPHMMC, 183 of them from Y12MC and the rest 97 of them are from ZMH. The sample size was allocated proportionally for each hospital. Children and adolescents together with their primary care-givers were selected from each hospital using a simple random sampling technique for each hospital. Since the number of children and adolescents with T1DM on follow up at endocrinology clinic is different for each hospital, proportion for each hospital has been calculated using the formula below.

Proportional for each selected hospital	Children and adolescents had been on T1DM follow up at X hospital *Total sample size Children and adolescents had been on T1DM follow up at selected hospitals
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Therefore, the sample size for the selected hospitals is, **TASH= 129, SPHMMC=119, Y12MC=110, ZMH=58.**

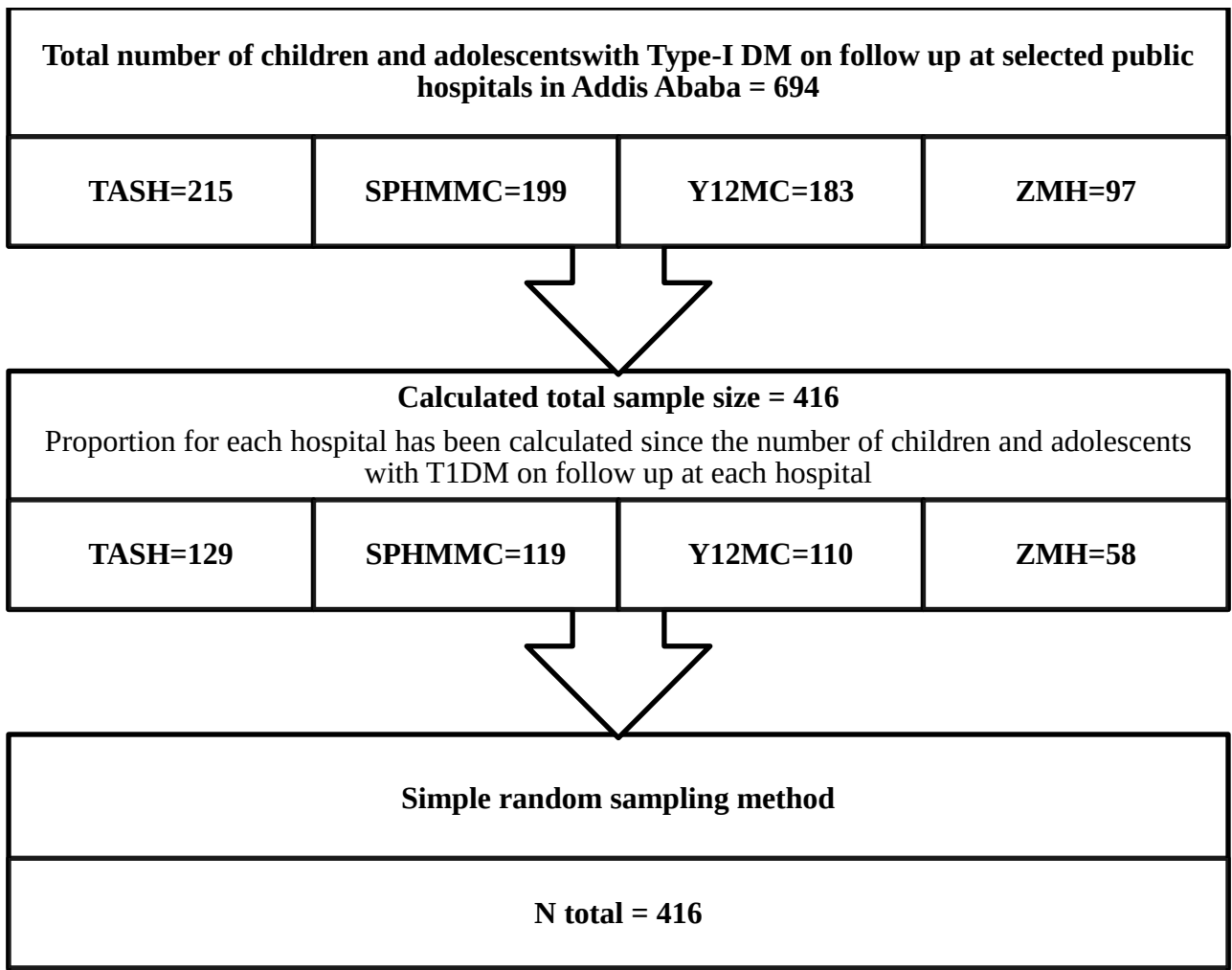


Figure 2: Schematic presentation of sampling procedures for selecting samples for the study from the selected public hospitals in Addis Ababa, Ethiopia, October 2020.

4.6. Study variables

Dependent variable

- ✓ Mean score of Health-Related Quality of life of children and adolescents with T1DM (Physical functioning, emotional functioning, social functioning, and school functioning)
- ✓ Mean score of Disease-Related Quality of life of children and adolescents with T1DM (Diabetes symptoms, Treatment barriers, Treatment adherence, Worry and Communication)

Independent variables

- ✓ **Socio-demographic characteristics:** Age, Gender, Marital status of primary care givers, Average family monthly income, Primary caregiver's employment status, educational status of the child and adolescent, Educational status of primary care giver, Family setting
- ✓ **Clinical related factors:** Duration of the illness, Age at diagnosis, Glycemic control (HgbA1c) level, Blood sugar control and monitoring frequency, Insulin administration frequency, physical activity, Nutritional status of child and adolescent, Family history of diabetes, Number of admissions over past 6 months

4.7. Operational definitions

- **Pediatric Quality of life inventory (PedsQL™)(33,34)**

The Pediatric Quality of Life Inventory (PedsQL) is a brief measure of health-related quality of life in children and young people. The measure can be completed by parents (the Proxy Report) as well as children and young people (the Self-Report).

- **Quality of Life (QoL)**

Quality of life (QOL) is defined as 'individuals' perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns.

- **Health related quality of life: GCS (HRQoL)**

Health related Quality of life (HRQoL) refers to the physical, school, emotional psychosocial and social domains of health that are influenced by a person's experiences, beliefs, expectations and perceptions.

- **Disease related quality of life (DRQoL)(15)**

Health-related quality of life indicates the extent to which a disease or medical condition impacts upon the daily physical, emotional, mental and contextual well-being of an individual. In other words, it reflects the subjective perception of health. This concept is therefore increasingly considered as a relevant 'patient reported outcome'.

- **Recent HgbA1c**

HgbA1c test that was done within the past 3 months is taken.

- **Children (35)**

Pediatric age groups from 5-9 years old

- **Adolescents (35)**

Pediatric age groups from 10-18 years old

- **Primary Caregiver**

In this study, primary caregiver is defined as an individual who provides the majority of care or guardianship (has the greatest responsibility for the daily care and rearing) of a child and/or adolescent.

- **Poor HRQoL and DRQoL (15)**

Those respondents who score one standard deviation (1SD) below the sample mean in relative to population sample.

- **Glycemic control:** for the purpose of this study, fasting glucose level (FBS) will be used and classified as:

- Well controlled FBS level: 90-130mg/dl
- Poor glycemic control: FBS level <90 or >130mg/d.

- **Co-Morbidity (36)**

The occurrence of any chronic health conditions among children and adolescents with T1DM in addition to the DM.

4.8. Data collection method, tool and procedures

Standardized and structured questionnaire was used by adapting from the PedsQL™ 4.0 generic core scales and PedsQL™ 3.2 diabetes module (33,34). The data questionnaire has been obtained from eprovide.mapi-trust.org and permission was given to translate it (Special terms No. 34085 dated 6 April,2021). The questionnaire was designed to obtain information on the socio-demographic characteristics, health related characteristics and psychosocial condition of participants and their parents. Scoring of the QoL in the questionnaire was done using both the PedsQL™ 4.0 generic core scales and PedsQL™ 3.2 diabetes module. This scoring method was explained in simple terms to the children, adolescents and care-givers by the data collector so that they can understand and unclear things were clarified by the data collector.

Electronic collection method using a mobile application (Kobo toolbox) and paper-based data collection methods were used. The Amharic version of the questionnaire was uploaded to Kobo toolbox, and Kobo collect, which is a mobile application for data collection, was used to collect the data. The data was collected through face-to-face interview from selected children, adolescents and their respective primary care-giver. Completed questionnaires were saved in the mobile devices and were sent to the central server immediately after completing the interview. In cases where the data collectors cannot complete the questionnaires and when an internet connection cannot be accessed, the completed questionnaires will be forwarded when there is an internet connection available. The data collection was managed directly from the principal investigator's server. Each data collector and supervisor did have a code to make data management easy.

The data collection was conducted by 2 Nurses who hold BSc degrees, 2 General Practitioners, and was supervised by the principal investigator. In addition to this, a close follow-up by the principal investigator was done.

PedsQL™ 4.0 generic core scales

PedsQL™ 4.0 generic core scales contains questionnaires to be filled by the parents or care givers (Parent report) for those age 5-18 years contains 23 items comprising of 4 dimensions (Physical functioning (8 items), emotional functioning (5 items), social functioning (5 items),

and school functioning (5 items)). The PedsQL 4.0 Generic Core Scales are comprised of parallel child self-report and parent proxy-report formats. The Physical Health Summary Score (8 items) is the same as the Physical Functioning Subscale. To create the Psychosocial Health Summary Score (15 items), the mean is computed as the sum of the items divided by the number of items answered in the Emotional, Social, and School Functioning Subscales. The parent or primary care giver report for those above 5 years has 23 items comprising 4 dimensions (Physical functioning, emotional functioning, social functioning & school functioning) and the scoring is similar like the child and adolescent format (33).

PedsQLTM 3.2 diabetes module

PedsQLTM 3.2 diabetes module contains questionnaire to be filled by the parents or care givers of children and/or adolescents. It contains 32 items and 33 items for those age 5-7 and 8-18, respectively, comprising 5 dimensions (Diabetes symptoms (15 items), Treatment I (barriers) (5 items), Treatment II (adherence) (6 items), worry (2 items for 5-7 years children and 3 items for 8-18 years), and communication (4 items)). It has 5 scales from 0 (never a problem) to 4 (almost always a problem) and scores will be transformed on scale from 0-100. Higher score indicates better DRQoL. Children aged 5–18 years provided self-reports, and parents or care givers of children aged 2–18 years provided parent proxy-reports (34).

Measurements

Child and adolescent self-report include ages 5–7, 8–12, and 13–18 years. Parent proxy-report includes ages 2–4 (toddler), 5-7 (young child), 8–12 (child), and 13–18 (adolescent), and assesses parents' perceptions of their child's or adolescent's HRQoL and DRQoL. The items for each of the forms are essentially identical, differing in developmentally appropriate language, or first or third-person tense. The instructions ask how much of a problem each item has been during the past 1 month. A 5-point response scale is utilized across child self-report for ages 8–18 and parent proxy-report (0 = never a problem; 1 = almost never a problem; 2 = sometimes a problem; 3 = often a problem; 4 = almost always a problem). To further increase the ease of use for the young child self-report (ages 5–7), the response scale is reworded and simplified to a 3-point scale (0 = not at all a problem; 2 = sometimes a problem; 4 = a lot of a problem), with each response choice anchored to a happy to sad faces

scale. Items are reverse scored and linearly transformed to a 0–100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0), so that higher scores indicate better HRQOL and DRQoL. Scale scores are computed as the sum of the items divided by the number of items answered (this accounts for missing data). If more than 50% of the items in the scale are missing, the scale score is not computed (33).

4.8.1. KoBo toolbox and KoBo collect

KoBo toolbox, an open-source software developed by the Harvard Humanitarian Initiative, is an open-source suite of tools for data collection and analysis that provides an out of the box solution for users to: Build a data collection form or survey; Collect the data on a mobile device/tablet and send it to a server; and aggregate the collected data on a server and extract it in useful formats e.g., Charts/Graphs, Reports (could be exported to Excel or SPSS). It comprises of real time data collection, visualization and monitoring tools (37).

KoBo Collect is KoBo Toolbox's data collection application and can be installed on any Android phone or tablet. Data can be entered from interviews or other primary data online or offline. KoBo toolbox collect and store user data according to Privacy Policy and general data protection regulations. KoBo Toolbox employ industry standard best practices (both technical and administrative) to protect against unauthorized access of data (38,39).

4.9. Data quality assurance

The quality of data was controlled starting from the time of questionnaires preparations. The questionnaire is developed by reviewing relevant literatures on the subject to ensure reliability. First the questionnaire, which was prepared in English, is translated into Amharic. To ensure the consistency of the tool, it was translated back to English language.

Training was provided for one day prior to the study for supervisor and data collectors on the purpose of study, procedures of data collection and explaining on 'how to use Kobo Collect to collect data' with examples demonstration of the features of the application. There was Periodic supervision and technical support by the principal investigator for data collectors. After completing the training, trainees conducted pre-test using 5% of the total sample size (21) at non-study health facility (Tirunesh Beging Hospital).

The data collection was supported by the Kobo toolbox in which each and every question is required to be answered, helping to avoid missing data. The Kobo toolboxes also allow editing of the responses in front of each interviewee.

During data collection, the supervisor received questionnaires from data collectors and review for completeness, accuracy, and consistency on daily bases. Incomplete, inconsistent and invalid data were refined properly to get maximum quality of data before, during and after data entry.

4.10. Data processing and analysis

The collected data were cleaned and entered directly during the time of data collection since Kobo collect Version 1.27.3 was used. Then, the data were exported to SPSS version 25 for further analysis. Descriptive analysis was performed to describe number and percentage of sociodemographic characteristics of categorical variables. Continuous variables were expressed in median and interquartile range (IQR) or mean and standard deviation and compared using independent group *t* tests. Paired sample *t*-test was used to compare children and adolescents self-report and primary caregiver's parent proxy report. Independent sample *t*-test and One-way ANOVA were conducted to determine if there is a difference in mean score of children and adolescents for HRQoL and DRQoL. Multivariable linear regression is used to explore the real difference in mean score and to identify significant predictor factor of both HRQoL and DRQoL of children and adolescents. Microsoft Excel 2019 was used to make graphs and charts. A P-value of ≤ 0.05 was considered statistically significant. Tables, figures, charts and texts used for data presentation.

4.11. Ethical considerations

Ethical approval was sought from the Institutional Research Review Boards (IRBs) of St. Paul's Hospital Millennium Medical College (PM23/294), Tikur Anbessa Specialized Hospital (ሀጸ/ሀቶ/262/13), Yekatit 12 Hospital Medical College (14/12) and ethical clearance was obtained from Addis Ababa public health research and emergency management directorate (A/A/5962/227). Then, permission to carry out the study was sought from TASH, SPHMMC, Y12MC, TBH and ZMH Hospitals' administrations and a formal letter of support was obtained from the hospitals. Participation in the study was on voluntary

basis. After a detailed explanation of the study purpose, written informed consent was sought from care-givers and assent from participating children and adolescents. Confidentiality and privacy of the participant has been maintained throughout the process of data collection. The data collection teams were trained on how to handle sensitive and emotional issues and on the importance of keeping confidentiality and participants were free to decline or withdraw from participating in the study at any time during the study period. This study was conducted with a serious consideration of Coronavirus Pandemic. So that, in order to minimize the risk of infection transition during the face-to-face interview, the interview was conducted in the ventilated area with keeping an enough distance between the interviewer and interviewees and also facemask was worn by all participants as well as the data collectors.

4.12. Plan for dissemination of findings

The result of the study is going to be presented for research defense and a formal report will be submitted to public health department and department of pediatrics and child health of St. Paul's Hospital Millennium Medical College and department of pediatrics and child health of Tikur Anbessa Specialized Hospital, Yekatit 12 Medical College and Zewditu Memorial Hospital. In addition, the final report will be archived in the SPHMMC library. Furthermore, the findings of this study will be disseminated to Addis Ababa public health research and emergency management directorate and for publication in national or international peer reviewed reputable journal. The study will also be presented during various research symposiums, conferences or on seminars.

5. Results

5.1. Sociodemographic Characteristics of the study participants

A total of 379 participants were included in the study (giving 91.1% response rate). Twenty-six patients were not included due to attending follow-up visits without primary care giver, or not attending follow-up visits, while 11 patients rejected their participation in the study. The mean age of the children and adolescents was 11.65 years with ± 3.56 standard deviations (SD). The mean age of the children was 8.98 ± 2.42 years, and that of the adolescents was 14.89 ± 1.33 years. Two hundred fourteen (56.5%) of children and adolescents were girls. About 69.1% of children and adolescents live with both parents (mothers and fathers). The median monthly income of the primary care givers is 4500 birr (IQR= 2000-8000). Regarding educational status of parents, about 43 (12.3%) of children's mothers, 19 (6.8%) children's fathers and 4 other primary care givers had no formal education. On average there were around 2.37 children who are less than or equal to 18 years old in children and adolescent's household. Three hundred sixty-three (95.8%) of the children and adolescents were member family having less than or equal to four children or adolescents aged 18 or less. Table 2 shows the demographic characteristics of the study participants.

Table 2: Sociodemographic characteristics of of the study participants at selected public hospitals in Addis Ababa, July 2021

Variable	Response	Frequency	Percent
Sex (N=379)	Male	165	43.5
	Female	214	56.5
Age in years (N=379)	Mean $\pm$ SD	11.65 $\pm$ 3.56	
	5-12 (Child)	208	54.9
	13-18 (Adolescent)	171	45.1
Educational status of child/adolescent (N=379)	Not yet started	6	1.6
	Kindergarten	42	11.1
	Primary school	258	68.1
	Secondary school	73	19.3
Family setting: Child/adolescent lives with (N=379)	Lives with both parents	262	69.1
	Lives with father only	16	4.2
	Lives with mother only	87	23.0
	Other primary care giver ¹	14	3.7
Maternal/Mother' Educational status (N=349)	No formal education	43	12.3
	Read and write	11	3.2
	Primary education (1-8)	101	28.9
	Secondary education (9-12)	131	37.5
	College/university	63	18.1
Paternal/Father's educational status (N=278)	No formal education	19	6.8
	Read and write	3	1.1
	Primary education (1-8)	66	23.7
	Secondary education (9-12)	104	37.4
	College/university	86	30.9
Maternal/Mother' Occupation (N=349)	House wife	181	51.9
	Daily laborer	14	4.0
	Private employee	63	18.1
	Government employee	50	14.3
	Private/self-organization	41	11.7
Paternal/Father's Occupation (N=278)	Unemployed	18	6.5
	Daily laborer	17	6.1
	Private employee	118	42.4
	Government employee	66	23.7
	Private/self-organization	59	21.2
Monthly income in Ethiopian Birr (ETB)	Mean $\pm$ SD	5513.98 $\pm$ 4681.79	
	Low (less than 2500)	102	26.9
	Middle (2501-7500)	178	47.0
	High (greater than 7500)	99	26.1
Number of children $\leq$ 18 years in the family (N=379)	$\leq$ 4 children	363	95.8
	> 4 children	16	4.2

N stands for frequency while SD is for standard deviation

¹ Three sisters, Two brothers, Two Aunts, One uncle and six legal care givers

5.2. Nutritional status of children and adolescents

The mean weight and height of children and adolescents were 37.44 kilograms (Kg) with a SD of ± 12.17 and 140.59 ± 16.71 centimeters, respectively. Average body mass index (BMI) of the study participants was 18.45 ± 2.90 kg/m². Using the WHO anthropometric measurement tool, three hundred fifty-three (93.1%) of children and adolescents had normal BMI for age (Figure 3). Those children and adolescents who have wasting and overweight/obese were linked to pediatrics nutrition clinic for treatment of malnutrition.

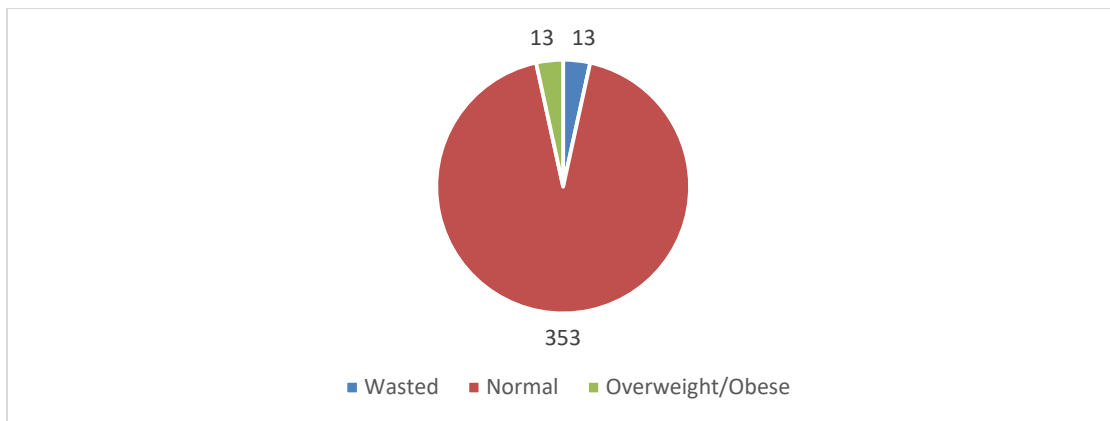


Figure 3: BMI for age of children and adolescents with type I DM on follow up at selected public hospitals in Addis Ababa, July 2021.

5.3. Clinical characteristics of children and adolescents

The mean age at onset of diabetes for participants was 7.36 years with a SD of ± 4.16 years and the mean duration of diabetes for participants were 4.34 years with a SD of ± 3.47 , with 112 (29.6%) longstanding (>5 years), and 26 (6.9%) less than 1 year. Since the study is on children and adolescents with T1DM, all of children and adolescents were insulin only users.

The average HbA1c level was 10.12 ± 2.04 percent. The mean HbA1c levels were 9.9 ± 2.1 in the children and 10.4 ± 1.94 in the adolescents. They had 179.76 ± 78.45 mean level of fasting blood sugar (FBS) level with minimum being 36 and maximum of above 600.

About 108 (28.5%) children and adolescents had history of health facility admission in the last six month and 86 (22.7%) of children and adolescents had family history of diabetes. The clinical characteristic of respondent is presented, in (Table 3).

Table 3: Clinical characteristics of children and adolescents with type I DM on follow up at selected public hospitals in Addis Ababa, July 2021

Variable	Response	Frequency (N=379)	Percent
Age of onset (N=379)	Mean $\pm$ SD	7.36 $\pm$ 4.16 years old	
Duration of diabetes mellitus (N=379)	Mean $\pm$ SD	4.34 $\pm$ 3.47 years	
	Less than 1 year	26	6.9
	1 to 5 years	241	63.6
	Greater than 5 years	112	29.6
Attending education during follow up (N=379)	Yes	244	64.4
	No	135	35.6
Frequency of insulin administration (N=379)	Twice daily	372	98.2
	Three times per day	7	1.8
Who administers insulin to the child frequently? (N=379)	Self	224	59.1
	Primary care giver (Mother, Father, Other primary care giver)	155	40.9
Admission in the last 6 months (N=379)	Yes	108	28.5
	No	271	71.5
Frequency of admission (N=108)	Once	100	92.6
	Two times	8	7.4
Frequency of monitoring of blood glucose (N=379)	Once during follow up visit	22	5.8
	Once or twice per week	13	3.4
	Once daily	23	6.1
	Twice per day	295	77.8
	Three times and above per day	26	6.9
Family history of Diabetes (N=379)	Yes	86	22.7
	No	293	77.3
Number of exercises per week (N=379)	None	55	14.5
	Once per week	67	17.7
	Twice per week	137	36.1
	Three times per week	72	19.0
	Always	48	12.7
Hemoglobin A1C (N=215)	Mean $\pm$ SD	10.12 $\pm$ 2.04	
	<7.5	22	10.2
	7.5 and above	193	89.8
Mean Fasting Blood Sugar (FBS) level (N=333)	Mean $\pm$ SD	179.76 $\pm$ 78.45	
	Controlled (90-130)	98	29.4
	Uncontrolled (<90 or>130)	235	70.6

5.4. Magnitude of Pediatric health related quality of life (HRQOL) and disease related quality of life (DRQOL) of the study participants

Total mean scores on the PedsQL™ 4.0 GCS were found to be 90.11 ± 9.88 for the 5-12 years old and 86.36 ± 11.47 for the 13-18 years old as reported by the children and adolescents themselves and the total mean scores were 85.31 ± 10.91 for children and 78.34 ± 13.57 for adolescents as reported by primary care givers. Both children and adolescents' self-reports and parent proxy reports for school and emotional functioning were coincide each other, there were relatively low scores when compare to other sub scale scores.

The total score of the PedsQL Diabetes Module self-report were found to be 83.77 ± 11.11 for the 5 -12 years old and 80.27 ± 13.52 for the 13-18 years old. Total mean scores of parent proxy reports for total PedsQL™ 3.2 Diabetes Module scoring was 80.08 ± 9.50 for children, compared to 75.76 ± 15.37 for adolescents. The score of children and adolescent in sub scale of diabetes symptoms and treatment adherence DRQoL of children and adolescents were relatively lower. Relatively they had better score in treatment barriers, worry and communication.

PedsQL™ 4.0 Generic Core Scale (HRQoL)

About 5.8% and 9% of children and adolescents were scored below one standard deviation from the total self-reports of HRQoL of children and adolescents. With Similar pattern about 3.2% and 9.8% children and adolescents were scored below one standard deviation from the total parent proxy reports of HRQoL of children and adolescents. About 19.8% and 29% of children and adolescents scored one standard deviation below total HRQoL in emotional function and School function respectively. Relatively they had better scores in social function and physical function that about 6.3% and 17.9% of children and adolescents were scored below one standard deviation from the total self-reports of HRQoL of children and adolescents in social function and physical function respectively.

Physical functioning scores were lower in girls, adolescents, those from single-parent families, those with duration of DM more than 5 years and those with poor glycemic control. Females, children with no education, those who live with primary care givers other than their parents, adolescents, those children and adolescents' whose parents had no formal education

or can only read and write, and those from low family income has low self-report HRQoL. On the other hand, Children, patients with good glycemic control and shorter duration of disease (<5 years), showed better scores on self-report of HRQoL. Table 4 shows the mean scores on HRQOL according to sociodemographic and clinical variables.

PedsQL™ 3.2 Diabetes Module (DRQoL)

About 17.9% of children and adolescents were scored below one standard deviation from the total self-reports of DRQoL. Children and adolescents in diabetes symptoms, in treatment barriers, in treatment adherence, in worry and in communication had scored one standard deviation below the total self-score in 15.8%, 16.1%, 16.9%, 12.1%, and 14.5%, respectively.

Diabetes symptoms scores were lower in adolescents, secondary school students, those from single-parent families and with primary care givers other than their parents, those with fathers with no jobs or daily laborers, frequency of insulin administration three times per day and HbA1C level ≥ 7.5 in low self-report DRQoL. From total DRQoL adolescents, those from single-parent families and with primary care givers other than their parents, those with fathers with no jobs or daily laborers, patients with poor glycemic control, HbA1C level ≥ 7.5 and those with > 4 children in a family showed lower scores on self-report of DRQoL. Table 4 shows the mean scores on DRQOL according to sociodemographic and clinical variables.

Table 4: Pediatrics quality of life (PedsQL) generic core scale 4.0 and diabetes module 3.2 score of children and adolescents with type I DM and their primary care givers on follow up at selected public hospitals in Addis Ababa, 2021

PedsQL	Number of items	Children's report (Mean±SD)	Children's parents report (Mean±SD)	Adolescents' report (Mean±SD)	Adolescents' parents report (Mean±SD)	Children and Adolescents report (Mean±SD)	Children and Adolescents' parents report (Mean±SD)
PedsQL GCS							
Physical functioning	8	90.31±13.85	87.36±16.05	88.21±14.09	79.46±19.12	89.36 ±13.98	83.80±17.92
Emotional functioning	5	89.88±13.34	76.11±18.87	81.37±20.07	70.06±21.20	86.04 ±17.22	73.38 ±20.15
Social functioning	5	95.14±9.01	95.02±11.02	94.62±11.29	91.20±15.57	94.91 ±10.09	93.30 ±13.38
School functioning	5	84.98±15.69	81.43±15.10	80.06±18.41	71.91±21.15	82.74 ±17.13	77.10 ±18.59
Psychosocial function sub scale	15	90.02±10.31	85.31±11.16	85.36±12.52	78.34±13.34	87.92±11.58	81.30±12.60
Total	23	90.11±9.98	87.36±10.91	86.36±11.47	79.46±13.57	88.42±10.82	82.17±12.65
PedsQL DM							
Diabetes symptoms	15	82.73±15.04	77.09±13.13	74.54±16.45	69.12±17.11	79.04±16.20	73.50±15.55
Treatment barriers	5	89.18±13.01	81.32±15.97	83.60±17.27	77.13±22.44	86.66±15.31	79.43±19.25
Treatment adherence	6	78.23±20.39	79.87±18.40	86.18±15.50	84.04±17.04	81.82±18.75	81.75±17.89
Worry	3	92.29±14.71	88.10±19.82	79.63±25.65	79.00±28.05	86.58±21.31	83.99±24.28
Communication	4	83.98±25.64	85.10±24.70	89.07±21.23	83.99±25.58	86.28±23.86	84.60±25.07
Total	33	83.77±11.11	80.08±9.50	80.27±13.52	75.76±15.37	82.19±12.36	78.13±12.66

SD=standard deviation

5.5. Comparison of children and adolescents' self-reports and parent proxy reports of HRQoL and DRQoL

The paired sample t-test compares children and adolescents' self-reports and parent proxy reports of PedsQL™ 4.0 Generic Core Scales and PedsQL™ 3.2 Diabetes Module scores of children and adolescents. There was statically significant difference in self-reports and parent proxy reports of PedsQL™ 4.0 Generic Core Scales scoring in all sub scales but social functioning. In PedsQL™ 3.2 Diabetes Module scoring of children and adolescents QoL, there was statistically significant difference in diabetes symptoms, treatment barriers, and total score of self-reports and parent proxy reports.

Table 5: Comparison of children and adolescents' self-reports and parent proxy reports of QoL among children and adolescents with T1DM on follow up at selected public hospital, Addis Ababa, Ethiopia, 2021

PedsQL	Number of items	Children's report	Children's parents report	t	P
PedsQL GCS					
Physical functioning	8	90.31±13.85	87.36±16.05	-3.716	<0.001*
Emotional functioning	5	89.88±13.34	76.11±18.87	-10.060	<0.001*
Social functioning	5	95.14±9.01	95.02±11.02	1.036	0.301
School functioning	5	84.98±15.69	81.43±15.10	-3.782	<0.001*
Psychosocial function sub scale	15	90.02±10.31	85.31±11.16	-7.968	<0.001*
Total	23	90.11±9.98	87.36±10.91	-7.431	<0.001*
PedsQL DM					
Diabetes symptoms	15	82.73±15.04	77.09±13.13	-8.217	<0.001*
Treatment barriers	5	89.18±13.01	81.32±15.97	-7.296	<0.001*
Treatment adherence	6	78.23±20.39	79.87±18.40	0.785	0.434
Worry	3	92.29±14.71	88.10±19.82	-2.475	0.014*
Communication	4	83.98±25.64	85.10±24.70	0.454	0.650
Total	33	83.77±11.11	80.08±9.50	-6.041	<0.001*
PedsQL	Number of items	Adolescents' report	Adolescents' parents report		
PedsQL GCS					
Physical functioning	8	88.21±14.09	79.46±19.12	-6.180	<0.001*
Emotional functioning	5	81.37±20.07	70.06±21.20	-6.520	<0.001*
Social functioning	5	94.62±11.29	91.20±15.57	-1.902	0.059
School functioning	5	80.06±18.41	71.91±21.15	-5.262	<0.001*
Psychosocial function sub scale	15	85.36±12.52	78.34±13.34	-7.442	<0.001*

Total	23	86.36±11.47	79.46±13.57	-8.053	<0.001*
PedsQL DM					
Diabetes symptoms	15	74.54±16.45	69.12±17.11	-6.077	<0.001*
Treatment barriers	5	83.60±17.27	77.13±22.44	-5.455	<0.001*
Treatment adherence	6	86.18±15.50	84.04±17.04	-1.676	0.096
Worry	3	79.63±25.65	79.00±28.05	2.215	0.028*
Communication	4	89.07±21.23	83.99±25.58	-3.671	<0.001*
Total	33	80.27±13.52	75.76±15.37	-6.787	<0.001*
PedsQL	Number of items	Children and Adolescents report	Children and Adolescents' parents report		
PedsQL GCS					
Physical functioning	8	89.36 ±13.98	83.80±17.92	-6.892	<0.001*
Emotional functioning	5	86.04 ±17.22	73.38 ±20.15	-11.774	<0.001*
Social functioning	5	94.91 ±10.09	93.30 ±13.38	-0.645	0.519
School functioning	5	82.74 ±17.13	77.10 ±18.59	-6.296	<0.001*
Psychosocial function sub scale	15	87.92±11.58	81.30±12.60	-10.911	<0.001*
Total	23	88.42±10.82	82.17±12.65	-10.922	<0.001*
PedsQL DM					
Diabetes symptoms	15	79.04±16.20	73.50±15.55	-10.182	<0.001*
Treatment barriers	5	86.66±15.31	79.43±19.25	-9.088	<0.001*
Treatment adherence	6	81.82±18.75	81.75±17.89	-0.255	0.799
Worry	3	86.58±21.31	83.99±24.28	-0.697	0.486
Communication	4	86.28±23.86	84.60±25.07	-1.672	0.095
Total	33	82.19±12.36	78.13±12.66	-8.777	<0.001*

GCS = Generic Core Scale; DM = Diabetes Module

5.6. Mean differences between children and adolescents' self-reports of Quality of life (HRQoL and DRQoL) and independent variables

According to independent t-test analysis, there was a statistically significant difference between children (5-12 years) and adolescents (13-18 years) respondents in total mean HRQoL, ($t(377) = -3.855$, $P < 0.001$, 95% CI = -1.01043, -0.32789). The mean values indicate that children respondents had more HRQoL ($N = 208$, $M = 90.11$) than adolescents ($N = 171$, $M = 86.36$). An independent samples t-test on the number of children that live with the child/adolescent has found that, there was a significant difference in HRQoL score between the groups that live with other ≤ 3 children or those with greater than 3, ($t(377) = -2.155$, $P = 0.032$, 95% CI = -1.79385, -0.08232). The mean HRQoL score among the children that live with ≤ 3 other children ($N = 363$, $M = 88.60$) was higher than those with greater than 3 children in the household ($N = 16$, $M = 84.31$). Children and adolescents that are from low-income family ($N = 102$, $M = 86.16$) has lower HRQoL than those from medium/high income family ($N = 277$, $M = 89.25$), ($t(377) = -2.476$, $P = 0.012$, 95% CI = 0.10758, 0.88188). Doing the independent t-test analysis, there was a statistically significant difference in mean HRQoL between those who self-administer insulin and those respondents whose insulin is administered by primary care givers, ($t(377) = 3.714$, $P < 0.001$, 95% CI = 0.30736, 0.99914). The mean values indicate that primary care givers' insulin administering respondents had more HRQoL ($N = 155$, $M = 90.87$) than self-administering respondents ($N = 224$, $M = 86.72$). Children and adolescents that had hospital admission within 6 months before the data collection time ($N = 108$, $M = 86.87$) has lower HRQoL than those who were not admitted ($N = 271$, $M = 89.03$), ($t(377) = 3.865$, $P < 0.001$, 95% CI = 0.31262, 0.96140). It was also found that children and adolescents with family history of Diabetes Mellitus ($N = 86$, $M = 90.74$) has better HRQoL score than those without ($N = 293$, $M = 87.74$), ($t(377) = -2.234$, $P < 0.026$, 95% CI = -0.87720, -0.05587).

Table 6: Summary of an independent samples t-test on HRQoL with socio-demographic and clinical characteristics among

Variables		N	Mean±SD	t-value	p-value	95% CI		Mean difference
						Lower	Upper	
Age	Child	208	90.11±9.98	-3.855	<0.001*	-1.01043	-0.32789	-.66916
	Adolescent	171	86.36±11.47					
Sex	Male	165	88.98±9.68	-0.379	0.705	-0.41643	0.28184	-0.06729
	Female	214	87.98±11.63					
Number of children	≤ 4	363	88.60±10.90	-2.155	0.032*	-1.79385	-0.08232	-0.93808
	> 4	16	84.31±8.03					
Duration of DM	≤5 years	267	88.54±10.28	0.557	0.578	-0.29379	0.52480	0.11550
	>5 years	112	88.12±12.07					
Attending Health Education	Yes	244	89.08±12.10	-0.325	0.745	-0.39445	0.28246	-0.05599
	No	135	89.02±8.01					
Family monthly income	Low	102	86.16±13.16	-2.476	0.012*	0.10758	0.88188	0.49473
	Medium/High	277	89.25±9.72					
Frequency of insulin administration	Twice	372	88.59±10.31	0.959	0.389	-3.39735	1.52494	-0.93620
	Three times	7	79.02±26.37					
Who administers insulin	Self	224	86.72±11.45	3.714	<0.001*	0.30736	0.99914	0.65325
	Primary care giver	155	90.87±9.34					
Admission in the past 6 months	Yes	108	86.87±9.46	3.865	<0.001*	0.31262	0.96140	0.63701
	No	271	89.03±11.28					
Frequency of admission	Once	100	86.75±9.52	0.384	0.702	-0.74526	1.10289	0.17882
	Twice	8	88.38±9.26					
Family history of DM	Yes	86	90.74±9.49	-2.234	0.026*	-0.87720	-0.05587	-0.46653
	No	293	87.74±11.11					
HbA1C	< 7.5	22	89.15±11.33	0.052	0.959	-0.70833	0.74666	0.01917
	≥ 7.5	193	90.27±9.34					
Glycemic control	Controlled	98	89.33±10.49	-0.645	0.519	0.20553	0.53689	0.27173
	Uncontrolled	235	88.69±10.99					

children and adolescents with T1DM on follow up at selected public hospital, Addis Ababa, Ethiopia, 2021

**Statistically significant= $p \leq 0.05$ N=number of respondents, SD=standard deviation*

An independent t-test analysis, there was a statistically significant difference between children (5-12 years) and adolescents (13-18 years) respondents in total mean DRQoL, ($t(377) = -2.655$, $P = 0.008$, 95% CI = -0.10367, -0.39974). The mean values indicate that children respondents had more DRQoL ($N = 208$, $M = 83.77$) than adolescents ($N = 171$, $M = 80.27$). It was also found, there was a significant difference in DRQoL score between the groups that live with other ≤ 3 children or those with greater than 3, ($t(377) = -4.690$, $P < 0.001$, 95% CI = -1.04501, -0.40887). The mean DRQoL score among the children that live with ≤ 3 other children ($N = 363$, $M = 82.37$) was higher than those with greater than 3 children in the household ($N = 16$, $M = 78.08$). According to independent t-test analysis, there was a statistically significant difference in the mean score of DRQoL between children and adolescents who had attended health education about diabetes ($N = 244$, $M = 83.48$) and respondents who didn't attend health education ($N = 135$, $M = 79.86$), ($t(377) = -3.176$, $P = 0.002$, 95% CI = -0.80142, -0.18854). Finally, it was found respondents who took insulin twice per day ($N = 372$, $M = 82.39$) have a different mean DRQoL with respect to those who took three times per day ($N = 7$, $M = 71.54$). The mean values indicate that those who took twice per day have better mean DRQoL score than those who took three times ($t(377) = 2.182$, $P = 0.030$, 95% CI = -2.31539, -0.12043). Table 6 and 7 presents summary of independent sample t test results of independent variables with HRQoL and DRQoL.

Table 7: Summary of an independent samples t-test on DRQoL with socio-demographic and clinical characteristics among children and adolescents with T1DM on follow up at selected public hospital, Addis Ababa, Ethiopia, 2021

Variables		N	Mean±SD	t-value	p-value	95% CI		Mean difference
						Lower	Upper	
Age	Child	208	83.77±11.11	-2.665	0.008*	-0.69580	-0.10367	-0.39974
	Adolescent	171	80.27±13.52					
Sex	Male	165	81.85±13.46	0.014	0.989	-0.29782	0.30201	0.00210
	Female	214	82.45±11.47					
Number of children	≤ 4	363	82.37±12.56	-4.690	<0.001*	-1.04501	-0.40887	-0.72694
	> 4	16	78.08±5.20					
Duration of DM	≤5 years	267	82.20±12.40	-0.119	0.842	-0.35886	0.29289	-0.03298
	>5 years	112	82.17±12.34					
Attending Health Education	Yes	244	83.48±12.23	-3.176	0.002*	-0.80142	-0.18854	-0.49498
	No	135	79.86±12.30					
Family monthly income	Low	102	81.16±12.20	1.210	0.227	-0.12864	0.54061	0.20599
	Medium/High	277	82.57±12.43					
Frequency of insulin administration	Twice	372	82.39±12.20	-2.182	0.030*	-2.31539	-0.12043	-1.21791
	Three times	7	71.54±17.34					
Who administers insulin	Self	224	80.21±12.65	4.378	<0.001*	0.36193	0.95201	0.65697
	Primary care giver	155	85.05±11.39					
Admission in the past 6 months	Yes	108	80.82±10.71	1.896	0.059	-0.1170	0.64402	0.31616
	No	271	82.73±12.94					
Frequency of admission	Once	100	80.73±10.98	0.030	0.976	-0.93904	0.96802	0.01449
	Twice	8	81.94±6.96					
Family history of DM	Yes	86	82.90±11.03	-0.118	0.906	-0.37635	0.33369	-0.02133
	No	293	81.98±12.74					
HbA1C	< 7.5	22	80.49±14.46	1.258	0.220	-0.30096	1.24267	0.47085
	≥ 7.5	193	84.91±11.28					
Glycemic control	Controlled	98	83.32±11.71	-1.031	0.303	-0.53366	0.16667	-0.18350
	Uncontrolled	235	82.13±12.63					

**Statistically significant= $p \leq 0.05$ N=number of respondents, SD=standard deviation*

One-way ANOVA was done for the socio-demographic characters with more than two categories to determine if HRQoL and DRQoL scores differ across different subgroups.

The One-way ANOVA analysis on HRQoL indicated that child/adolescent educational status, family setting, mother's education, father's education, father's occupation and frequency of blood glucose monitoring status of participants had a significant effect. The test indicated that the mean score for kindergarten students ($M=92.75$), is significantly different from secondary school students ($M=85.78$) with, ($F(3, 375)=4.074$, $P=0.007$). It was also found that family setting of children and adolescents had significant effect on mean score of HRQoL with, ($F(2, 376)=8.946$, $P<0.001$). The mean value indicates that participants living with both parents ($M=90.02$) had more HRQoL score than those living with one parent ($M=85.06$) or with other primary care giver ($M=83.17$). One-way ANOVA analysis has found that both mother's education level and father's education level have significant effect on the HRQoL score of children and adolescents ($F(3, 345)=8.918$, $P<0.001$) and ($F(3, 274)=8.053$, $P<0.001$), respectively. Children and adolescents of mothers with primary education ($M=91.62$). or secondary education ($M=90.90$). have better HRQoL score than those who had no formal education/who read and write ($M=83.91$). It was also found children and adolescents of mothers with primary education or secondary education have better HRQoL score than those who had college education ($M=84.27$). Children and adolescents of fathers with primary education ($M=90.63$). or secondary education ($M=92.03$). have better HRQoL score than those who had no formal education/who read and write ($M=82.91$) and those who had college education ($M=87.82$). The test also indicated that the mean score for children and adolescents whose fathers are private/government organization employees ($M=90.69$), is significantly different from those who are unemployed/daily laborers ($M=85.31$) with, ($F(2, 275)=3.998$, $P=0.019$). Children and adolescents who measure their blood glucose once/twice per week ($M=93.06$) have significantly different HRQoL score than those who check their blood glucose during follow up only ($M=82.62$), ($F(2, 376)=3.969$, $P=0.020$) (See Table 8 below).

Table 8: Summary of One-Way ANOVA on HRQoL with socio-demographic and clinical characteristics among children and adolescents with T1DM on follow up at selected public hospital, Addis Ababa, Ethiopia, 2021

Variables		Mean±SD	Test of Homogeneity of variances		ANOVA		Group differences				
			Levene Statistic	P-value	F	P-value		Mean difference	P-value	95% CI	
										Lower	Upper
Child/ adolescent educational status	Kindergarten	92.75±5.76	0.050	0.985	4.074	0.007*	Kindergarten-Primary	-0.70864	0.059	-1.4349	0.0176
	Primary	88.53±10.71					Kindergarten- Secondary	-1.13361	0.003*	-1.9790	-0.2883
	Secondary	85.78±11.79					Kindergarten- Not started	-1.05452	0.482	-2.9595	0.8505
	Not started	85.42±20.29					Primary- Secondary	-0.42496	0.232	-1.0036	0.1537
							Primary- Not started	-0.34588	0.960	-2.1484	1.4567
							Secondary- Not started	-0.07909	1.000	-1.7747	1.9328
Family setting	Biparental	90.02±10.14	0.852	0.427	8.946	<0.001*	Biparental-Monoparental	-0.71599	0.001*	-1.1749	-0.2571
	Monoparental	85.06±11.55					Biparental-Other	-1.16171	0.032*	-2.2442	-0.0792
	Other	83.17±11.07					Monoparental-Other	-0.44572	0.620	-1.5698	0.6783
Maternal Education	No formal education/read and write	83.91±15.53	2.552	0.055	8.918	<0.001*	No formal educ-Primary educ	0.94472	0.03*	0.2397	1.6498
	Primary education	91.62±6.94					No formal educ-Secondary educ	0.82423	0.010*	0.1479	1.5005
	Secondary education	90.90±7.56					No formal educ-College	-0.12062	0.978	-0.8962	0.6550
	College	84.27±12.62					Primary educ-Secondary educ	-0.12049	0.943	-0.6743	0.4333
							Primary educ- College	-1.06534	<0.001*	-1.7368	-0.3939
							Secondary educ- College	-0.94484	0.001*	-1.5860	-0.3036
Paternal Education	No formal education/read and write	82.91±10.59	1.164	0.324	8.053	<0.001*	No formal educ-Primary educ	1.53777	0.001*	0.4996	2.5759
	Primary education	90.63±13.92					No formal educ-Secondary educ	1.54285	<0.001	0.5532	2.5325
	Secondary education	92.03±7.72					No formal educ-College	0.81299	0.160	-0.1945	1.8205

	College	87.82±9.35					Primary educ-Secondary educ	0.00508	1.000	-0.6586	0.6687
							Primary educ- College	-0.72478	0.035*	-1.4149	-0.0347
							Secondary educ- College	-0.72986	0.013*	-1.3445	-0.1152
Mother's occupation	House wife/ Daily laborer	89.18±10.40	2.662	0.071	0.127	0.881					
	Private/ Gov't employee	87.91±11.72									
	Private/self-organization	89.70±7.61									
Father's occupation	Unemployed/ Daily laborer	85.31±15.09	0.182	0.618	3.998	0.019*	Unemployed/ Daily laborer- Private/ Gov't employee	0.81736	0.023*	0.0897	1.5450
	Private/ Gov't employee	90.69±9.69					Unemployed/ Daily laborer- Private/self-organization	0.44235	0.432	-0.3996	1.2843
	Private/self-organization	89.09±8.97					Private/ Gov't employee - Private/self-organization	-0.37500	0.294	-0.09654	0.2154
Frequency of monitoring of blood glucose	≥ 1per day	88.61±10.69	0.685	0.505	3.969	0.020*	≥ 1per day- 1-2 times per week	0.81952	0.204	-0.3098	1.9488
	1-2 times per week	93.06±9.96					≥ 1per day- During follow up	-0.80636	0.080	-1.6853	0.0726
	During follow up	82.62±11.64					1-2 times per week- During follow up	-1.62588	0.018*	-3.0241	-0.2276

**Statistically significant= $p \leq 0.05$, SD=standard deviation*

The One-way ANOVA analysis on DRQoL indicated that child/adolescent educational status, family setting, mother's education, father's occupation and frequency of blood glucose monitoring status of participants had a significant effect. The test indicated that the mean score for kindergarten students ($M = 88.16$), is significantly different from both primary school ($M = 82.27$) and secondary school students ($M = 78.95$) with, ($F(3, 375) = 5.611$, $P = 0.001$). It was also found that family setting of children and adolescents had significant effect on mean score of DRQoL with, ($F(2, 376) = 9.031$, $P < 0.001$). The mean value indicates that participants living with both parents ($M = 83.73$) had more DRQoL score than those living with one parent ($M = 79.00$). One-way ANOVA analysis has found that mothers education level has significant effect on the DRQoL score of children and adolescents ($F(3, 345) = 6.927$, $P < 0.001$). Children and adolescents of mothers with primary education ($M = 84.87$) or secondary education ($M = 85.04$) have better DRQoL score than those who had no formal education/who read and write ($M = 75.30$). The test also indicated that the mean DRQoL score for children and adolescents whose fathers are private/government organization employees ($M = 84.56$), is significantly different from those who are unemployed/daily laborers ($M = 76.92$) with, ($F(2, 275) = 4.581$, $P = 0.011$). Children and adolescents who measure their blood glucose once/twice per week ($M = 88.60$) or those who measure their blood glucose ≥ 1 per day ($M = 82.39$) have significantly different DRQoL score than those who check their blood glucose during follow up only ($M = 75.31$), ($F(2, 376) = 4.385$, $P = 0.013$).

Table 9: Summary of One-Way ANOVA on DRQoL with socio-demographic and clinical characteristics among children and adolescents with T1DM on follow up at selected public hospital, Addis Ababa, Ethiopia, 2021

Variables		Mean±SD	Test of Homogeneity of variances		ANOVA		Group differences				
			Levene Statistic	P-value	F	P-value		Mean difference	P-value	95% CI	
										Lower	Upper
Child/ adolescent educational status	Kindergarten	88.16±6.86	3.567	0.014	5.611	0.001*	Kindergarten-Primary	-0.72513	0.014*	-1.3452	-0.1051
	Primary	82.27±12.18					Kindergarten- Secondary	-1.11085	<0.001*	-1.8326	-0.3891
	Secondary	78.95±13.73					Kindergarten- Not started	-1.32557	0.154	-2.9520	0.3009
	Not started	76.42±18.28					Primary- Secondary	-0.38572	0.184	-0.8798	0.1083
							Primary- Not started	-0.60043	0.746	-2.1394	0.9386
							Secondary- Not started	0.21472	0.985	-1.7974	1.3680
Family setting	Biparental	83.73±12.15	0.799	0.451	9.031	<0.001*	Biparental-Monoparental	-0.64954	<0.001*	-1.0436	-0.2555
	Monoparental	79.00±12.14					Biparental-Other	-0.86467	0.074	-1.7941	0.0648
	Other	76.89±12.89					Monoparental-Other	-0.21513	0.859	-1.1803	0.7500
Maternal Education	No formal education/read and write	75.30±17.66	10.306	<0.001	6.927	<0.001*	No formal educ-Primary educ	0.89971	0.019*	0.1009	1.6985
	Primary education	84.87±9.08					No formal educ-Secondary educ	0.87634	0.018*	0.1045	1.6482
	Secondary education	85.04±9.21					No formal educ-College	0.32822	0.908	-0.5744	1.2308
	College	79.37±13.86					Primary educ-Secondary educ	-0.02337	1.000	-0.4541	0.4073
							Primary educ- College	-0.57148	0.112	-1.2181	0.0751
							Secondary educ- College	-0.54812	0.103	-1.1602	0.0640
Paternal Education	No formal education/read and write	79.07±12.62	3.751	0.011	1.503	0.214					
	Primary education	83.05±11.48									
	Secondary education	84.22±13.74									

	College	84.31±10.50									
Mother's occupation	House wife/ Daily laborer	83.12±12.94	2.892	0.057	2.765	0.064					
	Private/ Gov't employee	80.59±11.90									
	Private/self-organization	84.43±9.40									
Father's occupation	Unemployed/ Daily laborer	76.92±17.65	1.860	0.158	4.581	0.011*	Unemployed/ Daily laborer- Private/ Gov't employee	0.82589	0.008*	0.1818	1.4699
	Private/ Gov't employee	84.56±11.08					Unemployed/ Daily laborer- Private/self-organization	0.73256	0.055	-0.0126	1.4777
	Private/self-organization	84.40±10.56					Private/ Gov't employee - Private/self-organization	-0.09333	0.907	-0.6159	0.4292
Frequency of monitoring of blood glucose	≥ 1per day	82.39±12.19	3.437	0.033	4.385	0.013*	≥ 1per day- 1-2 times per week	0.69003	0.216	-0.2788	1.6589
	1-2 times per week	88.60±7.58					≥ 1per day- During follow up	-0.75651	0.049*	-1.5106	-0.0024
	During follow up	75.31±14.74					1-2 times per week- During follow up	-1.44654	0.013*	-2.6461	-0.2470

**Statistically significant= $p \leq 0.05$, SD=standard deviation*

5.7. Factors associated with HRQOL and DRQOL (by domains and summary measures)

After checking the assumptions of linear regression analysis, both simple and multivariable linear regression were done to show the significance of each independent variable in predicting the HRQoL (PedsQL GCS 4.0) and DRQoL (Diabetes module 3.2).

5.7.1. Simple linear regression for the domains of HRQoL (PedsQL GCS)

The socio-demographic variables and clinical characteristics of children and adolescents with T1DM on follow up at public hospitals were analyzed in bivariate analysis. From the socio-demographic variables & clinical characteristics the following variables were significant at different degree of p value ≤ 0.05 for different subdomains of HRQoL as mentioned in annex IV (table 13).

From the simple linear regression analysis, it was seen that the independent factors such as age, family setting, maternal educational level, father's educational level, father's occupation, number of children in the family, duration since diagnosis of DM, health facility admission in the past 6 months, family history of DM, level of HbA1C and mean FBS with level of control were candidate variables for multiple linear regression analysis in the physical functioning subdomain of HRQoL with p-value ≤ 0.05 . Age, children/adolescents' educational status, family setting, maternal educational level, father's educational level, father's occupation, family monthly income, mean FBS and individual who administers insulin medication were found significant in predicting emotional functioning, thus, included in the multivariate analysis.

Family setting, maternal educational level, father's educational level, mother's and father's occupation, frequency of insulin administration, family monthly income, number of children in the family and frequency of monitoring of blood glucose were significantly associated to social functioning subdomain HRQoL of children and adolescents, thus, included in the multivariate analysis. Also, Age, children/adolescents' educational status, family setting, maternal educational level, father's educational level, father's occupation, family monthly income, individual who administers insulin medication, family monthly income and health facility admission within the past 6 months were found significant in predicting school

functioning, thus, included in the multivariate analysis. Furthermore, Age, children/adolescents' educational status, family setting, maternal educational level, father's educational level, father's occupation, family monthly income, individual who administers insulin medication, family monthly income, health facility admission within the past 6 months and individual who administers insulin medication were found significant in predicting psychosocial functioning, thus, included in the multivariate analysis.

Independent factors such as age, children/adolescents' educational status, family setting, maternal educational level, father's educational level, father's occupation, number of children in the family, family monthly income, health facility admission in the past 6 months, individual who administers insulin medication, family history of DM and frequency of monitoring of blood glucose level were candidate variables for multiple linear regression analysis in the total of HRQoL with p-value ≤ 0.05 .

5.7.2. Multiple linear regression analysis: Factors associated with the domains of HRQOL

Physical functioning

Children and adolescents' mother's educational status, children and adolescents' father's occupation, family history of Diabetes Mellitus and mean fasting blood sugar were significantly associated factors with physical functioning sub-domain with, $F(17,188)=3.808, p<0.001$ and $R^2=18.9$.

Children and adolescents with T1DM whose mothers attended primary education and secondary education have 0.373 times and 0.235 times higher score in the physical functioning sub-domain comparing to those who can't read and write or had no formal education, respectively ($\beta =0.373, t= 3.629, p= <0.001$ and $\beta=0.235 t= 2.239, p=0.026$).

Children and adolescents with T1DM whose fathers are private and government organizations employees have 0.331 times higher score in the physical functioning sub-domain comparing to those whose fathers are unemployed or daily laborers ($\beta =0.331, t= 2.854, p= 0.005$).

Patients who have no family members with diabetes mellitus have -0.155 times fewer mean scores in the physical functioning sub-domain compared to those who have family members with DM ($\beta = -0.155$, $t = -2.225$, $p = 0.027$).

For every one mg/dl increase in the mean FBS of the patients the score of Physical Functioning subdomain was decreased by 0.206 ($\beta = -0.206$, $t = -2.947$, $p = 0.004$).

Emotional functioning

Age, children and adolescents' mothers' and fathers' educational status, duration since diagnosis of diabetes mellitus, individuals that administer insulin treatment, and frequency of monitoring of blood glucose were significantly associated factors with Emotional functioning sub-domain with $F(18,360) = 7.399$, $p < 0.001$ and $R^2 = 23.4$.

For every one-year increase in the age of the patients the score of emotional functioning sub-domain was decreased by 0.294 ($\beta = -0.294$, $t = -1.723$, $p < 0.001$).

Children and adolescents with T1DM whose mothers attended primary education and secondary education have 0.251 times and 0.207 times higher score in the emotional functioning sub-domain comparing to those who can't read and write or had no formal education, respectively ($\beta = 0.251$, $t = 3.879$, $p < 0.001$ and $\beta = 0.207$, $t = 3.147$, $p = 0.002$). Children and adolescents with T1DM whose fathers attended primary education and secondary education have 0.208 times and 0.301 times higher score in the emotional functioning sub-domain comparing to those who can't read and write or had no formal education, respectively ($\beta = 0.208$, $t = 2.492$, $p = 0.010$ and $\beta = 0.301$, $t = 3.325$, $p = 0.001$).

Children and adolescents whose insulin treatment are administered by primary care givers have 0.212 times higher score in the emotional functioning sub-domain comparing to those who self-administers insulin ($\beta = 0.212$, $t = 3.388$, $p = 0.001$).

For every single year increase in duration since the diagnosis of T1DM, patient's emotional quality of life decreases by 0.145 ($\beta = -0.145$, $t = -2.752$, $p = 0.006$).

Those patients who monitor their blood glucose level 1-2 times per week have emotional functioning sub-domain score 0.156 times those who monitor during follow up ($\beta = 0.156$, $t = 2.669$, $p = 0.008$).

Social functioning

For social functioning, children and adolescents' mothers' and fathers' educational status, father's occupation and family monthly income were significantly associated factors with social functioning sub-domain with $F(12,366)=6.486, p<0.001$ and $R^2=14.8$.

Children and adolescents with T1DM who lives with either of their parents (monoparental) have a social functioning subdomain mean score 0.354 times less than those who live with both parents (biparental) ($\beta = -0.354, t = -4.066, p < 0.001$).

Children and adolescents with T1DM whose mothers attended primary education, secondary education and college have 0.175 times, 0.315 times and 0.127 times higher score in the social functioning sub-domain comparing to those who can't read and write or had no formal education, respectively ($\beta = 0.175, t = 2.649, p = 0.008, \beta = 0.315, t = 4.619, p < 0.001$ and $\beta = 0.127, t = 1.998, p = 0.046$). On contrary, children and adolescents with T1DM whose fathers attended primary education, secondary education, and college have social functioning sub-domain mean score of 0.245 times, 0.323 times and 0.487 times lower score comparing to those who can't read and write or had no formal education, respectively ($\beta = -0.245, t = -2.968, p = 0.003, \beta = -0.323, t = -3.525, p < 0.001$ and $\beta = -0.487, t = -5.334, p < 0.001$).

Fathers of children and adolescents with T1DM whose occupation is as an employee of government or private organization have 0.185 times higher score than those who are unemployed or daily laborers in social functioning sub-domain ($\beta = 0.185, t = 2.272, p = 0.024$).

Finally, those patients from medium/higher family monthly income have social functioning subdomain score 0.114 times higher than those from low family monthly income ($\beta = 0.114, t = 2.097, p = 0.037$).

School functioning

Age, patients' father's education status and health facility admission within previous 6 months were significantly associated factors with school functioning sub-domain with $F(18,354)=5.544, p<0.001$ and $R^2=18.0$.

For every one-year increase in the age of the patients the score of school functioning was decreased by -0.355 ($\beta = -0.355$, $t=-3.791$, $p<0.001$).

Children and adolescents with T1DM whose fathers attended secondary education and college have 0.263 times and 0.201 times higher score in the school functioning sub-domain comparing to those who can't read and write or had no formal education, respectively ($\beta =0.263$, $t=2.890$, $p= 0.004$ and $\beta=0.201$, $t=2.205$, $p=0.028$).

Children and adolescents with T1DM who were not admitted in a health facility during the past 6 months had 0.265 times higher score of school functioning sub-domain than those who were admitted ($\beta = 0.265$, $t=5.285$, $p<0.001$).

Psychosocial functioning

Age, children and adolescents' mothers' and fathers' educational status and frequency of monitoring blood glucose were significantly associated factors with psychosocial functioning sub-domain with $F(18,360)=6.307$, $p<0.001$ and $R^2=20.2$.

For every one-year increase in the age of the patients the score of psychosocial functioning was decreased by 0.233 ($\beta = -0.233$, $t= -2.644$, $p=0.009$).

Children and adolescents with T1DM whose mothers attended primary education and secondary education have 0.206 times and 0.259 times higher score in the psychosocial functioning sub-domain comparing to those who can't read and write or had no formal education, respectively ($\beta =0.206$, $t= 3.211$, $p= 0.001$, and $\beta=0.259$, $t= 3.909$, $p<0.001$). Also, children and adolescents with T1DM whose fathers attended secondary education have psychosocial functioning sub-domain mean score of 0.179 times higher score than those who can't read and write or had no formal education ($\beta = 0.179$, $t= 2.001$, $p=0.046$).

Those patients who monitor their blood glucose level 1-2 times per week have psychosocial functioning sub-domain score 0.140 times those who monitor during follow up ($\beta = 0.140$, $t= 2.345$, $p=0.019$).

Total GCS 4.0 (HRQoL) score

In multivariable linear regression analysis, age, children and adolescents' with T1DM mothers' and fathers' educational status, fathers' occupation, frequency of insulin

administration, duration since diagnosis of T1DM and frequency of monitoring of blood glucose were an independent influencing factors for HRQoL scoring of children and adolescents which explain approximately to quarter of the variability of total HRQoL scores of children and adolescents ($R^2=0.216$, $F(21,357)=5.968$, $p<0.001$).

For every one-year increase in the age of the patients the score of HRQoL was decreased by 0.197 ($\beta = -0.197$, $t = -2.199$, $p=0.028$).

Children and adolescents with T1DM whose mothers attended primary education and secondary education have 0.242 times and 0.259 times higher score in the total HRQoL comparing to those who can't read and write or had no formal education, respectively ($\beta = 0.242$, $t = 3.800$, $p<0.001$, and $\beta=0.259$, $t = 3.910$, $p<0.001$).

Children and adolescents with T1DM whose fathers have occupation as an employee of an organization have HRQoL mean score of 0.170 times higher score than those who had no occupation or are daily laborers ($\beta = 0.170$, $t = 2.082$, $p=0.038$).

Patients who administer insulin three times per day have total HRQoL mean score 0.132 times less than those who take twice per day ($\beta = -0.132$, $t = -2.723$, $p=0.007$). Together with this, those patients who monitor their blood glucose level 1-2 times per week have HRQoL score 0.165 times those who monitor during follow up ($\beta = 0.165$, $t = 2.769$, $p=0.006$).

For every one-year increase in duration since the diagnosis of T1DM, patient's HRQoL decreases by 0.101 ($\beta = -0.101$, $t = -1.882$, $p=0.050$).

Table 10: Summary of multiple linear regression on HRQoL with socio-demographic and clinical characteristics among children and adolescents with T1DM on follow up at selected public hospital, Addis Ababa, Ethiopia, 2021

		Physical functioning			Emotional functioning			Social Functioning			School Functioning			Psychosocial functioning			Total HRQoL score		
		B	β (95% CI)	P-value	B	β (95% CI)	P-value	B	β (95% CI)	P-value	B	β (95% CI)	P-value	B	β (95% CI)	P-value	B	β (95% CI)	P-value
Age		0.303	0.093 (-0.169,0.775)	0.207	-1.420	-0.294 (-2.164,-0.676)	<0.001 *	-	-	-	-1.717	-0.355 (-2.607, -0.826)	<0.001 *	-0.756	-0.233 (-1.319, -0.194)	0.009*	-0.597	-0.197 (-1.131, -0.063)	0.028 *
Family setting	Biparental (Ref)																		
	Monoparental	3.958	0.147 (-2.323,10.240)	0.215	5.383	0.139 (-1.495,12.260)	0.125	-8.023	-0.354 (-11.904, -4.143)	<0.001*	0.094	0.002 (-6.556, 6.743)	0.978	-0.951	-0.037 (-5.367,3.464)	0.672	-0.256	-0.011 (-4.419,3.908)	0.904
	Other	-	-	-	7.618	0.084 (-3.605,18.840)	0.183	-3.689	-0.069 (-10.361,2.984)	0.278	-4.475	-0.048 (-16.173, 7.222)	0.452	1.048	0.017 (-6.555,8.651)	0.787	3.206	0.056 (-3.900,10.313)	0.376
Mother's Education status	No formal education/ read and write (Ref)																		
	Primary education	9.363	0.373 (4.274, 14.452)	<0.001 *	9.771	0.251 (4.897,14.646)	<0.001 *	3.982	0.175 (1.027, 6.938)	0.008*	2.288	0.059 (-2.711,7.287)	0.369	5.399	0.206 (2.092,8.705)	0.001*	5.926	0.242 (2.859,8.994)	<0.001*
	Secondary education	5.131	0.235 (0.6109,652,)	0.026*	7.479	0.207 (2.811,12.146)	0.002*	6.681	0.315 (3.836,9.525)	<0.001*	4.357	0.121 (-0.413,9.127)	0.073	6.290	0.259 (3.126,9.455)	<0.001 *	5.876	0.259 (2.920,8.831)	<0.001*
	College	-9.920	-0.032 (-6.590, 4.751)	0.749	-4.334	-0.094 (-10.190,1.521)	0.146	3.447	0.127 (0.055,6.840)	0.046*	-5.307	-0.116 (-11.206,0.593)	0.078	-2.431	-0.078 (-6.351,1.489)	0.223	-2.055	-0.071 (-5.718,1.609)	0.271
Father's Education status	No formal education/ read and write (Ref)																		
	Primary education	- 5.990	-0.208 (-12.642,0.662)	0.077	9.420	0.208 (2.253, 16.588)	0.010*	-6.499	-0.245 (-10.804, -2.193)	0.003*	6.302	0.139 (-0.962,13.565)	0.089	3.082	0.101 (-1.739,7.903)	0.209	3.073	0.108 (-1.443,7.588)	0.182
	Secondary education	- 2.547	-0.113 (-8.781,3.687)	0.421	11.594	0.301 (4.742, 18.446)	0.001*	-7.301	-0.323 (-11.374, -3.228)	<0.001*	10.097	0.263 (3.226,16.968)	0.004*	4.649	0.179 (0.080,9.218)	0.046*	2.458	0.101 (-1.804,6.719)	0.257

	College	-4.803	-0.195 (-11.542,1.935)	0.161	6.219	0.151 (-0.921, 13.360)	0.088	-11.724	-0.487 (-16.046, -7.402)	<0.001*	8.183	0.201 (0.885,15.481)	0.028*	0.963	0.035 (-3.888,5.813)	0.697	-1.119	-0.043 (-5.625,3.386)	0.625
Father's Occupation	Unemployed/ Daily laborer (Ref)																		
	Private/ Gov't employee	7.216	0.331 (2.228,12.204)	0.005*	1.903	0.055 (-3.527,7.334)	0.491	3.721	0.185 (0.501,6.941)	0.024*	-1.665	-0.049 (-7.170,3.839)	0.552	1.002	0.043 (-2.638,4.642)	0.589	3.682	0.170 (0.204,7.160)	0.038*
	Private/self-organization	5.534	0.204 (-0.119,11.187)	0.055	3.687	0.078 (-2.453,9.826)	0.238	.342	0.012 (-3.325,4.009)	0.855	-3.158	-0.067 (-9.346,3.030)	0.316	0.211	0.007 (-3.889,4.311)	0.920	3.515	0.118 (-0.350,7.380)	0.075
Frequency of insulin administration	Twice(ref)																		
	Three times	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-10.566	-0.132 (-18.198, -2.935)	0.007*
Who administers insulin	Self (ref)																		
	Primary care giver	-	-	-	7.429	0.212 (3.161,11.696)	0.001*	-	-	-	-2.502	-0.072 (-6.990,1.986)	0.274	2.038	0.087 (-0.869,4.946)	0.169	1.430	0.065 (-1.280,4.139)	0.300
Family monthly income	Low(ref)																		
	Medium/High	-	-	-	-	-	-	2.592	0.114 (0.161,5.024)	0.037*	0.514	0.013 (-3.636,4.665)	0.808	1.211	0.046 (-1.544,3.967)	0.388	-0.065	-0.003 (-2.665,2.535)	0.961
Duration of DM		-	-	-	-0.718	-0.145 (-1.230,-0.206)	0.006*	-	-	-	-	-	-	-	-	-	-0.315	-0.101 (-0.644, -0.014)	0.050*
Admission in the past 6 months	Yes (ref)																		
	No	-	-	-	-	-	-	-	-	-	10.037	0.265 (6.302,13.772)	<0.001*	-	-	-			
Family history of DM	Yes (ref)																		
	No	-4.241	-0.155 (-8.000,-0.481)	0.027*	-	-	-	-2.187	-0.091 (-4.487,0.114)	0.062	-	-	-	-	-	-	-2.045	-0.079 (-4.524,0.435)	0.106

Mean FBS		-0.030	-0.206 (-0.050,-0.010)	0.004*	-	-	-	-	-	-	-	-	-	-	-	-			
Frequency of monitoring of blood glucose	During follow up (Ref)																		
	≥ 1per day	-	-	-	2.502	0.042 (-4.533, 9.538)	0.485	-	-	-	3.915	0.066 (-3.352,11.182)	0.290	1.837	0.046 (-2.969,6.642)	0.453	1.983	0.053 (-2.512,6.478)	0.386
	1-2 times per week	-	-	-	14.726	0.156 (3.814, 25.639)	0.008*	-	-	-	9.747	0.104 (-1.444,20.939)	0.088	8.897	0.140 (1.465,16.330)	0.019*	9.794	0.165 (2.837,16.752)	0.006*
		Adjusted R ² =18.9			Adjusted R ² =23.4			Adjusted R ² =14.8			Adjusted R ² = 18.0			Adjusted R ² = 20.2			Adjusted R ² =21.6		

B= Unstandardized regression coefficient, β = Standardized regression coefficient, *Statistically significant= p≤ 0.05, ref. = Reference category

5.7.3. Simple linear regression for the domains of DRQoL (PedsQL Diabetes Module)

The socio-demographic variables and clinical characteristics of children and adolescents with T1DM on follow up at public hospitals were analyzed in bivariate analysis. From the socio-demographic variables & clinical characteristics the following variables were significant at different degree of p value ≤ 0.05 for different subdomains of HRQoL (see annex IV (table 13)).

From the simple linear regression analysis, it was seen that the independent factors such as age, children and adolescents' educational status, family setting, maternal educational level, father's educational level, father's occupation, frequency of insulin administration, individual who administers insulin medication and mean FBS were candidate variables for multiple linear regression analysis in the diabetes symptom subdomain of HRQoL with p-value ≤ 0.05 . Also, age, children and adolescents' educational status, family setting, maternal educational level, father's educational level, father's occupation, individual who administers insulin, duration since diagnosis of DM, attending health education and frequency of monitoring of blood glucose level were found significant in predicting about treatment barriers, thus, included in the multivariate analysis.

Age, children and adolescents' educational status, family setting, maternal educational level, mother's occupation and type of individual who administers insulin were found significant in predicting about treatment adherence, thus, included in the multivariate analysis. Age, children/adolescents' educational status, family setting, maternal educational level, father's educational level, father's occupation, family monthly income, individual who administers insulin medication, duration since the diagnosis of DM and frequency of monitoring blood glucose level were found significant in predicting worry sub-domain, thus, included in the multivariate analysis. Furthermore, maternal educational level, father's educational level, father's occupation, and attending health education during follow-up were found significant in predicting communication, thus, included in the multivariate analysis.

Independent factors such as age, children/adolescents' educational status, family setting, maternal educational level, father's educational level, father's occupation, frequency of taking insulin medication, type of individual who administers insulin medication, attending

diabetic health education and frequency of monitoring of blood glucose level were candidate variables for multiple linear regression analysis in the total of DRQoL with p-value ≤ 0.05 .

5.7.4. Multiple linear regression analysis: Factors associated with the domains of DRQOL

Diabetes symptoms

Children and adolescents' educational status, Children and adolescents' mother's educational status, father's occupation, type of individual that administer insulin and mean fasting blood sugar were significantly associated factors with diabetes symptoms sub-domain with, $F(17,315) = 6.970$, $p < 0.001$ and $R^2 = 23.4$.

Children and adolescents with T1DM who attended primary education have 0.228 times lower score in the diabetes symptom sub-domain comparing to those who are kindergarten students ($\beta = -0.228$, $t = -2.328$, $p = < 0.001$).

Children and adolescents with T1DM whose mothers attended primary education and secondary education have 0.345 times and 0.312 times higher score in the diabetes symptoms sub-domain comparing to those who can't read and write or had no formal education, respectively ($\beta = 0.345$, $t = 5.001$, $p = < 0.001$ and $\beta = 0.312$, $t = 4.512$, $p < 0.001$).

Patients whose fathers are private and government organizations employees and those who have private/self-organization have 0.268 times and 0.184 times higher score in the diabetes symptoms sub-domain comparing to those whose fathers are unemployed or daily laborers, respectively ($\beta = 0.268$, $t = 3.159$, $p = 0.002$ and $\beta = 0.184$, $t = 2.591$, $p = 0.010$).

Patients who get their insulin administration by their primary care giver have 0.201 times higher mean scores in the diabetes symptoms sub-domain compared to those who take insulin by themselves ($\beta = 0.201$, $t = 2.961$, $p = 0.003$).

For every one mg/dl increase in the mean FBS of the patients the score of diabetes symptoms mean score was decreased by 0.033 ($\beta = -0.033$, $t = -3.019$, $p = 0.003$).

Treatment barriers

Children and adolescents' mothers' educational status, individual who administers insulin medication, and frequency of monitoring of blood glucose were significantly associated factors with treatment barriers sub-domain with $F(19,359)= 3.976$, $p<0.001$ and $R^2=13.0$.

Children and adolescents with T1DM whose mothers attended primary education and secondary education have 0.208 times and 0.209 times higher score in the treatment barrier sub-domain comparing to those who can't read and write or had no formal education, respectively ($\beta =0.208$, $t=3.141$, $p=0.002$ and $\beta =0.209$, $t=3.046$, $p=0.002$).

Children and adolescents whose insulin treatment are administered by primary care givers have 0.146 times higher score in this sub-domain comparing to those who self-administers insulin ($\beta =0.146$, $t= 2.219$, $p=0.027$).

Those patients who monitor their blood glucose level daily and 1-2 times per week have better treatment barrier sub-domain score with 0.176 times and 0.187 times than those who monitor during follow up ($\beta = 0.176$, $t=2.733$, $p=0.007$ and $\beta = 0.187$, $t=3.020$, $p=0.003$).

Treatment adherence

For treatment adherence, age of patients, children and adolescents' mothers' educational status and occupation were significantly associated factors with social functioning sub-domain with $F(10,368)= 5.712$, $p<0.001$ and $R^2=11.1$.

For every one-year increase in the age of the patients, mean score of treatment adherence was increased by 0.238 ($\beta = 0.238$, $t= 2.671$, $p=0.008$).

Children and adolescents with T1DM whose mothers attended secondary education have 0.221 times higher score in treatment adherence sub-domain comparing to those who can't read and write or had no formal education, ($\beta =0.221$, $t=3.348$, $p= 0.001$).

Patients of mothers whose occupation is as an employee of government or private organization have lower treatment adherence score than those who are unemployed or daily laborers by 0.144 times ($\beta = -0.144$, $t=-2.454$, $p=0.015$).

Worry

Age, patients' mothers' education status and fathers' occupation were significantly associated factors with worry sub-domain with $F(19,359)= 6.430$, $p<0.001$ and $R^2=21.4$.

For every one-year increase in the age of the patients the score of worry sub-domain was decreased by 0.311 ($\beta = -0.311$, $t= -3.503$, $p=0.001$).

Children and adolescents with T1DM whose mothers attended primary and secondary education have 0.155 times and 0.154 times better mean score in worry sub-domain comparing to those who can't read and write or had no formal education, respectively ($\beta =0.155$, $t=2.455$, $p= 0.015$ and $\beta=0.154$ $t= 2.357$, $p= 0.019$).

Patients of fathers who own private organization have better worry sub-domain mean score than those who are unemployed or daily laborers by 0.167 times ($\beta = 0.167$, $t=2.568$, $p=0.011$).

Communication

For the communication sub-domain, only mothers' educational status and attending diabetic health education during follow up were significantly associated factors $F(6,372)= 8.058$, $p<0.001$ and $R^2=10.1$.

Children and adolescents with T1DM whose mothers attended primary secondary education have 0.220 times higher mean communication score than those who can't read and write or had no formal education, ($\beta =0.220$, $t= 3.428$, $p= 0.001$).

Also, children and adolescents with T1DM who didn't attend diabetic health education have communication sub-domain mean score -0.277 times lower score than those who did attend ($\beta= -0.277$, $t= -5.402$, $p<0.001$).

Total Diabetes module 3.2 (DRQoL) score

In multivariable linear regression analysis, educational status of patients, children and adolescents' with T1DM mothers' educational status, fathers' occupation, the type of individual administering insulin medication, attending diabetes health education and mean FBS were an independent influencing factors for DRQoL scoring of children and adolescents which explain 20.3% of the variability of total DRQoL scores of children and adolescents ($R^2=0.203$, $F(20,312)= 5.225$, $p<0.001$).

Children and adolescents with T1DM who did not start or attended any education have 0.134 times lower score in total DRQoL comparing to those who are kindergarten students ($\beta = -0.134$, $t = -2.494$, $p = 0.013$).

Children and adolescents with T1DM whose mothers attended primary education and secondary education have 0.300 times and 0.343 times higher score in the total DRQoL comparing to those children and adolescents of mothers who can't read and write or had no formal education, respectively, ($\beta = 0.300$, $t = 4.233$, $p < 0.001$, and $\beta = 0.343$, $t = 4.836$, $p < 0.001$).

Children and adolescents with T1DM whose fathers have occupation as an employee of an organization or have their own private organization have DRQoL mean score of 0.242 times and 0.188 times higher total mean score than those who had no occupation or are daily laborers, respectively, ($\beta = 0.242$, $t = 2.773$, $p = 0.006$ and $\beta = 0.188$, $t = 2.567$, $p = 0.011$).

Patients who get their insulin medication injection by primary care givers have total DRQoL mean score 0.136 times higher than those who administer by themselves ($\beta = 0.136$, $t = 2.950$, $p = 0.050$).

In addition to this, those patients who didn't attend diabetic health education have DRQoL score 0.129 times those who did ($\beta = -0.129$, $t = -2.479$, $p = 0.014$).

Finally, for every one mg/dl increase in mean FBS level, patient's DRQoL decreased by 0.130 ($\beta = -0.130$, $t = -2.422$, $p = 0.016$).

Table 11: Summary of multiple linear regression on DRQoL with socio-demographic and clinical characteristics among children and adolescents with T1DM on follow up at selected public hospital, Addis Ababa, Ethiopia, 2021

		Diabetes symptom			Treatment barriers			Treatment adherence			Worry			Communication			Total DM score		
		B	β (95% CI)	P-value	B	β (95% CI)	P-value	B	β (95% CI)	P-value	B	β (95% CI)	P-value	B	β (95% CI)	P-value		β (95% CI)	P-value
Age		0.140	0.030 (-0.734, 1.015)	0.752	-0.544	-0.127 (-1.333,0.246)	0.176	1.253	0.238 (0.331, 2.176)	0.008*	-1.860	-0.311 (-2.904, -0.816)	0.001*	-	-	-	0.177	0.049 (-0.509,0.864)	0.612
Child/ adolescent educational status	Kindergarten (Ref)																		
	Primary	-8.119	-0.228 (-14.980, -1.258)	0.021*	6.127	0.187 (-.074, 12.327)	0.053	2.516	0.063 (-5.118, 10.150)	0.517	0.071	0.002 (-8.142, 8.284)	0.986	-	-	-	-	-0.070 (-7.244, 3.466)	0.488
	Secondary	-7.588	-0.185 (-17.151, 1.976)	0.120	5.612	0.145 (-3.273, 14.497)	0.215	-3.614	-0.076 (-14.382, 7.153)	0.510	-2.403	-0.045 (-14.152, 9.346)	0.688	-	-	-	-	-0.074 (-9.777, 5.148)	0.542
	Not started	-16.020	-0.076 (-37.734, 5.694)	0.148	-9.833	0-.080 (-22.525, 2.859)	0.128	-13.216	-0.088 (-28.674, 2.242)	0.094	8.987	0.053 (-7.821, 25.794)	0.294	-	-	-	-21.467	-0.134 (-38.406, -4.529)	0.013*
Mother's Education status	No formal education/read and write (Ref)																		
	Primary education	12.261	0.345 (7.437, 17.085)	<0.001*	7.202	0.208 (2.692, 11.711)	0.002*	2.978	0.070 (-2.211, 8.168)	0.260	7.442	0.155 (1.481, 13.403)	0.015*	4.577	0.085 (-2.053,11.207)	0.175	8.130	0.300 (4.351, 11.910)	<0.001*
	Secondary education	10.665	0.312 (6.014, 15.316)	<0.001*	6.713	0.209 (2.378, 11.047)	0.002*	8.706	0.221 (3.593, 13.818)	0.001*	6.890	0.154 (1.142, 12.638)	0.019*	11.015	0.220 (4.696, 17.334)	0.001*	8.938	0.343 (5.301, 12.574)	<0.001*
	College	4.747	0.108 (-1.014, 10.508)	.0106	2.491	0.061 (-2.881, 7.863)	0.362	0.523	0.010 (-6.327, 7.373)	0.881	-3.908	-0.068 (-11.054, 3.238)	0.283	1.866	0.029 (-5.711, 9.443)	0.629	1.316	0.039 (-3.184, 5.816)	0.565
Mother's Occupation	House wife/Daily laborer (Ref)																		
	Private/Gov't employee	-	-	-	-	-	-	-5.890	-0.144 (-10.609,-1.170)	0.015*	-	-	-	-	-	-	-	-	-
	Private/self-organization	-	-	-	-	-	-	-3.355	-0.006 (-6.412, 5.703)	0.908	-	-	-	-	-	-	-	-	-
Father's Occupation	Unemployed/Daily laborer (Ref)																		
	Private/Gov't employee	8.677	0.268 (3.273, 14.081)	0.002*	2.867	0.094 (-2.221, 7.955)	0.269	-	-	-	3.883	0.091 (-2.803, 10.569)	0.254	2.497	0.052 (-2.801, 7.795)	0.355	5.986	0.242 (1.738, 10.234)	0.006*
	Private/self-	7.926	0.184	0.010*	3.434	0.081	0.236	-	-	-	9.793	0.167	0.011*	6.001	0.091	0.096	6.162	0.188	0.011*

	organization		(1.906, 13.946)			(-2.254, 9.122)						(2.292, 17.293)			(-1.077,13.079)			(1.440, 10.884)	
Who administ ers insulin	Self (ref)																		
	Primary care giver	6.627	0.201 (2.223, 11.030)	0.003*	4.531	0.146 (0.515, 8.547)	0.027*	-0.905	-0.024 (-5.724, 3.914)	0.712	1.646	0.038 (-3.685, 6.976)	0.544	-	-	-	3.401	0.136 (0.031,6.833)	0.050*
Attendi ng Health Educati on	Yes(ref)																		
	No	-	-	-	-2.791	-0.087 (-6.082, 0.500)	0.096	-	-	-	-	-	-	-	-0.277 (-18.779, - 8.756)	<0.00 1*	- 3.361	-0.129 (-6.029, - 0.693)	0.014*
Frequen cy of monitori ng of blood glucose	During follow up (Ref)																		
	≥ 1per day	-	-	-	9.294	0.176 (2.606,15.983)	0.007*	-	-	-	7.575	0.103 (-1.248, 16.397)	0.092	-	-	-	- 5.463	-0.095 (-12.305, 1.378)	0.117
	1-2 times per week	-	-	-	15.734	0.187 (5.487,25.981)	0.003*	-	-	-	7.761	0.066 (-5.830,21.352)	0.262	-	-	-	- 0.627	-0.006 (-12.745, 11.491)	0.919
Mean FBS		-.033	-0.158 (-0.054, - 0.011)	0.003*	-	-	-	-	-	-	-	-	-	-	-	-	- 0.020	-0.130 (-.037, -.004)	0.016*
		Adjusted R ² =23.4			Adjusted R ² =13			Adjusted R ² =11.1			Adjusted R ² =21.4			Adjusted R ² =10.1			Adjusted R ² =21.3		

B= Unstandardized regression coefficient, β = Standardized regression coefficient, *Statistically significant= $p\leq 0.05$, ref. = Reference category

6. Discussion

Health related quality of life is important in many aspects for diabetes patients and health care providers. This study evaluated the level of quality of life among children and adolescents with T1DM on follow up at public endocrine clinics and determinant factors for their level of quality of life.

The result of this study revealed that, lower mean scores in sub-domains of emotional and school function of HRQoL, reported in a similar pattern in both self-reports and parent proxy reports of HRQoL of children and adolescents. and they had better score in social function of HRQoL sub-domain. These findings are similar to the findings of the studies done in Addis Ababa and Turkey (14,15). The reason for lower scores of the emotional functioning in the current study might be lower health education coverage and as age increases the very nature of adolescence resulted in more worry about children and adolescent's disease condition. Poor parents' education and frequent hospital admission and school day hospital follow up and school missing due to diabetes may have resulted for the lower score in school functioning of children and adolescents with T1DM. The better scores in a social functioning sub-domain might be the fact that in Ethiopian culture, every individual is wholehearted about patients and support their patients rather than isolating.

From the HRQoL domain, physical functioning, emotional functioning, school functioning, psychosocial functioning and total HRQoL self- reports of children and adolescents and parent proxy reports were statically different ($P < 0.001$), parent proxy reports of children and adolescents HRQoL were lower than self-reports of children and adolescents. This was similar to previous studies finding in Addis Ababa, Kuwait and Greek (15,24,30). The explanation for the differences might be the perception of primary care givers, which is more than their children and adolescents. Also, since more responsibility on the overall health of children and adolescents with T1DM fall on the primary care givers they are more likely to respond lesser score on the impact towards quality of life of the children and adolescents.

The study found that, the mean score of HRQoL was high among children's respondents than adolescents. This discrepancy may be due to the fact that most of the children were taken care of by their primary care givers more than older children and adolescents. Also,

adolescents tend to worry more than children which resulted in lower HRQoL score. This finding is also seen in the study conducted in Turkey (14).

It was found that number of children and adolescents in a household has a significant difference in HRQoL. Respondents living with lower than four children and adolescents had better HRQoL compared to those living with four or more children and adolescents. This finding is also aligned with a study conducted in Addis Ababa and Turkey (14,15).

Furthermore, children, adolescents and primary care givers education status and attending health education have resulted in mean difference of the total HRQoL. Children and adolescents who are kindergarten students have better score than those who are secondary school students. This study findings were consistent with the finding of a study done in Egypt and on contrary a study done in Greek showed that parents education level had no significant effect on QoL of children and adolescents with diabetes (27,30). This study finding could be due to the fact that adolescents worry more than children and are in the developmental phase of more stress. Children and adolescents primary care givers with better educational status corresponded to better score in HRQoL.

From the multiple linear regression result, it was found that mother's educational status has a positive statistically significant association with all subdomains and total HRQoL which was consistent with studies done in Egypt (27) and it was inconsistent with studies conducted in Greek (30) that mothers educational level was not associated with HRQoL of children and adolescents. This might be explained by the fact that most mothers in Ethiopia are house wives and have responsibility of taking care of their children and adolescents. Fathers' educational status was also significantly associated with school, psychosocial and total HRQoL.

In this study, age was associated with emotional functioning, school functioning, psychosocial functioning and total HRQoL of children and adolescents where, as age increases QoL decrease which was consistent with studies done in Egypt (27) and Greek origin (30) and it was inconsistent with studies conducted in Kuwait (24) and Turkey (14) revealed that age was positively associated with HRQoL of children and adolescents and studies conducted in Saudi Arabiya showed older age was associated with poorer HRQoL

scoring (9). This might be explained related to the discrepancies with primary care giver's supports of young age and older age children and adolescents. The fact that family supports and needs of children for support were different related to stage of development of children. The very developmental and physiological changes in the children and adolescents also might explain this finding.

Fathers' occupation was significantly associated with physical functioning, social functioning and total HRQoL of children and adolescents with T1DM. children and adolescents of Fathers who are employed and working have better QoL score than those whose fathers have no job or are daily laborers. This finding indicates that employment with good income from fathers might have resulted better care and QoL outcome. Thus, secure jobs in a society does positively affect QoL of children and adolescents with T1DM. this finding is consistent with the findings of study done in Egypt and Ethiopia (15,27).

Furthermore, health related quality of life of children and adolescents was significantly associated with frequency of insulin administration, duration since diagnosis of T1DM and frequency of monitoring of blood glucose. Children who took more frequent insulin medication, more duration since diagnosis of DM and those who measure their blood glucose level less frequently have lower score of QoL than those who frequently monitor their DM and take less aggressive insulin treatment. This finding was also seen in studies done in global TEENs study (13), a study done in Kuwait (24) and was in contrary to a study done in Italy (23). This might be due to the fact that as the duration the disease increases more complications are likely to occur and frequent insulin treatment (3 times per day) is for those who have uncontrolled glycemic control, thus lower HRQoL.

Gender was not statistically significant predictors of children and adolescents total HRQoL. Which was in agreement with studies done in Saudi Arabia and Kuwait (9,24) and it was in contrary to studies conducted in Egypt and Greek that gender had no effect on HRQoL (27,30).

This study revealed that, children and adolescents scores in diabetes symptoms and treatment adherence subdomain of DRQoL were low, reported in a similar pattern in both self-reports and parent proxy reports of DRQoL of children and adolescents and they had better score in

communication and worry sub-domain scores which was in line with studies done in Turkey (14). These results are different from the results seen in another study done in Addis Ababa where treatment barrier and communication are sub-domains with lowest score (15). Poor diabetes symptom score might be due to poor glycemic control results seen in the reports of children and adolescents' medical records. Inadequate health education and training of children and adolescents on self-medication and monitoring of blood glucose for the diabetic care might attributed for lower score in treatment adherence. Because most of patients and health professionals speak the same language and parents does involve in the communication with health care providers, communication score became high from all subdomains of DRQoL.

In this study self- reports of children and adolescents and parent proxy reports of diabetes symptoms, treatment barriers sub-domain and total DRQoL of children and adolescents were statically different. parent proxy reports of children and adolescents DRQoL were lower than self-reports of children and adolescents which was similar to previous studies findings (14,15,23,24). This might be explained by the burden of diabetes on parents, responsibilities and involvement of parents to their children forced them to perceive more likely than their children that diabetes influence their children's quality of life.

The study found that, the mean score of DRQoL was high among children's respondents than adolescents. This discrepancy may be due to the fact that most of the children were taken care of by their primary care givers more than older children and adolescents. Also, adolescents tend to worry more than children which resulted in lower DRQoL score. This finding is also seen in the study conducted in Addis Ababa(15) and was in contrary to the study done in Turkey (14).

The study found that, the mean score difference of DRQoL was seen among health education attended respondents than those who didn't which was seen in the study conducted in Iran (41). This discrepancy may be due to the fact that health education and promotion plays a crucial role for respondents to understand their medical condition and take a good care of themselves.

It was found that number of children and adolescents in a household has a significant difference in DRQoL. Respondents living with lower than four children and adolescents had better DRQoL compared to those living with four or more children and adolescents. This finding is also aligned with a study conducted in Bangladesh. This indicates when more children and adolescents live a household the burden to support all the children will increase and children and adolescents with DM in the household might get suboptimal care from their primary care givers.

From one-way ANOVA result, children, adolescents and mother's educational status, family setting, father's occupation and frequency of monitoring blood glucose level have resulted in mean difference of the total DRQoL. Children and adolescents who are kindergarten students have better score than those who are secondary school students. this could be due to the fact that adolescents worry more than children and are in the developmental phase of more stress. Children and adolescents' mothers with better educational status corresponded to better score in DRQoL. This indicates that mother's education in general is very important to improve quality of life of children and adolescents with T1DM since they are the one who primarily take care of the children and adolescents. Furthermore, like studies done in Brazil, Kuwait and Egypt, monitoring blood glucose level frequently resulted in a mean score higher than those who check their blood glucose level only during follow up (6,24,27). This might be due to the fact that early detection of abnormal blood glucose level findings and correcting them frequently did play significant role for improving DRQoL of children and adolescents.

When we compared the relationship between children/adolescent's education status and DRQoL of the patients with T1DM, kindergarten student patients received higher scores in total DRQoL than patients who didn't started any academic education. The finding from this study is in line with results from institution-based study in Greece (30) and Turkey (14).

Children and adolescent's with T1DM whose mothers attended primary and secondary education have a better DRQoL scores in all sub-domains of DRQoL than those who have no formal education or only read and write. The finding of the study conducted in Egypt and Ethiopia on DRQoL showed that DRQoL was significantly associated with educational status of mothers of children and adolescents with T1DM (15,27). This implying that patients with

T1DM whose mothers have better educational status have better ability to make decision on child-care, better understanding about the disease, its complication and treatment.

In this study, age was associated with worry and treatment adherence sub-domains of DRQoL of children and adolescents which was consistent with studies done in Egypt (27) and Greek origin (30) and it was inconsistent with studies conducted in Kuwait (24) and Turkey (14) revealed that age was positively associated with treatment adherence of children and adolescents and studies conducted in Iran (41) showed age wasn't associated with DRQoL scoring. For a reason that young age children might be getting special care from parents in self-managements of diabetes, they scored lower in treatment adherence sub-domain but higher in the total score of DRQoL when compared to older children. And this also might be explained related as older age children and adolescent's awareness on their disease condition and treatment schedule improvement as their age increases.

This study showed that father's occupation was statistically significant predictors of children and adolescents total DRQoL. Children and adolescents of fathers who had no occupation/are daily laborers reported lower DRQoL scores compared to those who have job. The possible justification might be due to fathers who have work are likely to generate income and can take care of their children, thus improved DRQoL.

In similar to study conducted in Egypt (27), this study showed that health education about diabetes had significant positive associations with QoL of children and adolescents with diabetes. Children and adolescents who were participating in health education were score better QoL than children and adolescent who was not participating in health education of diabetes. So, health professional should provide health education on diabetes self-management and diabetes cares of children and adolescents to improve their QoL. Furthermore, type of individuals that administer insulin medication are significantly associated with DRQoL. Those children and adolescents who get their insulin administration by their primary care giver have better QoL than those self-administer. This indicates that due to poor health education service children and adolescents are might not be appropriately administering insulin medication and more burden falls to their primary care givers.

In this study, it was observed that as mean FBS level increases, DRQoL score decreases, this finding was in agreement with previous studies (14,15) and it was in contrary to previous studies(10,27) thus revealed that glycemic control had effect on QoL. The result of the current study could be explained by the fact that children and adolescents who had well controlled blood glucose level was associated with minimized episodes of common acute complication of DM of children and adolescents, like hypoglycemia, hyperglycemia and DKA and also decreased symptoms of diabetes.

In general, in comparison with Greek, Iranian, Ethiopia, Turkey studies (14,15,30,41), this study on children and adolescents with type 1 diabetes reported higher HRQoL and DRQoL scores in all sub-domains, according to self- and proxy-reports using the PedsQL™ 4.0 Generic Core Scales and the PedsQL™ 3.2 Diabetes Module. While Greek and Ethiopia studies' children and adolescents rated their HRQOL significantly higher than their parents, there was no statistically-significant difference between child self-report and parent proxy-report in Iranians'.

7. Strengths and Limitations of the study

As strength, the study was conducted in such a way that it involved all public hospitals with pediatrics endocrine service in order to maximize representative of the study. Children and adolescents with T1DM quality of life were assessed using both generic instrument (PedsQL™ 4.0 Generic Core Scales) and disease-specific one (PedsQL™ 3.2 Diabetes Module) to increase detection of quality of life in different dimensions. Both the sub-domains and the summary measures were reported which will help to avoid the information loss that could have been occurred in reporting only the summary measures.

This study is not without limitations. One of the limitations is the absence of control groups in assessing generic core scales (HRQoL) for comparison. In addition, other quality of life determining factors like behavioral risks (coping, depression or other psychiatric states) and health service related are not included in this study. Since the study was done in institutions, it might not be generalized to children and adolescents with T1DM in the general population. Moreover, medical record reports (FBS and HgA1C) were secondary data and results from different laboratory taken by different individuals resulting in measurement bias. Furthermore, the study design was cross-sectional which measures the determinants and outcome at the same time and cannot establish at cause-and-effect relationship. Age classification of the study is not according to WHO standard which resulted in missing age 19 years old adolescents in the study.

8. Conclusions and Recommendations

8.1. Conclusions

In general, in HRQoL, emotional and school functions were somewhat low, while scores on the sub-domain of social function were higher. Similarly, there were lower score in treatment adherence, and diabetes symptoms, and better score in communication of DRQoL of children and adolescents. Age, mothers' and fathers' educational status, fathers' occupation, frequency of insulin administration, duration since diagnosis of T1DM and frequency of monitoring of blood glucose were significantly associated with HRQOL among children and adolescents with T1DM. Furthermore, educational status of patients, mothers' educational status, fathers' occupation, the type of individual administering insulin medication, attending diabetes health education and mean fasting blood sugar were significantly associated with DRQoL of children and adolescents with T1DM. There was a negative relationship between age, duration since diagnosis of diabetes and health related quality of life, and a positive relationship between attending health education and the quality of life of the children and adolescents. An evaluation of the quality of life after a diagnosis of diabetes can be used to detect early and to combat problems which children and adolescents may encounter.

8.2. Recommendations

From the study findings, the following are recommended.

For health care providers/health professionals in (SPHMMC, TASH, Y12HMC and ZMH): Understanding the effect of diabetes on QoL is important for day-to-day clinical management in order to improve the QoL and health outcomes of those with diabetes. So;

- Providing health education program about diabetes mellitus including demonstration on medication administration considering patient's age and condition and it should be sustainable and long lasting to improve quality of life of children and adolescents.
- In order to improve the quality of life of children and adolescent with T1DM, assessments tools for HRQoL and DRQoL of patients should be included in the routine follow up care.

- Considering flexible appointment and follow up services to decrease school absenteeism is recommended.

For Ministry of Health:

- Ministry of health should pay necessary attention for this issue by incorporating tools for assessments of QoL in treatment guidelines.
- Improving health education programs regarding diabetes mellitus.

For Ministry of Education: There must be support from schools in the process of adaptation to diabetes as it relates to school life.

- There must be support from schools in the process of adaptation to diabetes as it relates to school life. Measures such as providing a suitable environment for blood glucose monitoring and giving injections, education of the peer group on diabetes with the aim of reducing the child's feeling of being left out and making school programs more flexible may reduce absenteeism.

For researchers

- Researchers should conduct further research using designs that show temporal relationship, since cross sectional study design couldn't indicate temporal relationship between Quality of life and associated factors among children and adolescents with DM.
- Researchers should conduct more studies by including other factors that may determine quality of life further than what has been examined in this study and explore more by using qualitative studies.
- Since this study is conducted in few hospitals further nation-wide community-based researches needed to assure generalizability of the findings.

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10. Annexes

10.1. Annex I: Informed Consent form

This Informed Consent Form is for children, adolescents with Type-I Diabetes Mellitus and their respective care givers who attend pediatrics endocrine clinics at SPHMMC, TASH, Y12MC, and ZMH and who we are inviting to participate in research on quality of life of their children. The title of our research project is "Assessment of Quality of Life and its associated factors among Children and Adolescents with Type I Diabetes Mellitus attending follow-up at Pediatrics Endocrine Clinics of Selected Public Hospitals, Addis Ababa, Ethiopia"

Research Title: Assessment of Quality of Life and its associated factors among Children and Adolescents with Type I Diabetes Mellitus attending follow-up at Pediatrics Endocrine Clinics of Selected Public Hospitals, Addis Ababa, Ethiopia

Principal Investigator (PI): Bisrat Tamene Bekele

Part I: Information Sheet

1. Introduction

My name is_____. I am here on behalf of Bisrat Tamene, who is currently a Master of public health student in SPHMMC, who is now going to conduct a survey. I would like to interview you and your child few questions about his/her quality of life since they acquire diabetes mellitus. The objective of the study is to assess the Generic & health related QoL and to identify the factors affecting it in children with T1DM. This study will be helpful to improve the health care of patients with T1DM. The interview takes between 10-20 minutes to complete.

2. Description

You have been asked to participate in a research study, which will assess quality of life of children and adolescents with type I DM attending follow up at pediatrics endocrine clinic in St. Paul's Hospital Millennium Medical College, Tikur Anbessa specialized hospital, Yekatit 12 Medical College and Zewditu Memorial Hospital.

3. Aim of the study

Quality of life is one of the cumulative outcomes which can be affected by the health condition of individual and other associated factors like comorbidities. This level of quality will again affect affecting health outcomes. Understanding the factors that are affecting the quality of life and acting accordingly plays a crucial role on improvement of the provision of health care and better health outcome. Thus, I aim to assess the quality of life of children and adolescents with type I DM attending follow up at pediatrics endocrine clinic in St. Paul's Hospital Millennium Medical College, Tikur Anbessa Specialized Hospital, Yekatit 12 Medical College and Zewditu Memorial Hospital.

4. Procedure

This study will involve a questioner being filled by interviewer asking the participating children, adolescents and caregivers. To study the assessment of quality of life of children and adolescents with type I DM, I invite you to participate to the study. If you are willing to participate in the study, you have to read and understand before you sign an agreement paper. If there is anything unclear, you can ask the principal investigator or the data collectors. For the study, you are expected to answer the questions voluntarily. All the information you give will be kept private; nobody will know who filled in the questionnaires.

5. Participant selection

We are inviting all school aged children and adolescents with Type-I Diabetes Mellitus together with their corresponding caregivers who attend pediatrics endocrine clinic to participate in the research on assessment of quality of life of the children and adolescents.

6. Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Whether you choose to participate or not, all the services you receive at this clinic will continue and nothing will change. If you choose not to participate in this research project, you will be offered the treatment that is routinely offered in this clinic/hospital, and we will tell you more about it later. You may change your mind later and stop participating even if you agreed earlier.

7. Risks and Benefits

There is no any risk in participating in the research. If you participate in the study, you may not get direct benefit, but you will have an opportunity to self-assess level of quality of life.

8. Rights

You or your child do not have to take part in this research if you do not wish to do so and refusing to participate will not affect your treatment at this clinic in any way. Your child will still have all the benefits that you would otherwise have at this clinic. You and your child may stop participating in the research at any time that you wish without losing any of your rights as a patient here. Your child's treatment at this clinic will not be affected in any way.

9. Confidentiality

The information collected from this research project will be kept confidential and all records and other information obtained will be kept strictly confidential and your child's protected health information will not be used without permission. All data collection tools will be identified by number or otherwise coded to protect any information that could be used to identify your child.

10. Number of Participants

416 diabetic children and adolescents who are school age up to 18 years will be participants of this study. For all participants parent proxy report shall be obtained.

11. Whom to Contact

The participants have full right to ask information that is not clear about the research before they decide to participate. You can contact the principal investigator for any doubt that you want to clear. This research was reviewed and approved by SPHMMC, institutional review board. If you want more information and check about this study, you can contact the following people.

Bisrat Tamene

+25191244490

Consent and assent form (English and Amharic)

Consent form before conducting the interview

Greetings: Hello, how are you?

1. Primary caretaker's consent form

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research. I, hereby, describe my consent that the child's data can be used for the research. I confirm my agreement to let my child participate in the study with my signature below.

I agree to take part in the research

Yes ☐ **No** ☐

Signature of caregiver _____ Date _____

Supervisor's name _____, Signature _____

2. Assent form (7-18 years)

My name is _____. I am here on behalf of Bisrat Tamene, who is currently a Master of public health student in SPHMMC, who is now going to conduct a survey. I am inviting you to participate in a research study about the Quality of life and to identify the factors affecting it in children and adolescents with T1DM. Your parent(s) know we are talking with you about the study and gave permission for you to be involved. This form will tell you about the study to help you decide whether or not you want to take part in it.

What am I being asked to do?

If you decide to be in the study, I will ask you to answer questions related to quality of life of your child related to Type I DM. There is a list of things that might be a problem to you during the past one month and you are expected to answer their level of occurrence.

What are the risks and benefits to me for taking part in the study?

There is no any risk in participating in the research. Taking part in this study may not have direct benefits to you, but it will help me learn the level of quality of life of children and adolescents with T1DM and you will have an opportunity to self-assess level of quality of life.

Can anything bad happen if I am in this study?

I do not expect anything bad happening to you but some kids may feel fatigue, boredom or anxiety. If you become tired, let me know. We will take a short break.

Who will know that I am in the study?

If you decide to be in the study, I will not tell anyone else how you respond or act as part of the study. Even if your parents or teachers ask, I will not tell them about what you say or do in the study.

Do I have to be in the study?

No, you don't. The choice is yours. No one will get angry or upset if you don't want to do this. And you can change your mind anytime if you decide you don't want to be in the study anymore.

What if I have questions?

If you have questions about the study, you can ask me now or anytime during the study. You can also call me at +25191244490 or e-mail me at bisru1122@gmail.com.

Ticking "YES" below means that you have understood the information above and that you are willing to be in this study:

I agree to take part in the research

Yes ☐ No ☐

Supervisor's name _____, Signature _____

I thank you for your cooperation!

ለጥናቱ ተሳታፊዎች የሚሰጥ መረጃ

ይህ የመረጃ እና የስምምነት ሰነድ በቅዱስ ጳውሎስ ሆስፒታል የሚታከሙ የሰኪር ህመማት ህጻናት የኑሮ ሁኔታ እና ተያያዥነ ገፍቶን መረዳት እና መላካት ላይ ለማድረግ ውጥናት የተዘጋጀ ነው። የጥናቱ አላማ የሰኪር ህመማት ህጻናት የኑሮ ሁኔታ እና ተያያዥነ ገፍቶን ለማጥናት ነው። ይህ ጥናት ለወደፊት ያለውን የሰኪር ህመማት ህጻናት ክትትል ለማስደግድ ይረዳል።

የጥናቱ ርዕስ፡ የስኪር ታምቢህጻናትን እና የታዳጊ ወጣቶችን የህይወት ደረጃ ምንነት የዳሰሳ ጥናት በአዲስ አበባ የመንግስት ሆስፒታሎች ውስጥ፡ 2013

ዋና ተሟላሚ፡ ዶ/ር ብስራት ታማ

1. መግቢያ

ጤ ይስጥሌኝ ስሜ _____ ይባላል። እኔ በቅዱስ ጳውሎስ ሆስፒታል ሚኒኒየር ምህንድስና ኮሌጅ፤ በህብረተሰብ ጤ ት/ክፍል ተሟላሪ በሆኑት ዶ/ር ብስራት ታማ አማካኝነት በሚከናወን ውጥናትና ምርምር ላይ መረጃ ሰብሳቢ ሁኔታ እይሰራሁ እገኛለሁ። የእርሶዎንም ሆነ የእርሶዎ ልጅን ተሳትፎ በጣም እናበረታለን። እርሶዎም ሆኑ የእርሶዎ ልጅ የሚጠቅ መረጃ የስኪር ታምቢ ህጻናትንና የታዳጊ ወጣቶችን የህይወት ደረጃ ለማወቅና የህይወት ደረጃቸውን ለማሻሻል ይረዳል። ቃለ መጠይቁ 10-20 ደቂቃ ሊፈጅ ይችላል። እርሶዎ ልጅዎ መረጃ እንዲሰጥ/እንድትሰጡ ከፈቀዱለት/ላት ልጅዎንም ልንጠይቅ እንችላለን። ለጥናቱ መረጃ ለማስጠጥፈቃደኛ ከሆኑ ፈቃደኝነትዎን አዎ በማለት ሊገልጹልን ይችላሉ።

2. መግለጫ

በስኪር ህመም ወደ መንግስት ሆስፒታሎች ለአገልግሎት/ለክትትል ለሚመጡ እና በጥናቱ ላይ ለመሳተፍ ፍቃደኛ ለሆኑ ወላጆች እና ለታዳጊ ወጣቶች የመረጃ እና የፈቃደኝነት መረጋገጫ ቅጽ ተዘጋጅቷል።

3. ዓላማ

ይህ ጥናት የስኪር ታምቢ ህጻናትን እና የታዳጊ ወጣቶችን የህይወት ደረጃ ምንነትን ለማወቅ ይረዳል። በተጨማሪም እርሶዎም ሆኑ ልጅዎ የሚጠቅ መረጃ ለጥናቱ መላካት ብቻ ሳይሆን አገልግሎቱን ለማሻሻል ለስኪር ታምቢ ህጻናት እና ለታዳጊ ወጣቶች ትክክለኛውን መረጃ ለማስጠጥም ከፍተኛ አስተዋጾ ይኖረዋል። በመጨረሻም የጥናቱ ውጤት ለሚመለከቱ ታችኛው አካላት ይሰጣል።

4. አካላዊ

ከላይ የጠቀሰውን ዓላማ ለመላካት አስፈላጊው መረጃ ከስኪር ታምቢ ህጻናት እና ታዳጊ ወጣቶች እንዲሁም ከወላጆቻቸው ይወሰዳል። የሚጠቅ መረጃ በጠቅላላ በሚከተሉ ኮድ ተደርጎ ለማንም ሳይሰጥ ታሸጎ ይቀመጣል። በጥናቱ ላይ በመሳተፍ ግዚዎትን እንደምሻሞት ሊሰሞኑ ይችላሉ፤ ሆኖም ግን የጥናቱ ውጤት ለሚመጣው ለውጥ ብለው እንደሚሰተፉ እና ምናለን። እንዲሁም በጥናቱ በመሳተፍ ምንም አይነት ጉዳት አያደርስብትም።

5. በጥናቱ ያለመሳተፍ መብት

እርሶዎም ሆነ ልጆዎ በጥናቱ ያለመሳተፍ መላ መብት አለዎት፡፡ በጥናቱ ውስጥ ለሉ ጥያቄዎችም መላስ ያለመስጠት መብት አለዎት፡፡ በማንኛውም ጊዜ ከጥናቱ ያለመሳተፍ መብት አለዎት፡፡

6. ጥቅም

ቀጥተኛ የሆነ ጥቅም በዚሁ ጥናት ላይ በመሳተፍ ላይ ገኘ ይችላሉ፡፡ ነገር ግን እርሶዎም ሆነ ልጆዎ የሚሰጡ መረጃ የስኪር ታምሚህጻናትን እና የታዳጊ ወጣቶችን የህይወት ደረጃ ምንነትን ለማወቅም ሆነ አገልግሎቱን ለማሻሻል ይረዳል፡፡ በጥናቱ ላይ በመሳተፍ የተለየ ጥቅም ወይም ክፍያ አያገኙም፡፡ የተለየ አካላዊ፣ ልጆዎ በጥናቱ ላይ እንዳይሳተፍ የሚደረግ መላ መብት አሎት እንዲሁም በጥናቱ እንዳይሳተፍ በሚደረግ ለልጆዎ በሚሰጠው ፍጥነት አገልግሎት ላይ ተጽኖ አያመጣም፡፡

7. የተሳታፊዎች ቁጥር

416 የስኪር ታምሚህጻናት እና ታዳጊ ወጣቶች ያካትታል፡፡ በተጨማሪም ለሁሉም ተሳታፊዎች ከወላጆቻቸው ተጨማሪ መረጃም ይወሰዳል፡፡

8. ምስጢራዊነት

በዚሁ ጥናት ላይ የሚገኘው መረጃ በሙሉ ምስጢራዊነት ተጠበቆ ይቆያል፡፡ የእርሶዎም ሆነ ልጆዎ የሚሰጡ መረጃ በፍይል ከእርሶዎ ሆነ ከልጆዎ ስም ውጪ በኮድ ተደርጎ ይቆያል፡፡ በተጨማሪም ከጥናቱ ውጪ ለማንም ሰው አይሰጥም፡፡

9. ለጥናቱ መረጃ

ማንኛውም ጥያቄ ካሎት ከዚህ በታች በተገለፀው የዋና ተመራማሪ አድራሻ በማጠቀም መገዞቅ ይችላሉ፡፡
ዋና ተመራማሪ፡ ዶ/ር ብስራት ታሙ

ስልክ፡ +251912444904

ኢሜል፡ bisru1122@gmail.com

የፈቃድ እና የስምምነት መግለጫቅጽ

1. የወላጅ/አሳዳጊ ፈቃድ

ከላይ የተጠቀሱትን በሙሉ ተረድቻለሁ፡፡ በዚህ ጥናት ላይ የምትገኘውን በሙሉ ፈቃደኝነት ነው፡፡ እንደተነገረኝ ከሆነ የምትጠው መልስ ለሌላ ለማንም ሰው አይሰጥም፤ እንዲሁም ስለኔ ማንነት ለማንም አይገለፅም፡፡ ስለሆነ ምክትቤ ላይ ለመተባበር ፍቃደኛ ነኝ፡፡

(ተሳታፊ/ዋ ፍቃደኛ ካልሆኑ አማካኝነት ውድድራዊ ጥላውተሳታፊ ይለፍ)

ተሳታፊው ፍቃደኛ ከሆኑ ግን ይቀጥሉ፡፡

ከዚህ በታች ፊርማዬ የተገለፀው ግለሰብ ከላይ የተገለፁትን መረጃዎች በማንበብ እና በመረዳት የጥናቱ ተሳታፊ ለመሆን ተስማምቻለሁ፡፡

የጠያቂው ፊርማ _____

የጠያቂው ስም _____ ፊርማ _____

2. የልጆች የስምምነት ቅጽ (7-18 ዓመት)

ጤ ይስጥሌኝ ስሜ _____ ይባላል፡፡ እኔ በቅዱስ ጳውሎስ ሆስፒታል ሚኒኒየሪያ ህክምና ኮሌጅ፤ በህብረተሰብ ጤ ትክክል ተመራ በሆኑት ዶ/ር ብስራት ታሙ አማካኝነት በሚከናወን ውስጥ በስኬት ታምሟለሁ፡፡ ህፃናትንና የታዳጊ ወጣቶችን የህይወት ደረጃ ለመወቅና የህይወት ደረጃቸውን ለመገምገም ጥናትና ምርምር ላይ መረጃ ሰብሳቢ ሆኜ እይሰራለሁ እንኳ አለሁ፡፡ የአንተን/የአንቺን ተሳትፎ በጣም እናበረታታለን፡፡ በስኬት የተጠቁ ህፃናትን የኑሮ ደረጃ የምንመለከትበት ጥናት ላይ እንዲሳተፉ ወላጆቻችን ፈቅድዋለታል፡፡

ምን እንድሠራ ተጠየኩኝ?

አንተን/አንቺ መረጃ ለመስጠት ከፈቀድክ/ሽ ስለ በስኬት ታምሟለሁ ህፃናትንና የታዳጊ ወጣቶችን የህይወት ደረጃ እንመድቃለን፡፡ ታዳጊ ህፃናቶችና ታዳጊ ወጣቶች አንዳንድ ጊዜ በስኬት ህመም ጋር ተያይዞ የተለየ የመምረቻ ጥያቄዎች ሊኖሩ ይችላሉ፡፡ ከነዚህ ውስጥ በመከተለው ቅጽ ውስጥ ተዘርዝረዋል፡፡ በባለፈው አንድ ወር ውስጥ በእርሶ ላይ ምን ያህሎች ችግሮች እንደተስተዋሉ እንዲግልፁልን በትህትና እንመድቃለን፡፡

በጥናቱ ውስጥ መሳተፍ ለእኔ ምን አደጋዎች እና ጥቅሞች አሉኝ?

በምርምሩ ውስጥ ለመሳተፍ ምንም አደጋ የለውም፡፡ በዚህ ጥናት ውስጥ መሳተፍ ለእርስዎ ቀጥተኛ ጥቅም ላይኖረው ይችላል፡፡ ግን በስኬት የተያዙ የሕፃናት እና የጎረቤቶች የኑሮ ደረጃን ለመመርመር ይረዳኛል እናም የኑሮ ደረጃን በራስ የመዝገብ እድል ይኖርዎታል፡፡

በዚህ ጥናት ውስጥ ከሆኑት ምን ችግር ሊኖር ይችላል?

በአንተ/አንቺ ላይ ምንም ችግር ነገር አይመጣም፡፡ ግን አንዳንድ ልጆች ድካም፣ መሳላቸት ወይም ጭንቀት ሊሰማቸው ይችላል፡፡ ከደከምክ/ሽ አሳውቀኝ/ቂኝ፡፡ አጭሪ ዕረፍት እና ደርጋለን፡፡

በጥናቱ ውስጥ መሆኔን ማን ያወቃል?

በጥናቱ ውስጥ ለመሆን ከወሰን ክ/ሽ የጥናቱ አካል አንተ/አንቺ ምን ምላሽ እንደሚሰጡ ወይም እንደሚሰሩ ለማንም አልናገርም፡፡ ወላጆችዎ ወይም አስተማሪዎችዎ ቢጠይቁም እንኳ በጥናቱ ውስጥ ስላሉት ወይም ስለሚደርጉት ነገር አልነግራችዎም፡፡

በጥናቱ ውስጥ መሆን አለብኝን (ግዴታ ነው)?

በጥናቱ መሳተፍ ግዴታ አይደለም፡፡ ምርጫው የእርስዎ ነው ይህንን ለማድረግ ካልፈለጉ ማንም አይቆጣም ወይም አይበሳጭም፡፡ እና ከዚያ በኋላ በጥናቱ ውስጥ ላለሚሰሩ ከወሰኑ ሀሳብዎን በማንኛውም ሂደት መላውን ይችላሉ፡፡

ጥያቄዎች ካሉኝስ?

ስለ ጥናቱ ጥያቄዎች ካሉዎት አሁን ወይም በማንኛውም ጊዜ በጥናቱ ወቅት ሊጠይቁኝ ይችላሉ፡፡ እንዲሁም በ +25191244490 ሊደውልኝ ይችላሉ ወይም በኢ-ሜይል በ bisru1122@gmail.com ይጻፉልኝ፡፡

ከዚህ በታች “አዎ”ን መመረጥ ከላይ ያለውን ሚጃ ተረድተዋል ማለት ነው እና ምንምምንጭም በጥናት ውስጥ ለመሳተፍ ፈቃደኛ ነዎት፡፡

አዎ ተስማምቻለሁ

☐

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☐

የጠያቂውስም፡ _____ ፊርማ _____

ስለ ትብብርዎ አመሰግናለሁ!!!

11.2. Annex II: Questionnaire (English Version)

Title of the Research - Quality of life of children's with T1DM attending follow up at
Pediatrics Endocrine Clinics of Selected Public Hospitals, Addis Ababa, Ethiopia.

Instructions- I would like to ask your questions related to quality of life of your child related to Type I DM. Please fill free to answer each question without any fear

Code number _____

Date ____/____/____

Part I–General information

S. No.	Question	Response	Remove
Part 1.1. Sociodemographic questionnaire			
101.	Sex of the child	1. Male 2. Female	
102.	Age of the child	_____years old	
103.	School Grade	_____	
104.	Family Setting: Who do the child lives with?	1. Lives with both parent 2. Lives with mother only 3. Live with father only 4. Others(specify): _____	
105.	Number of children in family (enter space)	_____	
106.	Relation to the child	1. Mother 2. Father 3. Other (specify): _____	
107.	Age of primary care giver (interviewee) in completed years	_____years old	
108.	Ethnicity of primary care giver	1. Amhara 2. Oromo 3. Gurage 4. Tigre 5. Other (Specify): _____	
109.	Religion of primary care giver	1. Orthodox 2. Muslim 3. Protestant 4. Other (specify): -----	
110.	Marital status/family structure	1. Married and in union 2. Divorced 3. Widowed 4. Separated 5. Single parent	
111.	Maternal/Mother' Educational status	1. No formal education 2. Read and write	

		3. Primary education (1-8) 4. Secondary Education (9-12) 5. College/university	
112.	Paternal/Father's educational status	1. No formal education 2. Read and write 3. Primary education (1-8) 4. Secondary Education (9-12) 5. College/university (12+)	
113.	Other primary care giver's educational status	1. No formal education 2. Read and write 3. Primary education (1-8) 4. Secondary Education (9-12) 5. College/university (12+)	
114.	Maternal/Mother's Occupation	1. House wife 2. Daily laborer 3. Private employee 4. Government employee 5. Other	
115.	Paternal/Father's Occupation	1. Unemployed 2. Daily laborer 3. Private employee 4. Government employee 5. Other	
116.	Other primary care giver's Occupation	1. Unemployed 2. Daily laborer 3. Private employee 4. Government employee 5. Other	
117.	Average monthly income of the Family (in Ethiopian Birr)	_____birr	
Part 1.3. Question about Diabetes Mellitus/Clinical related questions)			
118.	Age at diagnosis of DM	_____year or/month	
119.	Duration since the diagnosis of DM	_____ year or/month	
120.	Frequency of insulin administration	1. Once daily 2. Twice daily 3. Three times per day 4. Other	
121.	Who injects insulin to the child?	1. Self	

		2. Mother 3. Father 4. Other primary Care-giver (specify)_____	
122.	Frequency of monitoring of blood glucose	1. Once during follow up visit 2. Once per week 3. Once Daily 4. Two times per day 5. Three & above 6. Other (specify): -----	
123.	Frequency of physical activity per week	1. None 2. Once per week 3. Two times per week 4. Three times per week 5. Other	
124.	Have you ever attended diabetes education provided at this Hospital?	1. Yes 2. No	
125.	Have you been admitted in the previous 6months?	1. Yes 2. No	If no go to part 3
126.	If yes to Q 21, for how many times (enter space).	_____ Times/number	

Part II- The PedsQL 4.0 Generic Core Scales

1.1.The PedsQL 4.0 Generic Core Scales: Child / Adolescent Report

Directions: - on the following page is a list of things that might be a problem to you. please tell us **how much of a problem** each one has been for you during the **past ONE** month.

0 – it’s never a problem 1 – it’s almost never a problem 2 –it’s sometimes a problem
3- it’s often a problem 4 – it’s almost always a problem

There are no right or wrong answers!

	About my health and activities (Problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
201.	It’s hard for me to walk more than one block	0	1	2	3	4
202.	It’s hard for me to run	0	1	2	3	4
203.	It’s hard for me to participate in sports & exercise	0	1	2	3	4
204.	It’s hard for me to lift something heavy	0	1	2	3	4
205.	It’s hard for me to take bath or shower by myself	0	1	2	3	4
206.	It’s hard for me to do chores around the house	0	1	2	3	4
207.	I have hurts or aches	0	1	2	3	4
208.	I have low energy	0	1	2	3	4
	About My Feelings (Problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
209.	I feel afraid or scared	0	1	2	3	4
210.	I feel sad or blue	0	1	2	3	4
211.	I feel angry	0	1	2	3	4
212.	I have trouble with sleeping	0	1	2	3	4
213.	I worry about what will happen to me	0	1	2	3	4
	How I get along with others (Problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
214.	I have trouble getting along with other children/teens	0	1	2	3	4
215.	Other kids don’t want to be my friend	0	1	2	3	4
216.	Other kids tease me	0	1	2	3	4
217.	I can’t do things that other kids/teens my age can do	0	1	2	3	4
218.	It’s hard to keep up when I play with other kids (peers)	0	1	2	3	4

	About School (Problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
219.	It's hard to pay attention in class	0	1	2	3	4
220.	I forget things	0	1	2	3	4
221.	I have trouble keeping up my schoolwork	0	1	2	3	4
222.	I miss school because of not feeling well	0	1	2	3	4
223.	I miss school to go to the doctor or hospital	0	1	2	3	4

1.2.The PedsQL 4.0 Generic Core Scales: Parent/Caregiver report

Directions: - on the following page is a list of things that might be a problem to you. please tell us **how much of a problem** each one has been for you during the **past ONE** month.

0 – it's never a problem 1 – it's almost never a problem 2 –it's sometimes a problem
3- it's often a problem 4 – it's almost always a problem

There are no right or wrong answers!

	Physical functioning (Problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
224.	Walking more than one block	0	1	2	3	4
225.	Running	0	1	2	3	4
226.	Participating in sports and exercise	0	1	2	3	4
227.	Lifting something heavy	0	1	2	3	4
228.	Taking bath or shower by him or herself	0	1	2	3	4
229.	Doing chores around the house	0	1	2	3	4
230.	Having hurts or aches	0	1	2	3	4
231.	Low energy level	0	1	2	3	4
	Emotional functioning (Problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
232.	Feeling afraid or scared	0	1	2	3	4
233.	Feeling sad or blue	0	1	2	3	4
234.	Feeling angry	0	1	2	3	4
235.	Trouble with sleeping	0	1	2	3	4
236.	Worrying about what will happen to him or her	0	1	2	3	4
	Social functioning (Problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
237.	Getting along with other	0	1	2	3	4

	children/teens					
238.	Other kids/teens not wanting to be his/her friend	0	1	2	3	4
239.	Getting teased by other children/teens	0	1	2	3	4
240.	Not able to do things that other children/teens his/her age can do	0	1	2	3	4
241.	Keeping up when playing with other children/teens	0	1	2	3	4
	School functioning (Problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
242.	Paying attention in class	0	1	2	3	4
243.	Forgetting things	0	1	2	3	4
244.	Keeping up with school work	0	1	2	3	4
245.	Missing school because of not feeling well	0	1	2	3	4
246.	Missing school to go to doctor or hospital	0	1	2	3	4

Part III:- The PedsQL 3.2 Type 1 Diabetes Scale Scoring

a. The PedsQL 3.2 Type 1 Diabetes Scale Scoring: Child report on Diabetic QoL

Directions: - Children/teens with Diabetes sometimes have special problems. Please tell us how **much of a problem** each one has been for you during the **past ONE month**.

0 – it’s never a problem 1 – it’s almost never a problem 2 –it’s sometimes a problem
3- it’s often a problem 4 – it’s almost always a problem

	About My DIABETES (<i>problems with...</i>)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
301.	I feel hungry	0	1	2	3	4
302.	I feel thirsty	0	1	2	3	4
303.	I have to go to the bathroom too often	0	1	2	3	4
304.	I have stomach(tummy) aches	0	1	2	3	4
305.	I have headaches	0	1	2	3	4
306.	I feel like I need to throw up	0	1	2	3	4
307.	I go “low”	0	1	2	3	4
308.	I go “high”	0	1	2	3	4
309.	I feel tired	0	1	2	3	4
310.	I get shaky	0	1	2	3	4
311.	I get sweaty	0	1	2	3	4
312.	I feel dizzy	0	1	2	3	4
313.	I feel weak	0	1	2	3	4
314.	I have trouble sleeping	0	1	2	3	4

315.	I get cranky or grumpy	0	1	2	3	4
	Treatment - I (problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
316.	It hurts to get my finger pricked	0	1	2	3	4
317.	It hurts to get insulin shots	0	1	2	3	4
318.	I am embarrassed about my diabetes treatment	0	1	2	3	4
319.	My parents and I argue about diabetes care	0	1	2	3	4
320.	It is hard for me to do everything I need to do to care of my diabetes	0	1	2	3	4
	Treatment - II (problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
321.	It is hard for me to take blood glucose tests	0	1	2	3	4
322.	It is hard for me to take insulin shots	0	1	2	3	4
323.	It is hard for me to play/exercise or do sports	0	1	2	3	4
324.	It is hard for me to track of carbohydrates	0	1	2	3	4
325.	It is hard for me to carry a fast-acting carbohydrates	0	1	2	3	4
326.	It is hard for me to snack when I go "low"	0	1	2	3	4
	Worry (problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
327.	I worrying about going "low"	0	1	2	3	4
328.	I worrying about going "high"	0	1	2	3	4
329.	I worrying about the long-term complications of diabetes	0	1	2	3	4
	Communication (problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
330.	It's hard for me to tell the doctors and nurses how I feel	0	1	2	3	4
331.	It's hard for me to ask doctors or nurses questions	0	1	2	3	4
332.	It's hard for me to explain my illness to other people	0	1	2	3	4
333.	I am embarrassed about having diabetes	0	1	2	3	4

b. The PedsQL 3.2 Type 1 Diabetes Scale Scoring: Parent/Caregivers Report for children on Diabetic QoL

Directions: - Children/teens with Diabetes sometimes have special problems. Please tell us how **much of a problem** each one has been for you during the **past ONE month**.

0 – it’s never a problem 1 – it’s almost never a problem 2 –it’s sometimes a problem
3- it’s often a problem 4 – it’s almost always a problem

	DIABETES Symptoms (<i>problems with...</i>)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
334.	Feeling hungry	0	1	2	3	4
335.	Feeling thirsty	0	1	2	3	4
336.	Having to go to the bathroom too often	0	1	2	3	4
337.	Having stomach(tummy) aches	0	1	2	3	4
338.	Having headaches	0	1	2	3	4
339.	Feeling like he/she needs to throw up	0	1	2	3	4
340.	Going “low”	0	1	2	3	4
341.	Going “high”	0	1	2	3	4
342.	Feeling tired	0	1	2	3	4
343.	Getting shaky	0	1	2	3	4
344.	Getting sweaty	0	1	2	3	4
345.	Feeling dizzy	0	1	2	3	4
346.	Feeling weak	0	1	2	3	4
347.	Having trouble sleeping	0	1	2	3	4
348.	Getting cranky or grumpy	0	1	2	3	4
	Treatment Barriers - I (<i>problems with...</i>)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
349.	Finger pricks causing him/her pain	0	1	2	3	4
350.	Insulin shots causing him/her pain	0	1	2	3	4
351.	Getting embarrassed about his/her diabetes treatment	0	1	2	3	4
352.	Arguing with me or my spouse about diabetes care	0	1	2	3	4
353.	It is hard for my child/teen to do everything he/she needs to do to care for his/her diabetes	0	1	2	3	4
	Treatment Adherence - II (<i>problems with...</i>)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
354.	It is hard for my child/teen to take blood glucose tests	0	1	2	3	4
355.	It is hard for my child/teen to take insulin shots	0	1	2	3	4
356.	It is hard for my child to play/exercise or do sports	0	1	2	3	4
357.	It is hard for my child/teen to track carbohydrates	0	1	2	3	4

358.	It is hard for my child/teen to carry a fast-acting carbohydrates	0	1	2	3	4
359.	It is hard for my child to snack when he/she goes “low”	0	1	2	3	4
	Worry (problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
360.	Worrying about going “low”	0	1	2	3	4
361.	Worrying about going “high”	0	1	2	3	4
362.	Worrying about the long-term complications from diabetes	0	1	2	3	4
	Communication (problems with...)	Never a problem	Almost never a problem	Sometimes a problem	Often a problem	Almost always a problem
363.	Telling the doctors and nurses how he/she feels	0	1	2	3	4
364.	Asking the doctors or nurses questions	0	1	2	3	4
365.	Explaining his/her illness to other people	0	1	2	3	4
366.	Getting embarrassed about having diabetes	0	1	2	3	4

Part 1.3. Information on the child (By data collector)			
401.	Weight of the child/teen in kilogram (Kg)		
402.	Height of the child/teen in centimeter (Cm)		
403.	Is FBS done? (Medical record review)	1. Yes 2. No	If No, Skip to question number 129
404.	If yes, 3 previous FBS Results	1. _____ 2. _____ 3. _____	
405.	Is HgbA1c done? (Medical record review)	2. Yes 3. No	If No, you are done. Thank You!
406.	If yes, Previous HgbA1c Result	_____	

11.3. Annex III: Questionnaire (Amharic Version) (የአማራጭ መጠይቅ ቅጽ)

የጥናቱ ርዕስ: የስኬሪ ታምቢህጻናትን እና የታዳጊ ወጣቶችን የህይወት ደረጃ ምንነት
የዳሰሳ ጥናት በአዲስ አበባ የመንግስት ሆስፒታሎች ውስጥ: 2013

የጥናቱ ጥያቄ

እባክዎን እያንዳንዱን ጥያቄ በጥንቃቄ አንብቦ ውምላሽ ይስጡ :

የመለያ ቁጥር [የታካሚ ክርድ ቁጥር] _____
_____/____/____

ቀን

ክፍል 1 - ማህበረሰባዊ ፤ ግላዊ ጥያቄዎች እና ጠቅላላ መረጃ

ተ.ቁ.	ጥያቄ	መልስ	
ክፍል 1.1 - ስለ ልጁ መረጃ (ከወላጅ/ ከአሳዳጊ)			
101.	የልጁ ጾታ	1. ወንድ 2. ሴት	
102.	የልጁ ዕድሜ (በአመት ይገለጽ)	_____	
103.	የልጁ የትምህርት ደረጃ (ክፍል)	_____	
104.	ልጁ ከማን ጋር ነው የምትኖረው/ረው?	1. ከአባትና ከእናት ጋር 2. ከአባት ጋር ብቻ 3. ከእናት ጋር ብቻ 4. ሌላ ግለጽ/ጭ _____	
ክፍል 1.2 - የቤተሰብ እና ተንከባካቢዎች መረጃ			
105.	ከልጁ ጋር ያለዎት ግንኙነት	1. እናት 2. አባት 3. ሌላ ዋና ተንከባካቢ _____	
106.	የቤተሰብ/ተንከባካቢ ዕድሜ (በአመት ይገለጽ)	_____	
107.	የቤተሰብ/ተንከባካቢ ሀይማኖት	1. ኦርቶዶክስ 2. እስልምና 3. ፕሮቴስታንት 4. ሌላ _____	
108.	የጋብቻ ሁኔታ/የቤተሰብ መዋቅር	1. የተጋቡ እና አብረው የሚኖሩ 2. የተፋቱ 3. ማባለት 4. የተለያዩ ግን ያልተፋቱ 5. ነጠላ ወላጅ (ያለገቡ)	
109.	የትምህርት ደረጃ - እናት	1. መደበኛ ትምህርት ያልወሰዱ 2. ማንበብ እና መጻፍ 3. የአንደኛ ደረጃ ትምህርት (1-8) 4. የሁለተኛ ደረጃ ትምህርት (9-12) 5. ኮሌጅ/ዩኒቨርሲቲ ትምህርት (12+)	
110.	የትምህርት ደረጃ - አባት	1. መደበኛ ትምህርት ያልወሰዱ 2. ማንበብ እና መጻፍ	

		3. የአንደኛ ደረጃ ትምህርት(1-8) 4. የሁለተኛ ደረጃ ትምህርት(9-12) 5. ኮሌጅ/ዩኒቨርሲቲ ትምህርት(12+)	
111.	የትምህርት ደረጃ - ሌላ ዋና ተንከባካቢ	1. መደበኛ ትምህርት ያልወሰዱ 2. ማንበብ እና መጻፍ 3. የአንደኛ ደረጃ ትምህርት(1-8) 4. የሁለተኛ ደረጃ ትምህርት(9-12) 5. ኮሌጅ/ዩኒቨርሲቲ ትምህርት(12+)	
112.	የስራ የቅጥር ሁኔታ - እናት	1. የቤት እመቤት 2. የቀን ስራ 3. የግል ቅጥረኛ 4. የመንግስት ሰራተኛ 5. የግል ስራ(የራስ) 6. ሌላ_____	
113.	የስራ የቅጥር ሁኔታ - አባት	1. ስራ የሌለው 2. የቀን ስራ 3. የግል ቅጥረኛ 4. የመንግስት ሰራተኛ 5. የግል ስራ(የራስ) 6. ሌላ_____	
114.	የስራ የቅጥር ሁኔታ - ሌላ ዋና ተንከባካቢ	1. ስራ የሌለው/የቤት እመቤት 2. የቀን ስራ 3. የግል ቅጥረኛ 4. የመንግስት ሰራተኛ 5. የግል ስራ(የራስ) 6. ሌላ_____	
115.	ወርሀዊ የቤተሰብ ገቢ	_____ብር / በወር	
116.	በቤተሰባችሁ ውስጥ ምን ያህል ልጆች አሉ?(ከ18 አመት በታች የሆኑ)	_____	
ክፍል 1.3 - የህክምና ሁኔታን በተመለከተ የሚጠየቁ ጥያቄዎች			
117.	ለመጀመሪያ ጊዜ የስኳር ሕመምተኛ ነውብሎ ሲነገረው/ራት ዕድሜዎ/ዎ ስንት ነበር? (ወር/አመት)	_____	
118.	ከስኳር ህመምጋር ስንት ጊዜ ቆየ/ች? (ወር/አመት)	_____	
119.	ልጅዎ በዚህ ሆስፒታል የሚጠወን የስኳር ህመም ትምህርት ተከታትሎ/ለ ያወቃል/ታወቃለች?	1. አዎ 2. አላወቅም	
120.	የኢንሱሊን መድሀኒት በቀን ስንት ጊዜ ይወጋል?	1. አንድ ግዜ 2. ሁለት ግዜ 3. ሶስት ግዜ 4. ሌላ_____	
121.	የኢንሱሊን መድሀኒት ማን ው የሚጠው/ጣት?	1. እራሱ/ሳ 2. እናት 3. አባት 4. ሌላ እንክብካቤ ሰጪ _____	
122.	የደምግሎኮስ መጠኑ ምን ያህል	1. በክትትል ጊዜ ብቻ	

	ጊዜ ይለካል?	2. በሰዓት አንድ ጊዜ 3. በቀን አንድ ጊዜ 4. በቀን ሁለት ጊዜ 5. በቀን ሶስት ጊዜ 6. ሌላ _____	
123.	የአካል ብቃት እንቅስቃሴ በሰዓት ምን ያህል ጊዜ ይሰራል?	1. ምንም 2. አንድ ጊዜ 3. ሁለት ጊዜ 4. ሶስት ጊዜ 5. ሌላ _____	
124.	በላፈውስድስት ወር ውስጥ ለክሕምና በሆስፒታል ተኝተው ያቃሉ?	1. አዎ 2. አይላይም	
125.	ለጥያቄ 21: ሙሉ ስም አዎ ከሆነ ለምን ያህል ጊዜ ተኝተህ/ሽ ነበር?	_____ ጊዜ	
126.	በቤተሰባችሁ ውስጥ የስኳር ህመም ነበረበት/ባት አባል አለ/ች?	1. አዎ 2. የላም	

ክፍል 2 - የህፃናት ህክምና የህይወት ደረጃ የቆጠራ አጠቃላይ ቅጽ 4.0 /ስለ አጠቃላይ የኑሮ ሁኔታ/

ክፍል 2.1. ልጆች የሚጠቀሙት ማጠቃለያ / ስለ አጠቃላይ የኑሮ ሁኔታ/

የማጠቃለያ አጠቃላይ መረጃ

በተከታታይ 7 ፆች በልጅዎ ላይ ሊታዩ የሚችሉ ችግሮች ተዘርዝረዋል፤ ስለሆነ ምን ተጠቅሰው ችግር የሚታይ ከሆነ በላረው እንደ ወር ውስጥ የችግሩን አስከፊነት እንዲግልፁልን በትህትና እንጠይቃለን፡፡

0 - ችግሩ በጭሽ የለም

1 - ችግሩ ባብዛኛው የለም

2 - ችግሩ አንዳንድ ጊዜ ይታያል

3 - ችግሩ ባብዛኛው ይታያል

4 - ችግሩ ሁልጊዜ ይታያል

	ከጤና ክላኒክ ብቃት ጋር የተያያዙ ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
201.	ከ 1 ደረጃ በላይ በእግሩ/ሮዋ መጓዝ ይከብደኛል	0	1	2	3	4
202.	መሮጥ ይከብደኛል	0	1	2	3	4
203.	የአካል ማሳልማት እንቅስቃሴ ወይም የሰውነት እንቅስቃሴ ላይ ማጎጠም ይከብደኛል	0	1	2	3	4
204.	ክብደት ያለውን ገር ማንሳት ይከብደኛል	0	1	2	3	4
205.	ራስን ችሎ ላን ማታጠብ ይከብደኛል	0	1	2	3	4
206.	የቤት ውስጥ ስራዎችን ማከናወን ይከብደኛል	0	1	2	3	4
207.	የሕመም ወይም የጉዳት ስሜት ማሳማት ይከብደኛል	0	1	2	3	4
208.	መደከክ ምልክት (አቅም በጣም ያንሰኛል)	0	1	2	3	4
	ከወስጥ ስሜት ጋር የተያያዙ ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
209.	እፈራለሁ	0	1	2	3	4
210.	አዝናለሁ	0	1	2	3	4
211.	እቆጣለሁ	0	1	2	3	4
212.	የእንቅልፍ ማጣት ችግር አለብኝ	0	1	2	3	4
213.	ምን ሊያጋጥመኝ ይችላል ብዬ እሰጋለሁ	0	1	2	3	4
	ከመከላከያ ሕይወት ጋር የተያያዙ ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
214.	ከሌሎች ህፃናት ጋር አብሮ/ራዬ ማህን ችግር አለብኝ	0	1	2	3	4

215.	ሌሎች ልጆች የእኔ ጓደኛ መሆን አይፈልጉም	0	1	2	3	4
216.	ሌሎች ልጆች ያበሽቁኛል (ያፈተብኛል)	0	1	2	3	4
217.	የእኔ እኩዮች ሌሎች ህፃናት የሚሰሩባቸውን ስራዎች መከራት አልችልም	0	1	2	3	4
218.	ከሌሎች ህፃናት ጋር ስጩት እንደ እነሱ መቀጠል ይከብደኛል	0	1	2	3	4
	በትምህርት ዙሪያ ያሉ ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
219.	በመሆኔ ክፍል ውስጥ በትምህርት መከታተል ይከብደኛል	0	1	2	3	4
220.	ነገሮችን እረሳለሁ	0	1	2	3	4
221.	ከትምህርት ቤት የሚሰጡ ስራዎችን መከራት ያለመቻል ችግር አለብኝ	0	1	2	3	4
222.	በሕመም ምክንያት ከትምህርት ቤት እቀራለሁ	0	1	2	3	4
223.	ሐኪም ቤት ለመጫወት ከትምህርት ቤት እቀራለሁ	0	1	2	3	4

ክፍል 2.2. ወላጅ ወይንም አሳዳጊ የሚቃረን መግቢያ /ስለ አጠቃላይ የኑሮ ሁኔታ/

የመግቢያ አጠቃላይ መረጃ

በተከታታይ ገጾች በልጅዎ ላይ ሊታዩ የሚችሉ ችግሮች ተዘርዝረዋል፤ ስለሆነም የተጠቀሰው ችግር የሚታይ ከሆነ ባለፈው እንደ ወር ውስጥ የችግሩን አስከፊነት እንዲግልፁልን በትህትና እንጠይቃለን፡፡

0 ችግር በጭሽ የለም 1 ችግር ባብዛኛው የለም 2 ችግር አንዳንድ ጊዜ ይታያል

3 ችግር ባብዛኛው ይታያል 4 ችግር ሁልጊዜ ይታያል

ተ.ቁ.	ከጤና ክስካል ብቃት ጋር የተያያዙ ልጅዎ ያለበት/ባት ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
224.	ከ 1 ደረጃ በላይ በእግሩ/ሮዋ መጓዝ ይከብደዋል/ዳታል	0	1	2	3	4
225.	መሮጥ ይከብደዋል/ዳታል	0	1	2	3	4
226.	የአካል መግልጫ እንቅስቃሴ ወይም የሰውነት እንቅስቃሴ ላይ መከተል ይከብደዋል/ዳታል	0	1	2	3	4
227.	ክብደት ያለው ነገር መንሳት ይከብደዋል/ዳታል	0	1	2	3	4
228.	ራስን ችሎ ላን መታጠብ ይከብደዋል/ዳታል	0	1	2	3	4
229.	የቤት ውስጥ ስራዎችን መከናወን መከብድ	0	1	2	3	4
230.	የሕመም ወይም የጉዳት ስሜት መከሰት	0	1	2	3	4

231.	መደካከም(አቅምበጣም ያንሰዋል/ሳታል)	0	1	2	3	4
	ከወስጣዊ ስሜት ጋር የተያያዙ ልጅዎ ያለበት/ባት ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛ ው አየታይ ም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛ ው ይታያል	ችግሩ ሁልጊ ዜ ይታያል
232.	የፍርሃት ስሜት	0	1	2	3	4
233.	የሀዘን ወይም የብስጭ ስሜት	0	1	2	3	4
234.	ንዴት (መቆጣት)	0	1	2	3	4
235.	የእንቅልፍ ማጣት	0	1	2	3	4
236.	ምን ሊያጋጥሙኝ ይችላል በመል መጫኔ ቅ	0	1	2	3	4
	ከማህበራዊ ሕይወት ጋር የተያያዙ ልጅዎ ያለበት/ባት ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛ ው አየታይ ም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛ ው ይታያል	ችግሩ ሁልጊ ዜ ይታያል
237.	ከሌሎች ህፃናት ጋር አብሮ/ራዩ መሆን ችግር አለበት/ባ	0	1	2	3	4
238.	ሌሎች ልጆች በጓደኝነት አብረዋቸው መሆን አለመረዳት	0	1	2	3	4
239.	በሌሎች ልጆች ማሳሸቅ (ያፈዙበታል/ባታ)	0	1	2	3	4
240.	እኩሮቻቸው የሚያደርጉትን ነገሮች ማድረግ ያለመቻል	0	1	2	3	4
241.	ከሌሎች ህፃናት ጋር ሲጨው/ስትጨው እንደ እነሱ መቅጠል ይከብደዋል/ዳታል	0	1	2	3	4
	በትምህርት ዙሪያ ልጅዎ ያለበት/ባት ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛ ው አየታይ ም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛ ው ይታያል	ችግሩ ሁልጊ ዜ ይታያል
242.	በመሠረቱ ክፍል ውስጥ ትምህርት ማከታተል ያለመቻል	0	1	2	3	4
243.	ነገሮችን የመረሳት ችግር	0	1	2	3	4
244.	ከትምህርት ቤት የሚሰጡ ራዎችን ማከራት ያለመቻል	0	1	2	3	4
245.	በሕመም ምክንያት ከትምህርት ቤት መቆረት	0	1	2	3	4
246.	ሐኪም ቤት ለመድከም ከትምህርት ቤት መቆረት	0	1	2	3	4

ክፍል 3 - የስኳር ህመም ላይ የሚገኙ ሰዎች ህይወት ደረጃ በህፃናት ህክምና እይታ ሞጁል ቅጽ 3.2

ክፍል 3.1. ልጆች የሚጥሉት ማጠቃለያ /ከስኳር ሕመም ጋር የተያያዘ/

የማጠቃለያ አጠቃላይ መሠረዎ

ታዳጊ ህፃናቶችና ታዳጊ ወጣቶች አንዳንድ ጊዜ ከስኳር ህመም ጋር ተያይዞ የተለየ

የሚያጋጥሙት ችግሮች ሊኖሩ

ይችላሉ፡ ፡ ከነዚህ ውስጥ በሚከተለው ቅጽ ውስጥ ተዘርዝረዋል፡ ፡ በባለፈው አንድ ወር

ወስጥበእርሶ ላይ ምን

ያህሎች ችግሮች እንደተስተዋሉ እንዲግልፁልን በትህትና እንጠይቃለን፡፡

0 ችግሩ በጭሽ የለም 1 ችግሩ ባብዛኛው የለም 2 ችግሩ አንዳንድ ጊዜ ይታያል

3 ችግሩ ባብዛኛው ይታያል 4 ችግሩ ሁልጊዜ ይታያል

	ከስኳር ሕመም ጋር የተያያዙ ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
301.	ደርበኛል	0	1	2	3	4
302.	ይጠመኛል	0	1	2	3	4
303.	ወደ መፀዳጃ ቤት ቶሎ ቶሎ እሄዳለሁ	0	1	2	3	4
304.	የሆድ ህመም አለብኝ	0	1	2	3	4
305.	የራስ ምታት አለብኝ	0	1	2	3	4
306.	እራሱን/ሷን መቆጣጠር ይሳነኛል (ማጥወል ወል)	0	1	2	3	4
307.	የስኳር መጠኑ ይወርዳል	0	1	2	3	4
308.	የስኳር መጠኑ ይጨምራል	0	1	2	3	4
309.	ይደክመኛል	0	1	2	3	4
310.	ያንቀጠቅጠኛል	0	1	2	3	4
311.	ያልበኛል	0	1	2	3	4
312.	ያፈዘኛል	0	1	2	3	4
313.	አቅም አጣላለሁ	0	1	2	3	4
314.	እንቅልፍ ማጣት ችግር አለብኝ	0	1	2	3	4
315.	እነ ጭጭ ጭጭ	0	1	2	3	4
	ከሕክምናው ጋር የተያያዙ ችግሮች /1/	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
316.	ከጣት ላይ የደምና መኖ ሲወሰድ ሕመም ይሰማኛል	0	1	2	3	4
317.	ኢንሱሊን ሲሰጠኝ ሕመም ይሰማኛል	0	1	2	3	4
318.	በስኳር ሕመሙ አፍራለሁ/መኖ መቆቅ/	0	1	2	3	4
319.	በሕክምናው የተነሳ ሳክቤተሰብ ጋር እጣለሁ (ማጭቃጭ)	0	1	2	3	4
320.	ሕመሙ የሚፈገውን ውንኑ ገሮች (የስኳር ህመም እንክብካቤ) እቅዱን ለማድረግ አቸገራለሁ	0	1	2	3	4
	ከሕክምናው ጋር የተያያዙ ችግሮች /2/	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
321.	ከጣት ላይ የደምና መኖ ለመወሰድ የጉልኮስ ምርመራ ማድረግ አቸገራለሁ	0	1	2	3	4
322.	ኢንሱሊን ለመወሰድ አቸገራለሁ	0	1	2	3	4
323.	ለመጨመር ወይም ስፕሮች ለመከራት (የአካል እንቅስቃሴን ማድረግ) አቸገራለሁ	0	1	2	3	4
324.	ስኳር አወሳሰድን ለመከተካከል አቸገራለሁ	0	1	2	3	4
325.	ፈጣን ሐይል ሰጪ ምግብ ይከብደኛል					

326.	የስኳር ማጠን ሲወርድ ለማስተካከል አቸገራለሁ	0	1	2	3	4
	ከጭቀት ጋር የተያያዙ ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
327.	የስኳር ማጠኔ ይወርዳል ብዬ እንጂ ቃለሁ	0	1	2	3	4
328.	የስኳር ማጠኔ ይጨምራል ብዬ እንጂ ቃለሁ	0	1	2	3	4
329.	ስለስኳር ህመም ረጅም ዘመን ችግር እንጂ ቃለሁ					
	ከመግባባት ጋር የተያያዙ ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
330.	ለሕክምና ባለሙያዎች ስለሚሰጡ መመሪያዎች ስሜት ለመገናኛ አቸገራለሁ	0	1	2	3	4
331.	የሕክምና ባለሙያዎችን ጥያቄዎች ለማጠየቅ አቸገራለሁ	0	1	2	3	4
332.	ስለሕመሙ ሌሎች ሰዎች ለማስረዳት አቸገራለሁ	0	1	2	3	4
333.	የስኳር ሕመሙን በመሆኔ አፍረት ይሰማኛል	0	1	2	3	4

ክፍል 3.2. ወላጅ ወይንም አሳዳጊ የሚጻጸው መግቢያ /ከስኳር ሕመም ጋር የተያያዘ/ የመግቢያ አጥጋቢ መሠረዳ

ታዳጊ ህፃናቶችና ታዳጊ ወጣቶች አንዳንድ ጊዜ ከስኳር ህመም ጋር ተያይዞ የተለየ የሚያጋጥሙ ችግሮች ሊኖሩ ይችላሉ፡ ስነ ዚህ ውስጥ በሚካተተው ቅጽ ውስጥ ተዘርዝረዋል፡ በባለፈው አንድ ወር ውስጥ በልጅዎት ላይ ምን ያህሎች ችግሮች እንደተስተዋሉ እንዲግልፁልን በትህትና እንጠይቃለን፡፡

0 ችግሩ በጭሽ የለም 1 ችግሩ ባብዛኛው የለም 2 ችግሩ አንዳንድ ጊዜ ይታያል

3 ችግሩ ባብዛኛው ይታያል 4 ችግሩ ሁልጊዜ ይታያል

	ከስኳር ሕመም ጋር የተያያዙ ልጅዎ ያለበት/ባት ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
334.	የረሀብ ስሜት	0	1	2	3	4
335.	የማጠማት ስሜት	0	1	2	3	4
336.	ወደ መፀዳጃ ቤት ቶሎ ቶሎ መሄድ	0	1	2	3	4
337.	የሆድ ህመም	0	1	2	3	4
338.	የራስ ምታት	0	1	2	3	4
339.	እራሱን/ሷን መቆጣጠር ይሳነዋል/ናታል (ማጥፋት ወይም)	0	1	2	3	4
340.	የስኳር ማጠን ይወርዳል	0	1	2	3	4
341.	የስኳር ማጠን ይጨምራል	0	1	2	3	4

342.	የድካም ስሜት	0	1	2	3	4
343.	ማንቀጥቀጥ	0	1	2	3	4
344.	ለብላብ ማለት	0	1	2	3	4
345.	የፈዘኛል	0	1	2	3	4
346.	አቅም አጣላ	0	1	2	3	4
347.	እንቅልፍ ማጣት	0	1	2	3	4
348.	ማጭጭ	0	1	2	3	4
	ከሕክምናው ጋር የተያያዙ ልጅዎ የለበት/ባት ችግሮች/1/	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
349.	ከጣት ላይ የደምና መፍ ሲወሰድ ሕመም ይሰማል/ታል	0	1	2	3	4
350.	ኢንሱሊን ሲሰጥ ሕመም ይሰማል/ታል	0	1	2	3	4
351.	በስኳር ሕመም መፈረ /መሻ ማቆቅ/	0	1	2	3	4
352.	በሕክምናው የተነሳ ከቤተሰብ ጋር መጣለት (ማጭጭ)	0	1	2	3	4
353.	ሕመሙን መፈልገውን ነገሮች (የስኳር ሕመም እንደ ክብካቤ) እንቅልፍ/ዳን ለማድረግ መቻሉን	0	1	2	3	4
	ከሕክምናው ጋር የተያያዙ ልጅዎ የለበት/ባት ችግሮች/2/	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
354.	ከጣት ላይ የደምና መፍ ለመውሰድ መቻሉን	0	1	2	3	4
355.	ኢንሱሊን ለመውሰድ መቻሉን	0	1	2	3	4
356.	ለመጨመር ወይም ስፕሮት ለመሰራት (የአካል እንቅስቃሴን ማድረግ) መቻሉን	0	1	2	3	4
357.	ስኳር አወሳሰድን ለማስተካከል መቻሉን	0	1	2	3	4
358.	ፈጣን ሀይል ስጪ ምግቦችን መውሰድ ይከብደዋል/ይከብዳታል	0	1	2	3	4
359.	የስኳር መጠን ሲወርድ ለማስተካከል መቻሉን	0	1	2	3	4
	ከጭቀት ጋር የተያያዙ ልጅዎ የለበት/ባት ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
360.	የስኳር መጠኑ ይወርዳል ብሎ ማሰብ	0	1	2	3	4
361.	የስኳር መጠኑ ይጨምራል ብሎ ማሰብ	0	1	2	3	4
362.	ስለስኳር ሕመም የረጅም ጊዜ መቆየት ይጨምራል/ትጭቃል	0	1	2	3	4
	ከመግባባት ጋር የተያያዙ ልጅዎ የለበት/ባት ችግሮች	ችግሩ በጭሽ አይታይም	ችግሩ ባብዛኛው አይታይም	ችግሩ አንዳንድ ጊዜ ይታያል	ችግሩ ባብዛኛው ይታያል	ችግሩ ሁልጊዜ ይታያል
363.	ለሕክምና ባለሙያዎች ስለመሰማዎት ስሜት ለመገናኛ መቻሉን	0	1	2	3	4
364.	የሕክምና ባለሙያዎችን ጥያቄዎች	0	1	2	3	4

	ለመጠየቅ መቼ ገር					
365.	ስለሕመሙ ሌሎች ሰዎች ለመነረዳት መቼ ገር	0	1	2	3	4
366.	ልጅዎ የስኳር ሕመምተኛ በመሆን ኑ/ና አፍረት ይሰማል/ታል	0	1	2	3	4

ክፍል 4 - ስለ ልጁ መረጃ (በመረጃ ሰብሳቢ)

401.	ክብደት	_____	
402.	ቁመት	_____	
403.	የኤፍ ቢኤስ (FBS) ምርመራ ተሰርታል? (ከካርድ ላይ በሞያት: መዝግብ/ቢ)	1. አለ 2. የለም	
404.	ካለ ቢያንስ ሶስት ጊዜ መዝግብ/ቢ	1. _____ 2. _____ 3. _____	
405.	የቅርብ ጊዜ የተሰራለት HgbA1c (ከካርድ ላይ በሞያት: መዝግብ/ቢ)	3. አለ 4. የለም	
406.	አለ ከተመረጠ HgbA1c ውጤት _____	1. _____	

11.4. Annex IV: Summary of simple linear regression results on HRQoL and DRQoL with socio-demographic and clinical characteristics

Table 12: Summary of simple linear regression on HRQoL with socio-demographic and clinical characteristics among children and adolescents with T1DM on follow up at selected public hospital, Addis Ababa, Ethiopia, 2021

		Physical functioning		Emotional functioning		Social Functioning		School Functioning		Psychosocial functioning		Total GCS	
		β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value
Age		-0.124 (-0.880,-0.092)	0.016 *	-0.275 (-1.800,-0.860)	<0.001 *	-0.045 (-0.414,0.159)	0.356	-0.217 (-1.534,-0.569)	<0.001 *	-0.260 (-1.161,-0.526)	<0.001 *	-0.237 (-1.017,-0.420)	<0.001 *
Sex	Male (Ref)												
	Female	-0.125 (-6.339,-0.679)	0.015 *	-0.004 (-3.652,3.372)	0.938	-0.050 (-3.077,1.033)	0.329	0.072 (-1.027,6.003)	0.165	0.014 (-2.025,2.700)	0.779	-0.046 (-3.209,1.202)	0.371
Child/adolescent educational status	Kindergarten (Ref)												
	Primary	-0.057 (-6.272,2.863)	0.464	-0.190 (-12.529,-1.475)	0.013 *	-0.050 (-4.396,2.219)	0.518	-0.233 (-14.160,-3.082)	0.002 *	-0.225 (-9.305,-1.836)	0.004*	-0.182 (-7.726,-0.725)	0.018*
	Secondary	-0.129 (-9.890,0.742)	0.091	-0.305 (-19.731,-6.864)	<0.001 *	-0.045 (-5.008,2.692)	0.555	-0.239 (-16.750,-3.856)	0.002 *	-0.281 (-12.600,-3.906)	<0.001 *	-0.254 (-11.047,-2.899)	0.001*
	Not started	-0.064 (-19.122,4.837)	0.242	-0.092 (-27.235,1.759)	0.085	-0.063 (-13.795,3.557)	0.247			-0.077 (-16.959,2.634)	0.151	-0.085 (-16.518,1.844)	0.117
Family setting	Biparental (Ref)												
	Monoparental	-0.139 (-7.537,-1.188)	0.007 *	-0.150 (-9.698,-1.925)	0.003 *	-0.186 (-6.494,-1.950)	<0.001*	-0.152 (-9.655,-1.956)	0.003 *	-0.204 (-7.876,-2.717)	<0.001 *	-0.204 (-7.380,-2.543)	<0.001 *
	Other	-0.037 (-10.190,4.785)	0.478	-0.111 (-19.305,-0.973)	0.030 *	-0.055 (-8.308,2.409)	0.280	-0.168 (-25.037,-6.268)	0.001 *	-0.150 (-15.305,-3.138)	0.003*	-0.119 (-12.545,-1.137)	0.019*

Mother's Education status	No formal education/read and write (Ref)												
	Primary education	0.226 (3.185,11.090)	<0.001*	0.320 (7.683,17.209)	<0.001*	0.222 (2.204,7.893)	0.001*	0.172 (1.709,11.569)	0.008*	0.311 (4.946,11.348)	<0.001*	0.319 (4.824,10.789)	<0.001*
	Secondary education	0.166 (1.131,8.614)	0.011*	0.240 (4.160,13.177)	<0.001*	0.323 (4.155,9.540)	<0.001*	0.245 (4.165,13.526)	<0.001*	0.338 (5.193,11.253)	<0.001*	0.312 (4.258,9.905)	<0.001*
	College	-0.050 (-6.321,2.601)	0.413	-0.020 (-6.289,4.463)	0.594	0.133 (0.401,6.821)	0.028*	0.046 (-3.422,7.665)	0.452	0.053 (-1.956,5.270)	0.368	0.016 (-2.916,3.816)	0.793
Father's Education status	No formal education/read and write (Ref)												
	Primary education	0.162 (1.814,10.106)	0.005*	0.222 (5.072,15.020)	<0.001*	0.066 (-1.255,4.743)	0.253	0.154 (1.962,11.985)	0.007*	0.203 (2.864,9.507)	<0.001*	0.212 (2.915,9.171)	<0.001*
	Secondary education	0.147 (0.986,8.226)	0.013*	0.305 (7.414,16.099)	<0.001*	0.148 (0.732,5.968)	0.012*	0.306 (7.404,16.117)	<0.001*	0.346 (6.061,11.861)	<0.001*	0.307 (4.708,10.169)	<0.001*
	College	0.023 (-3.064,4.575)	0.698	0.128 (0.656,9.820)	<0.025*	-0.032 (-3.543,1.982)	0.579	0.225 (4.595,13.770)	<0.001*	0.165 (1.500,7.620)	0.004*	0.125 (0.349,6.112)	0.028*
Mother's Occupation	House wife/Daily laborer (Ref)												
	Private/Gov't employee	-0.091 (-5.938,0.384)	0.085	-0.070 (-6.531,1.253)	0.183	0.122 (0.404,4.958)	0.021	0.054 (-1.904,5.902)	0.315	0.026 (-1.975,3.287)	0.624	-0.022 (-2.989,1.926)	0.671
	Private/self-organization	0.034 (-3.144,6.167)	0.524	0.064 (-2.177,9.288)	0.223	0.006 (-3.173,3.532)	0.916	-0.013 (-6.502,5.093)	0.811	0.029 (-2.780,4.971)	0.579	0.036 (-2.360,4.878)	0.494
Father's Occupation	Unemployed/Daily laborer (Ref)												
	Private/Gov't	0.171 (1.714,7.849)	0.002*	0.199 (3.087,10.637)	<0.001*	0.177 (1.343,5.783)	0.002*	0.220 (3.753,11.305)	<0.001*	0.263 (3.578,8.592)	<0.001*	0.261 (3.300,7.987)	<0.001*

	employee												
	Private/self-organization	0.157 (1.834,10.292)	0.005 *	0.078 (- 1.489,8.919)	0.161	0.063 (- 1.304,4.817)	0.260	0.070 (- 1.888,8.453)	0.213	0.093 (- 0.502,6.410)	0.094	0.136 (0.815,7.276)	0.014*
Frequency of insulin administration	Twice(ref)												
	Three times	-0.106 (- 21.438,-0.552)	0.039 *	-0.094 (- 24.854,0.898)	0.068	-0.028 (- 9.664,5.486)	0.588	-0.058 (- 21.723,6.001)	0.266	-0.095 (- 16.848,0.472)	0.064	-0.119 (- 17.646,1.503)	0.020*
Who administers insulin	Self (ref)												
	Primary care giver	0.072 (- 0.837,4.901)	0.164	0.290 (6.745,13.525)	<0.001*	0.072 (- 0.604,3.536)	0.165	0.123 (0.755,7.827)	0.018 *	0.225 (2.976,7.618)	<0.001 *	0.189 (1.967,6.340)	<0.001 *
Family monthly income	Low(ref)												
	Medium/High	0.056 (- 1.430,4.937)	0.280	0.094 (- 0.270,7.548)	0.068	0.142 (0.950,5.504)	0.006 *	0.112 (0.410,8.273)	0.031 *	0.144 (1.144,6.371)	0.005*	0.127 (0.635,5.531)	0.014*
Number of children	≤ 4(ref)												
	> 4	-0.145 (- 17.060,-3.145)	0.005 *	-0.055 (- 13.324,3.970)	0.288	0.093 (- 0.388,9.716)	0.070	-0.042 (- 12.124,5.104)	0.423	-0.021 (- 7.021,4.627)	0.686	-0.080 (- 9.718,1.134)	0.121
Duration of DM		-0.096 (- 0.793,0.020)	0.062	-0.166 (-1.323,- 0.331)	0.001 *	-0.028 (- 0.377,0.212)	0.582	-0.007 (- 0.539,0.468)	0.890	-0.095 (- 0.655,0.019)	0.064	-0.109 (-0.655,- 0.026)	0.034*
Attending Health Education	Yes(ref)												
	No	0.056 (- 1.312,4.584)	0.276	0.056 (- 1.625,5.636)	0.278	-0.072 (- 3.650,0.600)	0.159	0.030 (- 2.578,4.712)	0.565	0.023 (- 1.896,2.995)	0.659	0.042 (- 1.347,3.220)	0.420
Admission in the past 6 months	Yes (ref)												
	No	0.083 (- 0.556,5.688)	0.107	-0.037 (- 5.246,2.464)	0.478	-0.061 (- 3.615,0.897)	0.237	0.236 (5.197,12.724)	<0.001*	0.076 (- 0.644,4.531)	0.140	0.090 (- 0.252,4.578)	0.079
Family history of DM	Yes (ref)												
	No	-0.170 (-9.001,- 2.347)	0.001 *	-0.015 (- 4.764,3.550)	0.774	-0.105 (- 4.949,-0.103)	0.041 *	-0.041 (- 5.804,2.484)	0.431	-0.057 (- 4.358,1.227)	0.271	-0.116 (-5.594,- 0.403)	0.024*
HbA1C		-0.135 (-1.426,- 0.008)	0.047 *	0.004 (- 0.873,0.919)	0.959	-0.040 (- 0.826,0.450)	0.562	-0.091 (- 1.958,0.389)	0.189	-0.061 (- 1.012,0.384)	0.376	-0.098 (- 1.087,0.170)	0.152

Mean FBS		-0.152 (-0.044,-0.008)	0.005 *	0.098 (-0.002,0.045)	0.073	0.025 (-0.011,0.018)	0.644	-0.050 (-0.035,0.013)	0.365	0.029 (-0.012,0.020)	0.598	-0.046 (-0.021,0.009)	0.401
Frequency of monitoring of blood glucose	During follow up (Ref)												
	≥ 1per day	0.095 (-1.456,10.621)	0.136	0.173 (2.916,17.660)	0.006 *	0.019 (-3.677,5.030)	0.760	0.169 (2.544,17.578)	0.009 *	0.171 (1.896,11.803)	0.007*	0.160 (1.350,10.625)	0.012*
	1-2 times per week	0.099(-2.001,17.211)	0.120	0.175 (4.829,28.283)	0.006 *	0.107 (-1.016,12.834)	0.094	0.152 (2.415,26.009)	0.018 *	0.190 (4.166,19.925)	0.003*	0.176 (3.058,17.812)	0.006*

β = Standardized regression coefficient, *Statistically significant= $p \leq 0.05$, ref. = Reference category

Table 13: Summary of simple linear regression on DRQoL with socio-demographic and clinical characteristics among children and adolescents with T1DM on follow up at selected public hospital, Addis Ababa, Ethiopia, 2021

		Diabetes symptom		Treatment barriers		Treatment adherence		Worry		Communication		Total DM score	
		β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value
Age		-0.307 (-1.831,-0.955)	<0.001*	-0.212 (-1.334,-0.484)	<0.001*	0.226 (0.671,1.709)	<0.001*	-0.376 (-2.807,-1.686)	<0.001*	-0.003 (-0.694,0.661)	0.961	-0.209 (-1.068,-0.382)	<0.001*
Sex	Male (Ref)												
	Female	-0.025 (-4.131,2.473)	0.622	0.038 (-1.949,4.294)	0.460	0.044 (-2.170,5.472)	0.396	0.020 (-3.477,5.215)	0.694	0.082 (-0.906,8.793)	0.111	0.024 (-1.924,3.119)	0.641
Child/ adolescent educational status	Kindergarten (Ref)												
	Primary	-0.403 (-19.052,-8.888)	<0.001*	-0.018 (-5.510,4.325)	0.813	0.248 (3.927,16.011)	0.001*	-0.276 (-19.219,-6.007)	<0.001*	-	-	-0.223 (-9.873,-1.925)	0.004*
	Secondary	-0.414 (-22.904,-11.074)	<0.001*	-0.209 (-13.849,-2.401)	0.006*	0.189 (1.918,15.983)	0.013*	-0.465 (-32.803,-17.426)	<0.001*	-	-	-0.294 (-13.836,-4.585)	<0.001*
	Not started	-0.138 (-31.266,-4.607)	0.008*	-0.092 (-24.209,1.590)	0.086	-0.045 (-22.593,9.101)	0.403	0.000 (-17.326,17.326)	1.000	-	-	-0.119 (-22.168,-1.321)	0.027*
Family setting	Biparental (Ref)												
	Monoparental	-0.196 (-10.759,-3.500)	<0.001*	-0.132 (-7.998,-1.053)	0.011*	-0.007 (-4.587,3.968)	0.887	-0.212 (-14.873,-5.426)	<0.001*	-0.071 (-9.217,1.653)	0.172	-0.191 (-8.056,-2.520)	<0.001*
	Other	-0.104 (-17.484,-0.362)	0.041*	0.054 (-3.777,12.604)	0.290	-0.100 (-20.036,0.143)	0.053	-0.170 (-30.353,-8.070)	0.001*	-0.097 (-25.135,0.503)	0.060	-0.127 (-14.867,-1.810)	0.012*
Mother's Education status	No formal education/read and write (Ref)												
	Primary education	0.328(7.467,16.535)	<0.001*	0.212 (2.937,11.725)	0.001*	0.040 (-3.636,6.997)	0.535	0.208 (3.945,16.067)	0.001*	0.080 (-2.539,11.203)	0.216	0.295 (4.786,11.684)	<0.001*
	Secondary	0.302	<0.001	0.135	0.041*	0.151	0.021*	0.224	0.001*	0.192	0.004*	0.324	<0.001

	education	(5.967,14.551)	*	(0.176,8.495)		(0.898,10.963)		(4.304,15.778)		(3.133,16.141)		(5.138,11.667)	*
	College	0.172 (2.350,12.584)	0.004*	0.043 (- 3.194,6.725)	0.484	-0.136 (- 12.846,-0.844)	0.025*	0.019 (- 5.749,7.932)	0.754	0.051 (- 4.481,11.029)	0.407	0.083 (- 1.153,6.633)	0.167
Father's Education status	No formal education/re ad and write (Ref)												
	Primary education	0.133 (0.920,10.437)	0.019*	0.157 (1.785,10.883)	0.006*	-0.004 (- 5.823,5.450)	0.948	0.118 (0.307,12.935)	0.040*	0.068 (- 2.827,11.419)	0.236	0.139 (0.885,8.169)	0.015*
	Secondary education	0.239 (4.499,12.808)	<0.001 *	0.160 (1.519,9.462)	0.007*	-0.014 (- 5.508,4.334)	0.815	0.182 (3.180,14.204)	0.002*	0.053 (- 3.407,9.031)	0.375	0.206 (2.521,8.881)	<0.001 *
	College	0.177 (2.466,11.233)	0.002*	0.102 (- 0.483,7.898)	0.083	0.057 (- 2.665,7.719)	0.339	0.165 (2.587,14.220)	0.005*	0.150 (1.965,15.088)	0.011	0.196 (2.437,9.148)	0.001*
Mother's Occupation	House wife/ Daily laborer (Ref)												
	Private/ Gov't employee	-0.046 (- 5.302,2.048)	0.385	-0.023 (- 4.235,2.716)	0.668	-0.159 (- 10.699,-2.284)	0.003*	-0.031 (- 6.293,3.381)	0.554	0.006 (- 5.111,5.733)	0.910	-0.081 (- 4.985,0.615)	0.126
	Private/self- organization	0.022 (- 4.284,6.541)	0.682	0.046 (- 2.861,7.377)	0.386	0.002 (- 6.096,6.298)	0.975	-0.054 (- 10.791,3.456)	0.312	0.019 (- 6.513,9.458)	0.717	0.017 (- 3.455,4.793)	0.750
Father's Occupation	Unemployed / Daily laborer (Ref)												
	Private/ Gov't employee	0.268 (5.188,12.188)	<0.001 *	0.148 (1.140,7.907)	0.009*	-0.012 (- 4.627,3.731)	0.833	0.264 (6.678,15.847)	<0.001 *	0.139 (1.381,11.883)	0.013*	0.253 (3.568,8.924)	<0.001 *
	Private/self- organization	0.135 (1.177,10.827)	0.015*	0.053 (- 2.426,6.902)	0.346	0.014 (- 5.058,6.464)	0.810	0.216 (6.352,18.992)	<0.001 *	0.154 (2.913,17.390)	0.006*	0.164 (1.877,9.261)	0.003*
Frequency of insulin administrat ion	Twice(ref)												
	Three times	-0.127 (- 27.336,-3.207)	0.013*	-0.060 (- 18.270,4.695)	0.246	-0.094 (- 27.030,1.013)	0.069	-0.036 (- 21.726,10.266)	0.482	-0.003 (- 18.496,17.344)	0.950	-0.118 (- 20.075,1.630)	0.021*
Who administers insulin	Self (ref)												
	Primary care giver	0.289 (6.318,12.696)	<0.001 *	0.192 (2.883,9.066)	<0.001 *	-0.179 (- 10.597,-3.008)	<0.001 *	0.263 (7.158,15.616)	<0.001 *	-0.032 (6.456,3.354)	0.534	0.185 (2.159,7.158)	<0.001 *

Family monthly income	Low(ref)												
	Medium/High	-0.018 (-4.361,3.023)	0.722	0.011 (-3.096,3.888)	0.823	0.071 (-1.254,7.275)	0.166	0.118 (0.842,10.492)	0.021*	0.089 (-0.633,10.204)	0.083	0.051 (-1.410,4.222)	0.327
Number of children	≤ 4(ref)												
	> 4	-0.090 (-15.371,0.851)	0.079	0.011 (-6.827,8.577)	0.823	0.017 (-7.844,11.013)	0.741	-0.058 (-16.805,4.595)	0.263	-0.075 (-20.887,3.043)	0.143	-0.070 (-10.491,1.916)	0.175
Duration of DM		-0.035 (-0.635,0.311)	0.500	-0.118 (-0.967,-0.079)	0.021*	0.032 (-0.373,0.722)	0.531	-0.138 (-1.465,-0.232)	0.007*	-0.048 (-1.024,0.369)	0.356	-0.064 (-0.589,0.132)	0.213
Attending Health Education	Yes(ref)												
	No	-0.042 (-4.836,1.998)	0.415	-0.117 (-6.945,-0.520)	0.023*	-0.070 (-6.675,1.225)	0.176	-0.078 (-7.942,1.031)	0.131	-0.267 (-18.133,-8.422)	<0.001*	-0.140 (-6.203,-1.032)	0.006*
Admission in the past 6 months	Yes (ref)												
	No	0.098 (-0.101,7.120)	0.057	-0.052 (-5.181,1.672)	0.315	0.082 (-0.805,7.568)	0.113	-0.080 (-8.533,0.986)	0.120	0.047 (-2.837,7.841)	0.357	0.070 (-0.854,4.673)	0.175
Family history of DM	Yes (ref)												
	No	-0.001 (-3.953,3.868)	0.983	-0.081 (-6.649,0.722)	0.115	-0.019 (-5.361,3.692)	0.717	-0.063 (-8.335,1.935)	0.221	-0.010 (-6.305,5.216)	0.853	-0.031 (-3.903,2.066)	0.545
HbA1C		-0.002 (-0.969,0.941)	0.977	-0.028 (-1.206,0.794)	0.685	0.118 (-0.124,1.982)	0.083	-0.037 (-1.703,0.964)	0.585	0.095 (-0.431,2.538)	0.163	0.046 (-0.510,1.036)	0.503
Frequency of monitoring of blood glucose	≥ 1per day (Ref)												
	1-2 times per week	0.059 (-3.690,14.244)	0.248	0.052 (-4.042,12.700)	0.310	0.079 (-2.302,18.514)	0.127	-0.021 (-14.057,9.255)	0.686	0.091 (-1.343,25.076)	0.078	0.082 (-1.233,12.363)	0.108
	During follow up	-0.088 (-13.083,0.875)	0.086	-0.183 (-18.497,-5.467)	<0.001*	-0.021 (-9.814,6.388)	0.678	-0.189 (-26.275,-8.131)	<0.001*	-0.057 (-16.094,4.469)	0.267	-0.134 (-12.391,-1.809)	0.009*
BMI for Age	Normal (ref)												
	Wasted	-0.009 (-9.815,8.140)	0.854	-0.033 (-11.312,5.718)	0.519	0.022 (-8.190,12.683)	0.672	0.022 (-9.291,14.432)	0.670	0.015 (-11.285,15.226)	0.770	0.005 (-6.543,7.211)	0.924
	Overweight/obese	0.092 (-0.841,17.114)	0.076	0.040 (-5.158,11.872)	0.439	0.003 (-10.113,10.760)	0.951	-0.011 (-13.137,10.586)	0.833	-0.062 (-21.381,5.130)	0.229	0.045 (-3.819,9.935)	0.382
Mean FBS		-0.159 (-0.055,-0.011)	0.004*	0.084 (-0.036,0.005)	0.128	-0.024 (-0.032,0.020)	0.662	-0.027 (-0.035,0.021)	0.624	-0.073 (-0.056,0.011)	0.181	-0.139 (-0.039,-0.005)	0.011*

β = Standardized regression coefficient, *Statistically significant= $p \leq 0.05$, ref. = Reference category

Declaration

I, Bisrat Tamene, declare that the research project entitled “Assessment of Quality of Life and its associated factors among Children and Adolescents with Type-I Diabetes Mellitus on follow-up at Pediatrics Endocrine Clinics of Specialized teaching Hospitals, Addis Ababa, Ethiopia” is my original work and has not been presented for a degree in this university or any other university and that all sources of material used for the project have been duly acknowledged.

Name of student: Bisrat Tamene (MD)

Signature: _____

Date: _____

Approval of Advisors

This research project has been submitted to Department of Public Health, St. Paul’s Hospital Millennium Medical College with my approval as an advisor

Name of Advisor 1:

Signature: _____

Date: _____

Name of Advisor 2:

Signature: _____

Date: _____