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**Evaluation of insulin used at the Palestinian MOH and  
diabetes complications**

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**Evaluation of insulin used at the Palestinian MOH and  
diabetes complications**

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requirements for the degree of Master of Pharmaceutical  
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Al-Quds University

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## Thesis Approval

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Jerusalem – Palestine

1438 / 2017

## **Dedication**

I dedicate this thesis to my family specially my mother, who gave me endless love, encouragement, and support every step of the way during my graduate education.

## **Declaration**

I certify that this thesis submitted for the degree of master is the result of my own research, except where otherwise acknowledged and that this thesis has not been submitted for a higher degree or any other university or institution.

Signature:

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Date: 2017/7/15

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## **Abstract**

### **Background**

Diabetic patient's numbers are increasing around the world, this metabolic disease affects patient's quality of life in all domains: physically, socially, psychologically and emotionally. As the disease progresses patients need to use insulin. According to the Palestinian MOH 12% of people in Palestine have diabetes. Twenty percent of type 2 diabetic patients, visits the MOH clinics, use insulin and 12% use both insulin and oral drugs to control their blood glucose levels. The only choice for these patients is the use of syringe and vial for the administration of insulin. Most of the diabetic patients QoL studies have been conducted in developed countries and only a few in developing countries.

### **Objective**

The aim of this study was to assess QOL of diabetic patients using insulin and factors affecting it.

### **Method**

A cross sectional study conducted on a sample of 311 diabetic patients using vial/syringe to administer insulin and attending MOH diabetic clinics in Bethlehem and Hebron. The questionnaire used was four parts; socio-demographic part, patient's health profile, QOL part and willingness to pay for insulin pens part. QoL measured using SF-36v2® questionnaire and the willingness to pay part validated using pilot study. The MOH approved the study and a verbal patient's consent obtained. Results were analyzed using QualityMetric Health Outcomes™ Scoring Software 4.0 and SPSS software.

### **Results and conclusion**

The mean scores of QoL domains ranges from 40.7 to 65.6. The domain with the highest score was social functioning ( $M = 65.6$ ), followed by physical functioning ( $M = 58.91$ ) and role emotional ( $M = 58.91$ ) while the lowest was vitality ( $M = 40.7$ ). Diabetic patients in this study had lower scores than general population in all domains of QoL; Physical Functioning, Role-Physical, Body Pain, General Health, Vitality, Role-emotional, Mental Health, physical composite summary and mental composite summary, except in social functioning. The majority of participants had lower scores than general population.

The result revealed that gender, age and glyceimic control had no significant impact on QoL. Married patients had better QOL than other patients. On the other hand it was influenced by residency, marital status, level of education, employment, monthly income, diabetes duration, diabetes type, diabetes complications and insulin regimen. 85% of participants preferred to use insulin pens if it was available as a choice in the MOH, and 35% of them were willing to pay extra money to get insulin pens instead of vial/syringe.

This study revealed that QoL of diabetic patients use insulin is low, which can be increased if the government included insulin pens in the MOH dug list, since many studies revealed that the use of insulin pens increases the QoL.



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## **List of Abbreviations**

HbA <sub>1c</sub>	Hemoglobin A1c
CVD	Cardiovascular disease
HRQOL	Health Related Quality of Life
QoL	Quality of Life
WHO	World Health Organization
SF-36	Short Form-36
WTP	Willingness To Pay
WHOQOL	World Health Organization Quality of Life Questionnaire
MOH	Ministry Of Health
DM	Diabetes Mellitus
DQOL	Diabetes Quality of Life Scale
RF	Role Physical
PF	Physical Functioning
GH	General Health
SF	Social Functioning
VT	Vitality
RE	Role Emotional
MH	Mental Health
PCS	Physical Component Summary
MCS	Mental Component Summary

## **Chapter 1: Introduction**

### **1.1 Diabetes**

Diabetes is a metabolic disease characterized by hyperglycemia, caused by deficiency in insulin secretion or tissue resistance to insulin action. 5-10% of diabetic patients have type 1 diabetes that is caused by destruction of B cells of the pancreas. 90-95% of patients have type 2, which is caused by insulin resistance and deficiency. Other types include gestational diabetes mellitus, diabetes due to genetic defects in B cells or insulin action and chemical or drug induced diabetes. The criteria for the diagnosis of diabetes is hemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>)  $\geq 6.5$  or fasting blood glucose  $\geq 126$  or 2 hours plasma glucose  $\geq 200$  using 75g glucose tolerance test, while type 1 diabetes is diagnosed when the patient appears with acute hyperglycemia.

Diabetes is related to microvascular and macrovascular complications. Microvascular complications include retinopathy, nephropathy and peripheral neuropathy, macrovascular complications include CVD, which is the most common cause of death in diabetic patients. Type 2 diabetes is frequently undiagnosed till the patient suffers from complications. Treatment of type 1 requires multiple daily insulin injections, type 2 treatment starts with oral hypoglycemic drugs and insulin is used at a later stage once blood glucose is no longer controlled by oral hypoglycemic agents. Glycemic control is the goal of treatments and lowering HbA<sub>1c</sub> to below 7% is the goal of treatment that is known to reduce diabetes complications (Association, 2005, 2012).

### **1.2 Epidemiology of diabetes**

The number of diabetic patients is increasing due to the increase in population age, obesity, rapid urbanization, physical inactivity and lifestyle changes. Many studies estimated the prevalence of diabetes in the future extrapolated from the current prevalence around the world. King et.al study (Kinge, Aubert, & Herman, 1998) suggested that between 1995 and 2025 the prevalence of diabetes will be increased by 35% and the number of diabetic patients by 122% from 135 million in 1995 to 300 million in 2025.

The number of people with diabetes in year 2000 was also estimated by Wild et al. (Sarah, Gojka, Anders, Richard, & Hilary, 2004) to be 171 million, which is higher than what was expected by King et. al., this study estimated the prevalence of diabetes to be doubled between 2000 and 2030. Both studies estimated the number of people with diabetes to be higher in developed countries than developing, and higher in urban than in rural.

Another study estimated the prevalence of diabetes worldwide for 2010 and 2030 using 133 studies from 91 countries found that; the highest prevalence for 2010 was in North America followed by Middle East and South Asia. By 2030 African countries are expected to have the highest prevalence followed by Middle East and North America. From 2010 to 2030 the overall increase in diabetics numbers is predicted to increase by 54%, number of diabetic patients in developing countries is expected to increase by 69%, while in developed countries by 20% (Shaw, Sicree, & Zimmet, 2010).

### **1.3 Diabetes in Palestine**

In Palestine one in ten people and two thirds of those older than 60 have at least one chronic disease (Husseini, Abu-Rmeileh, & Mikki, 2009). Husseini et.al. investigated the prevalence of diabetes in rural Palestinian population in Kobar, a village near Ramallah. The study included 500 participants, it was found that the prevalence of diabetes was 9.6%, which is considered high specially that the percentage is expected to be higher in urban areas (Husseini, 2000).

A recent publication from Birzeit University indicated that the prevalence of diabetes in Palestine was 15.3% in 2010 and is expected to increase to 23.4% by 2030 (Abu-Rmeileh et al., 2017).

According to the Palestinian MOH; 12% of people in Palestine have diabetes, which is estimated to be 500,000 patients. 5% of these patients have type 1 diabetes. On the other hand, 61% of type 2 diabetic patients use oral hypoglycemic drugs, 20% use insulin and 13% use both insulin and oral drugs to control their blood glucose levels. In the annual report 2016 there was 5761 new diabetic patients registered in the MOH. The number of patients visits the MOH facilities is 148,508 and 54,652 of them have diabetes



complications. The number of deaths caused by diabetes complications was 869 in 2015, which is estimated to be 19.7 out of 100.000 (*Health Report, 2016*).

#### **1.4 Quality of life**

QoL is a personal evaluation of how good or bad their life is. It evaluates the satisfaction of person's life in many aspects including psychological, environmental, social and physical. HRQoL concerns of health aspects as well as general QoL; it is the patient's perception of the effect of illness or treatments on their QoL, these two concepts, QoL and HRQoL, are used interchangeable (Theofilou, 2013).

QoL was defined by the WHO in 1947 as the perception of the individual's position in life, including the person's satisfaction of physical health, psychological health and social relationships. QoL is subjective; each person thinks of specific dimensions when he/she wants to evaluate their life, it also changes over time and influenced by many effects (Speight, Reaney, & Barnard, 2009; Theofilou, 2013).

#### **1.5 QOL measurements**

Only in recent years there has been a great interest in QoL measurement. In the first measurement depended on factors like physical symptoms, anxiety and depression or ability to attend to school. It is used in clinical trials especially for chronic diseases in order to measure improvements in patient's feeling and daily functioning.

QoL measurement could be done using generic measures or disease specific measures. Disease specific measures provide detailed information about the disease and treatment care impact on QoL while generic instruments assess the more global effect of the disease and complications on quality of life. Diabetes specific measurements contain domains that are specific for diabetic patients such as diet and enjoyment of food. diabetes specific instruments include Diabetes Quality of Life, Diabetes-39, Problem Areas in Diabetes (PAID) survey, Audit of Diabetes-Dependent Quality of Life (ADDQOL) and Diabetes Specific Quality of Life (Rubin & Peyrot, 1999; Speight et al., 2009) .

Generic measures such as the World Health Organization Quality of Life - Brief (WHOQOL-BREF) and The European Quality of Life (EUROQOL) are preferred by many scientists because they are more concerned about psychosocial factors. These instruments assess concepts that are relevant to everyone. The choice of the questionnaire depends on the purpose of the research, the time for the completion of the questionnaire and possibility of self-administration (Eiser, 2004; Theofilou, 2013).

### 1.6 SF36

Short-form survey (SF-36) is a short health survey with 36 questions. It was introduced in 1980, constructed by the Medical Outcomes Study (MOS). This survey has been used as a QoL measurement in general and specific population. The most frequently studied diseases used SF36 as QoL measurement tool are arthritis, back pain, diabetes, hypertension and depression (Ware Jr, 2000; Ware Jr & Sherbourne, 1992).

It includes eight health concepts (Figure 1): 1-Physical Functioning; this part includes questions such as climbing stairs, kneeling and walking, 2- Role Physical; limitations because of physical functioning, 3- pain; questions are concerned of pain that interfere with daily activities, 4- Social Functioning; this part contains questions about the effect of physical and emotional health on social life, 5- Mental Health that includes anxiety, depression and behavioral control, 6- Role Emotional, 7- Vitality, which includes energy and fatigue and 8-general health. It also includes physical and mental health summary that are formed from the eight domains. Studies have shown that the questionnaire domains are valid and reliable (Ware Jr, 2000).

Items	Scales	Summary
Moderate activity	Physical functions (PF)	
Lift, carry grocery		
Climb several flights		
Climb one flight		
Bend, kneel		
Walk mile		
Walk several blocks		
Walk one block		
Bathe, dress		

Cut down time	Role physical (RP)	Physical Health (PCS)
Accomplished less		
Limited in kind		
Had difficulty		
Pain magnitude	Bodily pain (BP)	
Pain –interfere		
EVGFP rating "In general would you say your health"	General Health (GH)	
Sick easier		
As healthy		
Health to get worse		
Health excellent		
life	Vitality (VT)	Mental Health (MCS)
Energy		
Worn out		
Tired		
Social extent	Social Functioning (SF)	
Social time		
Cut down time		
Accomplished less	Role Emotional (RE)	
Not careful		
Nervous	Mental Health (MH)	
Down in dumps		
Peaceful		
Blue/sad		
Happy		

Figure 1: SF-36 health concepts.

This survey can be self-administered, computerized administration, phone-administration or personal interview to persons older than 14 years. This survey is short and can be administered in 10-15 minutes. Each domain is scored from 0 to 100 with a mean of 50 and a standard deviation of 10, scores less than 50 (average) represents health status below average. Results also are interpreted as norm based scoring (Ware Jr, 2000; Ware Jr & Sherbourne, 1992).

In a study to examine the use of SF-36 generic survey and the Audit of Diabetes Dependent Quality of Life (ADDQOL) in QoL evaluation for diabetic patients, it was found that the use of generic and disease specific measure together was complementary. Diabetes related comorbidities were detected by the two surveys while SF36 was strongly affected by non-diabetic comorbidities (Woodcock, Julious, Kinmonth, & Campbell, 2001).

Another study compared SF-36 and DCP (Diabetes Care Profile), a diabetes specific survey, in patients with type 2 diabetes. It was found that either or both instruments can be used to measure QoL in diabetic patients depending on the purpose of the study. Both instruments were highly reliable and provided valid information about patients with diabetes (Anderson, Fitzgerald, Wisdom, Davis, & Hiss, 1997).

### **1.7 Pharmacists and QOL**

Pharmacists have an important role in diabetes management with the increase in diabetes regimens complexity. Many studies studied the role of pharmacists on diabetic patients QOL. Pharmacists role included counseling and education on diabetes, medications, lifestyle changes, medication adherence and drug related problems. Most of these studies found that QOL was improved with pharmacists intervention (Pousinho, Morgado, Falcão, & Alves, 2016; Wubben & Vivian, 2008).

### **1.8 Willingness to pay**

Willingness to pay is the maximum amount of money that the individual would pay to get the benefits of a service or intervention. WTP will be different between patients depending on the preferences and income. In order for healthcare decision makers to determine to reimburse a certain intervention or treatment the incremental benefits are found, the incremental benefits are the sum that each patient is willing to pay; if the

incremental benefits are higher than the incremental costs then the treatment is preferred (Bala, Mauskopf, & Wood, 1999).

WTP studies are used to examine the importance of certain treatment attributes for the patients by allowing them to choose between two hypothetical products' profiles and explore the patient's preference and the out of pocket money they will trade for these attributes.

### **1.9 Problem statement**

A large number of studies have been conducted to characterize HRQOL in diabetic patients. Caring for those patients is a global challenge with the increasing in the number of people living with diabetes. They make a huge effort and many decisions every day and all day long to reach a non-diabetic metabolism rate, which will affect social, physical and emotional aspects of life. So the evaluation of QoL in these patients is essential to measure psychosocial well-being, the benefits of new treatments and identify the dissatisfaction of the existing treatments. Many studies found that the association of complications with diabetes such as cardiovascular disease and neuropathy decreases quality of life and increases depression and anxiety (E. S. Huang, Brown, Ewigman, Foley, & Meltzer, 2007).

Diabetic patients face daily obstacles in order to achieve glycemic control; they need blood glucose monitoring, diet changes, medical visits and adherence to the drugs, which affects their QoL. Most of the diabetic patients QoL studies have been conducted in developed countries and only a few in developing countries.

Diabetic patients who cannot control blood glucose using oral hypoglycemic drugs need to use insulin in order to decrease HbA<sub>1c</sub>. In order to achieve glycemic control multiple daily injections of insulin are recommended for patients. Many patients treated with insulin fear the needles, may lack sufficient diabetes education and deny the need for insulin, all these reasons contribute to the non-adherence in those patients (Asamoah, 2008; Control & Group, 1993),

In 2012 a study was performed in Al-Makhfia governmental diabetes primary healthcare clinic in Nablus city to assess medication adherence in patients with type 2 diabetes; the Morisky Medication Adherence Scale (MMAS-8) was used as the adherence

measurement tool. It was found that 57.3% of patients were considered adherent and 42.7% were non-adherent. 17% of patients reported that they stopped taking their medicine because they felt worse upon taking them, 33% of patients reported that they forgot to take their medication when they left home, 34.6% reported that they are annoyed by their treatment plan. In this study it was shown that non-adherence was associated with diabetes knowledge, concerns about medication side effects and believes about the necessity of the treatment (Sweileh et al., 2014).

In 2011 a study was performed in Ramallah to assess the level of glycemic control in patients with type 2 diabetes in Ramallah governmental clinics. 517 patients participated in the study, the mean HbA<sub>1C</sub> was 8.8%. The majority of patients had poor glycemic control and only one in five patients achieved glycemic control. The percentage of patients with poor glycemic control among patients used insulin or a combination of insulin and oral drugs was higher than patients use oral drugs alone or patients used no drugs. It was found that patients who have diabetes for less than 7 years are more likely to have a controlled glycemic sugar than patients who have diabetes for more than 7 years (Imseeh, 2013).

The main objective of the study described in this thesis is to evaluate the QoL of diabetic patients that use insulin in order to understand how diabetes and it's complications in this patient population affects patient's life. This study will identify important variables that affect QOL for these patients.

Non-adherence leads to poor glycemic control and the development of diabetes complications such as retinopathy and nephropathy (Asamoah, 2008; Control & Group, 1993). A large part of the health care budget of diabetes is used to treat diabetes complications, those complications can be significantly reduced if the patients have controlled their blood glucose (Stockl et al., 2007).

In order to estimate medical costs of diabetes in 2010 and future costs in 2030 a study was performed in Palestine by Niveen Abu-Rmeileh and her colleagues (Abu-Rmeileh et al., 2017). Direct costs were estimated to be \$194 million in 2010, these costs are expected to increase to 316 million in 2030. When diabetes complications are included, the cost tripled and estimated to be \$341 million in 2010 and increase to \$567 million by 2030. Diabetes costs are estimated to take 11.9% - 15.4% of the total health expenses from 2012 – 2030.

In order for patients to adhere to the insulin regimen, the insulin needs to be easy to use, minimize lifestyle disruptions and the ability of patients to learn the skills to use the insulin delivery system such as insulin pens. The simplicity of insulin pens will improve the compliance of patients and is especially important for older patients and patients having a difficulty in handling injection devices. Patients with low income should be encouraged to use devices such as insulin pens, in spite of their initial higher costs, in order to reduce health care resources costs including prescription costs, diabetes related health care costs and outpatient costs (Pawaskar et al., 2007).

In the Ministry of Health in Palestine the vial/syringes are available for insulin delivery and not insulin pens, in this study we will use a willingness to pay survey in order to examine the preference of patients for insulin pens.

### **1.10 Specific objectives**

1. To assess the perceived QoL among diabetic patients using insulin and visiting MOH facilities in Bethlehem and Hebron.
2. To assess whether or not the QoL measure is related to socioeconomic status of diabetic patients.
3. To correlate the relationship between duration of the disease and the patient's QoL.
4. To examine the association between the QoL and DM complications.
5. To assess the preference of diabetic patients for insulin pens and the amount of money they are willing to pay for them.

## **Chapter 2: Literature review**

### **2.1 QOL and diabetes**

Some studies found that patients taking oral medications have a better QoL than those that use insulin while others found no significant association between treatment regimen and QoL. Most studies found a relationship between glycemic control and QoL. Generally QoL is lower in diabetic patients than other people. On the other hand diabetic patients have better QoL than people with other chronic diseases such as cardiac problems, arthritis, epilepsy and stroke, except for hypertension. Many studies found that QoL of diabetic patients can be improved by educational and counseling programs, introductions of new drugs and the change in insulin delivery systems (Rubin & Peyrot, 1999).

Glasgow et al. (Glasgow, Ruggiero, Eakin, Dryfoos, & Chobanian, 1997) evaluated quality of life in 2800 diabetes patients of type 1 and 2 in the U.S using the Medical Outcomes Study (MOS) Short-Form (SF)-20. They found that diabetic patients in this study had lower quality of life than other population, men had higher quality of life than women, patients with lower income had lower quality of life and patients of type 2 diabetes taking insulin had lower quality of life than other patients.

Diabetic patient's quality of life was measured in Saudi Arabia using hospital anxiety and depression scale (HADS) and SF-36 survey. This study found that women and patients older than 50 had lower QoL, patients with higher income had higher QoL, patients using insulin had lower QoL than patients using other combination regimens including oral hypoglycemic agents and insulin, also the longer duration of diabetes was associated with lower QoL (Al Hayek, Robert, Al Saeed, Alzaid, & Al Sabaan, 2014).

A study conducted in 2012 in China using the diabetes-specific quality of life (DSQOL) questionnaire and the Zung Self-rating Depression Scale (ZSDS), they found that QoL was lower in patients have neuropathy, coronary heart disease (CHD), microvascular complications, peripheral vascular disease (PVD) and depression. On the other hand regular exercise was associated with higher quality of life. QoL was not



affected by HbA<sub>1c</sub>, while patients that regularly attend diabetes education had a higher quality of life (Cong, Zhao, Xu, Zhong, & Xing, 2012).

In 2006 a HRQOL study of diabetic patients was conducted in the refugee camps in Gaza strip, a sample of 200 diabetic and 200 non-diabetics was recruited to examine QoL. The World Health Organization Quality of Life Questionnaire – short version (WHOQOL-BREF) was translated to Arabic and used. 80 % of these patients had complications such as diabetic foot, neuropathy and nephropathy; more than 50% of them used oral medications. It was found that diabetic patients had lower income education and widowed compared to non-diabetics. WHOQOL involves physical, psychological, environmental and social relationships and in all these domains diabetic patients had lower scores than non-diabetics. In the controls there was no difference between males and female and between older and younger than 50 in QoL, while in diabetics females and older patients had lower QoL (Eljedi, Mikolajczyk, Kraemer, & Laaser, 2006).

In order to evaluate patient's perception of quality of life and their relationship with diabetes complications and treatments a study was performed in 2007 in Chicago area clinics. 23% of patients reported they had experienced microvascular complication and 30% reported that they have cardiovascular complications. 61% of the patients in this study used oral drugs, 25% used insulin and 14% use no medication to control their blood glucose. Regarding treatments the lowest quality of life ratings were for patients use multiple daily injections of insulin while these ratings were not significantly different for patients used comprehensive oral medications. Patients reported quality of life with complications to be significantly lower than that without diabetes complications (E. S. Huang et al., 2007).

A study was conducted in the North of West Bank to measure the QoL in patients with type 2 diabetes using SF-36 questionnaire. The study found that 30% of patients have poor general health and moderate pain; diabetic patients in general have poor functional activities. It was also found that women have poor QoL compared to men, patients with high level of education have better QoL than patients with low level of education and older patients have lower QoL than younger patients (Showli, 2013).

In 2011, a study to measure the QoL using SF-36 with diabetes type 1 patients was performed in the northern districts in the West Bank using patients registered in the MOH facilities. The mean score of QoL ranged from 51.7% to 75.6%, the highest scores were in

the bodily pain domain and the lowest in general health domain. Those results were lower than QoL of type 1 diabetes in other populations. The presence of complications was the most dominant variable that affected QoL negatively. It was also found that the level of education, the presence of additional source of family income and body mass index were negatively associated with QoL. Physical activity was associated with better QoL, high level of HbA<sub>1c</sub> was associated with low QoL scores and the increase in number of insulin injections per day negatively affected QoL (Alkarmi, 2013).

## **2.2 Psychological insulin resistance**

Eventually and because of the progressive nature of diabetic type 2 patients will use insulin in order to control glucose levels. But most patients experience anxiety about insulin injections, which form a barrier for physicians who needs to start insulin treatments (Funnell, 2008).

Many studies identified patient's barriers for insulin use which included; the fear that they would lose control on their lives, the feeling of failure to control their blood glucose, believing that insulin will affect their social relationships, anxiety about insulin injections, the fear of insulin side effects and the fear that they couldn't manage insulin therapy requirements (Funnell, 2008).

The DAWN study examined patient and provider attitude toward insulin therapy in 13 countries, the results suggested that believes about insulin among providers related to cultural factors and health care systems. They found that many providers do not believe that insulin can reduce the costs of diabetes care and the delay in insulin therapy was significantly less among providers who believed insulin was efficacious. Regarding patients they found that patients in a more distress situations such as more complications and worse control have a stronger believe that insulin is efficacious (Peyrot et al., 2005).

Insulin naive patients resist and delay insulin therapy, which extends periods of hyperglycemia and leads to diabetes complications, this resistance is due to the believe that using insulin indicates loss of control over patient's life, the loss of confidence that they can be qualified to use insulin, the believe that insulin use indicates personal failure and the

disease itself is more dangerous now, anxiety due to the self-injections and they don't believe that insulin will help them (Polonsky & Jackson, 2004).

### **2.3 Pens vs. vial use**

The traditional insulin injections are time consuming and painful. The insulin pen device contains the insulin vial and the syringe together in a small size pen. Insulin pens are either prefilled or reusable pens. Prefilled pens contains a built in insulin cartridge, which makes it easy for the patient to use but it is more expensive. The reusable pen's cartridge can be changed, which allowed patients to use more than one type of insulin in the same pen, it is more economical than prefilled pens. To use the pen, the disposable needle is screwed into the pen, the dose is selected by the patient from the display window then the hidden needle is placed on the site of administration and when the injection button is pressed, the subcutaneous dose is delivered. Before usage the pen should be stored in the refrigerator, after usage it can be kept at room temperature for a month. Pens needles are shorter and thinner than the standard syringe needle, which reduces the pain at the time of injection. Air bubbles in insulin syringes leads to inaccurate dose, which can be a problem for patients with vision problems so the use of insulin pens can be beneficial for those patients (Bohannon, 1999).

Starting insulin therapy is easier with pens since they are easier to teach compared to vials, dose accuracy is more in using pens, they are also more socially accepted, can be used discreetly, easier to be used in older patients with disabilities, and they cause less pain. Pens cost higher than injections but compliance of patients leads to a decrease in the overall health care resources use (Asamoah, 2008).

In order to compare insulin pens with syringes, Cliff Molife et. al (Molife, Lee, Shi, Sawhney, & Lenox, 2009) reviewed patient's reported outcomes in articles published between 1980 to 2008, this review demonstrated that the majority of patients using pens reported less pain, higher treatment satisfaction, more convenient, easier to use, quicker, more socially accepted than patients using vial and syringes. All these findings suggested that the use of insulin pens will increase adherence and glycemic control.

In 1989 a study was performed to assess the use of NOVOLIN prefilled disposable and durable pens use compared to the use of insulin vial and syringe. 79% of patients

preferred the use of Novolin prefilled pen compared to 7% who preferred vial and syringe. 93% of patients reported that it was easy to take insulin using Novolin pen compared to 38% reported the same using vial/syringe and 75% of patients reported that the use of pen had a positive effect on their overall wellbeing compared to 47% reported such effect using vials. On the other hand, according to the patients used Novopen 1.5 durable pen 98% of them reported that it was easy to use it and 86% indicated that the use of it was easier than the use of vials. 85 % of patients rated the pen more comfortable than syringe/vial and 97% planned to continue using Novopen 1.5. Patients used prefilled pen in this study reported that they felt more confident about management of diabetes and patients used durable pen reported that it was easier to comply to treatment regimen, which suggests that the use of pens may help patients to adhere to their insulin treatment regimens, which will decrease long-term complications (Graff & McClanahan, 1998).

A study was performed between January 1, 2009, and December 31, 2010 to compare the adherence between patients using vial/syringe and prefilled pen. This study showed that compliance was similar between patients using vial/syringe and pens, while the persistent with insulin therapy was more in patients used prefilled insulin over the 24 months of the study (Cheen, Lim, Huang, Bee, & Wee, 2014).

Pawaskar et.al (Pawaskar et al., 2007) studied economic outcomes, health resource utilization and adherence in patients of type 2 diabetes, they compared between patients who initiated insulin using vials verses patients using pens and between patients using vials/syringes converted to pens verses patients continued to use vials/syringes, all these patients were followed for 24 months. Patients initiated insulin therapy using pens had lower overall health costs compared to vials users, this decrease was due to lower insulin prescription costs, lower total hospital costs and lower total outpatients visits. For patients who switched to pens, the costs were comparable with who stayed on syringes, but there was a cost reduction in syringe related resource expenses use in patients converted to pens. This study demonstrated that in spite of the higher costs of insulin pens there is a reduction in the overall health care costs.

## **2.4 Patient's preference for insulin pens**

In order to assess patients preference of insulin devices (pens over vial/syringe) and to examine glucose control a cross over study was performed in USA for patients of type 1 and 2 diabetes for twelve weeks, all patients were using insulin vials and naive to pens. Seventy four percent of patients preferred insulin pens, while twenty percent only preferred syringes; the results also showed that there was no significant difference in the glycemic control profiles. 85% of patients reported that reading the dose scale was easier using pens and 73% felt more confident in the accuracy of insulin dose using pens compared to syringes. 85% of patients reported that the use of pens was more discrete to be used in public places, 74% indicated that the use of pens is easier than syringes. During this study two serious hypoglycemic adverse effects were reported during the use of syringe/vial while none were reported during pens use (Korytkowski, Bell, Jacobsen, Suwannasari, & Team, 2003).

Stockle et.al (Stockl et al., 2007) studied the preference of patients of insulin delivery system, disposable prefilled doser that is similar to insulin pen, or vial/syringe. 260 patients were enrolled; all patients were using insulin via vial/syringe method, have diabetes type 1 or 2. 71.5% of patients reported the preference for disposable doser. Patients also reported that the use of disposable doser was easier to administer insulin, more convenient, more comfortable to be used in public places, made their life easier, allowed them to have a more enjoyable social life and provided a better quality of life. After using the disposable doser patients reported a decrease in fear of self-injection, a higher insulin treatment satisfaction, more lifestyle flexibility, less time for insulin administration, less often missed doses and better glycemic control than after using vial/syringe. The use of vial/syringe was associated with a lower compliance and more injection pain compared to the use of disposable doser.

## **2.5 Insulin pens and QoL**

In order to examine if the QoL would improve by the use of insulin pens 72 insulin dependent patients were studied in Sweden. These patients moved from injections to pens, after 9-13 months of the introduction of insulin pens the majority of patients reported QoL improvement. The items with highest mean change were alleviation of discomfort from the diabetes, increased stability in the disease, fewer episodes of

hypoglycemia, enhanced general well-being and the ability to lead an active life (Hörnquist, Wikby, Andersson, & Dufva, 1990).

## **2.6 Willingness to pay in diabetes studies**

Willingness to pay for treatment improvements was studied in Sweden with type 2 diabetic patients; participants were willing to pay a considerable amount of money each month to improve their treatment and gain health benefits. The most important aspects for patients were gaining weight, prevention of hypoglycemia and reduce HbA<sub>1c</sub> (Jendle et al., 2010).

A study was conducted to examine the willingness to pay of diabetic patients using insulin for attributes of long acting insulin therapy. Subjects were willing to pay a substantial amount of money to improve their treatment and the most important attributes for them were avoiding weight gain, easiness of using insulin device, avoiding hypoglycemia and reduction of number of injections per day (Lloyd et al., 2011).

## **Chapter 3: Methods**

This was a cross sectional study among diabetic patients that use insulin in Bethlehem and Hebron MOH clinics. Cross sectional study allows the collection of large amount of data from a population in a short period of time using a questionnaire. Cross sectional studies are the best to determine the prevalence of the outcome of interest in a population, identifying associations and allow studying multiple outcomes at one point in time only, these studies are done in short time and with limited resources (Levin, 2006; Mann, 2003).

### **3.1 Study instrument**

In our study we used a questionnaire of three parts; socio-demographic, quality of life and willingness to pay.

#### **3.1.1 Socio-demographic sheet**

The socio-demographic information sheet (Appendix A) covered the following areas of interest: Gender, age, educational level, marital status, residency and income status.

#### **3.1.2 Health profile**

Health profile part included duration of DM, duration of insulin use, type of diabetes, information about the use of insulin syringes, HbA1c level, type of treatment, incidence of hypoglycemia, insulin dosage regimen and presence of complications.

#### **3.1.3 Quality of life (SF-36 questionnaire)**

In this study, the Palestinian version of SF-36v2® (Appendix B) Health Survey was used to assess quality of life for diabetic patients using insulin. The Non-Commercial License Agreement was obtained from OptumInsight Life Sciences incorporation (OPTUM). SF-36v2 is a valid survey that has been used in many studies. The certificate of

Arabic (for Palestine) of the SF-36v2® Health Survey was obtained from the OPTUM incorporation (



Appendix D).

We used the eight domains measured by SF-36; physical functioning (PF), role physical (RP) which is role limitation due to physical health issues, bodily pain (BP), general health (GH), vitality and energy (VT), social functioning (SF), role emotional (RE) that is role limitation due to emotional problems and mental health (MH) to assess quality of life. Also the two summary components were used that are 1- physical component summary (PCS), which represents physical limitations, disabilities and the presence of fatigue and body pain. 2- The mental component summary (MCS), which evaluates psychological distress and limitations due to emotional problems.

The scoring range of the eight scales ranges is from 0 to 100, higher scores indicates a better quality of life. This version of SF36 includes norm-based scoring, each of the eight domains and the two summary measures is scored to have a mean of 50 and standard deviation of 10, which allows the comparison with general population. When the scores are above the score at the upper end of the 95% confidence interval it is considered above the general population t-score and when the patient score is below the score at the lower end of the confidence interval it is considered below the general population t-score.

#### **3.1.4 Willingness to pay survey (WTP):**

WTP survey (

**Appendix C**) was used in this study to examine the patient's preference for the insulin pens and their willingness to pay for those pens.

WTP questions are either closed-ended question, in which the patients are asked if they would pay a specific amount of money for the health service the answer will be yes or no, or open ended question, in which the patients can be asked what is the maximum amount they are willing to pay or a payment scale can be used, in which the patients are presented with a scale of possible WTP values (Donaldson, Jones, Mapp, & Olson, 1998). In this study a payment scale was used in order to ask about the amount of money the patient is willing to pay for the insulin pens.

## **3.2 Population and sampling**

### **3.2.1 Study population**

The target population for this study was diabetic patients that use insulin by vial/syringe and attend the MOH clinics in Bethlehem and Hebron. MOH facilities have purposely chosen based on the high percentage of diabetic patients attending these health care facilities. In Bethlehem; the central, Maskat, Beit Jala and Beit Sahour clinics were chosen. In Hebron Halhoul, Karanteena and diabetes center in Doora clinics were chosen.

#### **Selection criteria**

#### **Inclusion criteria**

- Diabetic patients use insulin by vial/syringe.
- Age 17 years and more (both male and female).

#### **Exclusion criteria**

- Patients who did not agree to participate.
- Patients use only oral hypoglycemic drugs.
- Patients use insulin pens during the time of the study.

## **3.3 Period of the study**

The pilot study data were collected during August 2016 and the final data were collected between November 2016 and April 2017.

## **3.4 Ethical approval**

Ethical approval for the study was obtained from the Ministry of Health (Appendix E). Each patient was provided with explanation about the study. Patients were informed that they can refuse to participate, can discontinue their participation at any point and they

could refuse to answer any question. Verbal consent was obtained from each patient before the beginning of questionnaire completion.

According to the MOH recordings the average number of patients use insulin and visits MOH primary health clinics is 275 in Bethlehem while in Hebron the average is 1750; distributed as 553 patients in South Hebron clinics, 332 patients in North Hebron clinics and 866 in Middle Hebron. The sample used was 311 patients distributed as 114 patients in Bethlehem and 196 patients in Hebron, distributed as 70 subjects in South Hebron, 20 subjects in North Hebron and 107 in Middle Hebron. The population size in Bethlehem and Hebron is large so we collected a convenient sample of 12% of the population.

### **3.5 Experts Review**

The SF-36 is a validated questionnaire that was used exactly as provided by the vendor. Other parts of the questionnaire like the socio-demographic and WTP domains, were forwarded to three clinical research experts for review. The reviewers were asked to provide feedback. All reviewers approved the questionnaire after it was modified according to their suggestions.

### **3.6 Pilot study**

We performed a pilot study of the WTP domain in order to test if it is appropriate and clear for the patients. It was also important to test reliability and validity of this part of the questionnaire.

### **3.7 Data collection**

All eligible patients were approached as they came in for routine follow-ups during the data collection period in the primary health clinics. Every consecutive patient who arrived at the clinics was approached in the waiting area. Patients who met the study inclusion criteria were asked if they were willing to participate in the study by completing the questionnaire while they were waiting to see the doctor. Verbal consent was obtained from each patient prior to completing the questionnaire. The interview with participants needed from 15 to 20 minutes.

### **3.8 Data Analysis**

The questionnaires were filled and the data for QoL part were introduced in the QualityMetric Health Outcomes™ Scoring Software 4.0. The results were in a scale of 0 to 100. These results from the software were introduced into the SPSS program.

SPSS program was used for analysis of the current study findings and to correlate the mean differences in the different components of the questionnaire; PF, RP, RE, BP, GH, VT, SF, MH, MCS and PCS with the independent variables of; age group, sex, level of education, marital status, employment status, monthly household income, type of diabetes, duration of diabetes, insulin regimen and the duration of insulin use.

A one-way Analysis of Variance (ANOVA) was used to compare differences between subgroups of independent categorical variables. Post-hoc analyses (Scheffé's Post hoc Test) was then conducted to test for differences between the groups to determine if the overall ANOVA was statistically significant. For interpretation of the results,  $P < 0.05$  was considered to be statistically significant. Confidence intervals were calculated at the 95% level of confidence.

Multiple regression analysis was used to test which variables significantly predicted PCS and MCS.

### **3.9 Null hypothesis**

H<sub>1</sub>: There is no statistical difference between males and females regarding QOL.

H<sub>2</sub>: There is no significant relationship between age and QOL.

H<sub>3</sub>: There is a significant relationship between QOL and residency in Bethlehem or Hebron.

H<sub>4</sub>: There is no significant relationship between social relationship and QOL.

H<sub>5</sub>: There is no significant relationship between educational level and QOL.

H<sub>6</sub>: There is no significant relationship between job and QOL.

H<sub>7</sub>: There is no significant relationship between place of living and QOL.

H<sub>8</sub>: There is no significant relationship between the number family members and QOL.

H<sub>9</sub>: There is no significant relationship between monthly income and QOL.

H<sub>10</sub>: There is no significant relationship between the duration of diabetes disease and QOL.

H<sub>11</sub>: There is no significant relationship between the type of diabetes and QOL.

H<sub>12</sub>: There is no significant relationship between poor glycemic control (HbA<sub>1c</sub> > 7%) and QOL.

H<sub>13</sub>: There is no significant relationship between the number of insulin types the patient use and QOL.

H<sub>14</sub>: There is no significant relationship between the duration of insulin use and QOL.

H<sub>15</sub>: There is no significant relationship between the number of times the patient administer insulin and QOL.

H<sub>16</sub>: There is no significant relationship between diabetes complications and QOL.

H<sub>17</sub>: There is no significant relationship between the patient's choice to use insulin pens and QOL.

H<sub>18</sub>: There is no significant relationship between the amount of money the patient is willing to pay for insulin pens and QOL.

## Chapter 4: Results

### 4.1 WTP part pilot study

The coefficient alpha (or Cronbach's alpha) was used to assess the internal consistency of the WTP part. The alpha value was 0.83 which indicated that the instrument is reliable.

As shown in Table 1 all the correlation coefficients indicated that this part of the questionnaire has a good internal consistency.

*Table 1: summary of the correlation coefficient and significance of the WTP part.*

Reasons to choose pens over syringes	Correlation Coefficient	P value
Easier to use	.455	.029
Easier to inject	.795	.000
More accurate in measuring the dose.	.491	.019
Need less time for the injection	.777	.000
Causes less pain	.557	.008
More lifestyle and social life flexibility	.714	.000
Reading the dose is easier	.702	.001

### 4.2 Description of the socio-demographic data of the participants

**Table 2** displays the socio-demographic characteristics of participants. The results revealed that 48% of participants were males and 52% females, the majority of them 84.9 % were married while 15.1 % had no partner. The mean age was  $50.6 \pm Sd 15.7$  years, age distribution shows that 25.3% of subjects were between the age of (17-40) years, 38.9%

between (41-59) years, and 35.7% were above 60 years, around 75 % of participants are older than 40 years and that is due to the nature of late onset of DM. Patients living in towns formed 37.3 % of the participants, 61.4 % lived in cities and 1.3% lived in camps. 15.1% of the sample had a full time job and 5.5% had a part time job while the majority 79.1% was unemployed. About 35% had no formal school education and are assumed to be illiterate, 51.4% had only primary school or secondary education, about 5% had diploma and 8.4% had a vocational education. The majority of the subjects 81.7% had an income of less than 3000, 13.2% had 3000-4000 while only 5% had an income of more than 4000 Israeli Shekels per month.

**Table 2:** distribution of the participants by socio-demographic characteristics

Variable		Frequency	Percent
Age	17-40	78	25.3%
	41-59	120	38.9%
	60 and more	110	35.7%
Gender	Female	162	52.1%
	Male	149	47.9%
Marital status	married	264	84.9%
	widow	21	6.8%
	single	25	8.0%
	divorced	1	0.3%
Education level	No schooling	110	35.%
	Elementary school and secondary	160	51.%
	diploma	15	4.8%
	Professional	26	8.4%
Employment status	Full time job	47	15.%
	Part time job	17	5.5%
	Not work	246	79.%
	other	1	0.3%



Place of living	town	116	37.%
	city	191	61.%
	camp	4	1.3%
Monthly income	Less than 3000	254	81.%
	3001-4000	41	13.%
	More than 4000	16	5.1%

#### 4.3 Results of the health profile:

Results of the health profile are shown in *Table 3*.

Most subjects 86.5% had type 2 and 13.5% had type 1 diabetes. 28% of participants said they did not receive counseling to increase disease awareness about the disease while 71.7% said they did and mostly from the health care providers in the MOH clinics. 92% of subjects reported that they received practical information from health care providers on how to use the injections while 8% reported they didn't. Patients were asked if they make sure that the syringe had no air bubbles before they inject themselves, 91% of them said they did and 9% said they didn't.

The majority 64% of subjects use Mixtard<sup>®</sup>, a pre-mixed neutral suspension of human insulin, to control their blood sugar, most patients 71.7% used one type of insulin while 19.3% of patients use two types. Almost 50% of the subjects reported that they had hypoglycemia in the past four weeks. When patients were asked about their insulin regimen; 67.5% of participants reported they used insulin two times daily, 22.8% three times and 9.6% once daily.

The mean level of HbA<sub>1c</sub> was 9% with a standard deviation of 2. The majority of patients (97%) (254 patients) had HbA<sub>1c</sub> level of 7 and higher while only 3% (8 patients) had HbA<sub>1c</sub> level of less than 7.

*Table 3: health profile information of participants*

Independent variable		frequency	Percent
Diabetes type	Type 2	269	86.5%
	Type 1	42	13.5%

Did the patient received Awareness about the disease	No	88	28.3%
	Yes	223	71.7%
Did any healthcare provider explained to the patient how to use insulin injection	yes	286	92%
	No	25	8%
Do the patient make sure that the injection have no air bubbles	yes	283	91%
	No	28	9%
HbA1c level	< 7.0%	8	3%
	≥ 7%	254	97%
Type of insulin	NPH <sup>®</sup>	84	27%
	Actrapid <sup>®</sup>	60	19%
	Mixtard <sup>®</sup>	199	64%
Number of insulin types used by patients	1	223	71.7%
	2	60	19.3%
Did you have hypoglycemia in the past four weeks	Yes	169	54%
	no	142	45%
Insulin regimen	Once	30	9.6%
	twice	210	67.5%
	Three times	71	22.8%

#### 4.4 Diabetes duration, insulin use duration and health Complications Associated with Diabetes:

Results are shown in *Table 4*

Participants had been diagnosed with diabetes from less than a year to 59 years with a mean of 14.9 years (standard deviation = 13.6), most patients had been diagnosed with diabetes for more than 11 years. The average duration of using insulin in our sample was 6.6 years and the majority of patients had been using insulin for less than five years. 21.6% of patients reported they had one complication, 23.8% reported two complication and 31.4% reported from 3 to 7 complications.

A multiple-response item asked participants to report the most common diabetes-related complications they experienced; the most frequent complication was visual disorders (58%), followed by neurological disorders (42%), heart disease (31%), stroke (22%), renal complications (16%) and foot ulcers (14%). The least common complication was gangrene (Table 4). On the other hand 23% of subjects reported they had no complications of diabetes.

**Table 4:** Results of Diabetes duration, insulin use duration and health Complications Associated with Diabetes

Variable		frequency	Percent
Diabetes duration	0-5	52	16.7%
	6-10	73	23.5%
	>10	185	59.6%
Diabetes complications	Eye problems	180	58%
	Kidney disease	51	16%
	Nerve damage or neuropathy	132	42%
	Heart Disease (e.g. angina, heart attack)	97	31%
	Stroke	67	22%
	Foot ulcers	42	14%
	Gangrene and/or amputation	4	1%
	None of the above	70	23%
Number of complications	1	67	21.6%
	2	74	23.8%
	3	54	17.4%
	4	28	9%
	>5	16	5%

#### 4.5 WTP results:

As shown in *Table 5*, 58.2 % reported that if both choices pens and syringes were available they will choose pens and 41.8% will choose syringes. 41.8% of participants didn't answer the question if they are willing to pay more for the pens, 35.4% reported they will and about 23% reported that they will not pay more. 11% reported they were willing to pay extra 10 NIS in order to get the pens and 7% were willing to pay 20 NIS, 4.5% and 3.9% were willing to pay 40 and 50NIS respectively and 4.5% were willing to pay 100NIS.

The most common two reasons reported by participants for choosing pens were that they are easier to use and inject than syringes. On the other hand the majority of patients 92% reported that they chose vials because they are used to them. Patients reported that they chose syringes because they are easy to use, they believe that they were more able to control their blood sugar 77% and less cost 72%.

*Table 5: the results of WTP part.*

Variable		frequency	percent
Choice pen/syringe	pens	181	58.2%
	Vial/syringe	130	41.8%
Paying extra for the pens	yes	110	35.4%
	no	71	22.8%
	No answer	130	41.8%
Willingness to pay	5	2	0.6%
	10	35	11.2%
	15	2	0.6%
	20	22	7.1%
	30	3	1%
	40	14	4.5%
	50	12	3.9%
	60	2	0.6%
	70	1	0.3%
	100	14	4.5%
	120	1	0.3%
	200	3	1%

What was important to you when you chose pens?	Easier to use	166	92%
	Easier to inject	158	87%
	More accurate in measuring the dose.	120	66%
	Need less time for the injection	126	70%
	Causes less pain	117	65%
	More lifestyle and social life flexibility	149	82%
	Reading the dose is easier	143	79%
What was important to you when you chose vial/syringe.	used to use it	120	92%
	Less cost	93	72%
	Hard to learn to use pens	44	34%
	Easy to use vials	105	81%
	Easy to inject by syringe	95	73%
	Feel more confident about the dose accuracy	83	64%
	Less painful	44	34%
	Syringes don't interfere with daily activities	90	69%
	Easy to read the dose	100	77%
	Believe to be more able to control blood sugar	100	77%

#### 4.6 QOL domains mean scores

**Table 6:** Mean, Standard deviation and percentages of participants whose scores were above or below the general population norm

Domains	Mean	SD <sup>1</sup>	Above the general population norms (%)	Below the general population norms (%)
Physical Component Summary (PCS)	41.42	11.67	17	63
Physical Functioning (PF)	58.92	31.2	19	56
Role Physical (RP)	44.25	36.72	17	68
Bodily Pain (BP)	49.03	32.64	21	60
General Health (GH)	48.3	22.0	12	58
Mental Component Summary (MCS)	41.32	12.19	15	59
Vitality (VT)	40.73	27.01	18	59
Social Functioning (SF)	65.61	36.23	43	45
Role Emotional (RE)	58.91	34.59	30	60
Mental Health (MH)	54.25	24.33	16	62 <sup>2</sup>

**Table 6** showed the mean scores of the quality of life domains. The domain with the highest score was social functioning ( $M = 65.6$ ,  $SD = 36.2$ ), followed physical functioning ( $M = 58.91$ ,  $SD = 31.2$ ) and role emotional ( $M = 58.91$ ,  $SD = 34.58$ ). The lowest was vitality ( $M = 40.7$ ,  $SD = 27$ ). The mean scores for physical component summary ( $M = 41.4$ ,  $SD = 31.2$ ) was lower than mental component summary ( $M = 54.25$ ,  $SD = 24.3$ ).

According to the norm based scoring which were applied a linear  $T$ -score transformation ( $M = 50$ ,  $SD = 10$ ) (

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1 SD: Standard deviation

**Appendix G**), the quality of life among patients who had scores of quality of life below than the general population norm in physical component score (PCS), physical functioning (PF), role physical (RP), body pain (BP), general health (GH), mental component score (MCS), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH) domains with the percentages of 63, 56, 68, 60, 58, 59, 59, 45, 60, and 62, respectively. More importantly, the percentage of patients that had scores above the general population norms appears relatively low for all domains (ranging from 12% to 30%). The domain with the highest percentage above the general population norms was social functioning with 43%.

#### **4.7 Gender and age**

As shown in *Table 7* and Appendix F there was no significant relationship between gender and QoL domains except for body pain in which men had a higher score than women.

There was no significant relationship between age and QoL domains (Appendix E).

#### **4.8 Residency**

T- test (Appendix F) was performed to evaluate the effect of residency on QoL, the mean score of all domains was higher for patients in Bethlehem relative to Hebron. A significant relationship was observed with the domains of role limitation due to physical health (RF) (p 0.001), general health (GH) (p 0.012), vitality (VT) (p 0.037), mental health (MH) (p 0.027), physical component summary (PCS) (p 0.012) and mental component summary (MCS) (p 0.037).

#### **4.9 Marital status**

Single patients had higher scores in all domains compared to married and widow. ANOVA test (Appendix F) showed that the relationship was significant in physical functioning, role limitation due to physical functioning, body pain, social functioning, role limitation due to emotional problems and physical component summary. LSD test showed

(Appendix F) that single participants had higher mean scores than married and widow in those six domains.

#### **4.10 Level of education**

Participants' level of education was found to be significantly associated with all QoL domains (*Table 7*) (Appendix F). LSD test (Appendix F) was performed to test for the differences in QoL domains by participants' level of education; it was found that participants who were illiterate had lower mean scores in all domains than those who had primary or secondary education, diploma and university level of education.

#### **4.11 Occupation**

ANOVA and LSD tests (Appendix F) showed that in PCS, RE, SF, VT, GH, BP, RF and PF aspects of QoL there was a significant positive relationship between working and QoL. In particular, participants who have a full time or a part time job had higher mean scores in those QoL domains.

#### **4.12 Place of living**

There was no significant relationship between the place of living; village, city or camp and QoL domains (Appendix F).

#### **4.13 Number of family members**

In order to examine the relationship between the number of family members and QoL we did Pearson test (Appendix F) and there was no significant relationship.

#### **4.14 Monthly income**

ANOVA test was performed to examine the relationship between income and QoL (Appendix F), monthly income had a significant relationship with the domains of physical functioning, role limitation due to physical functioning, social functioning and role limitation due to emotional problems (*Table 7*). LSD test (Appendix F) showed that participants with higher income had a higher mean QoL scores.



#### **4.15 Diabetes duration**

The results of ANOVA test (Appendix F) showed significant relationship between PF, RP, BP and PCS QOL domains and diabetes duration (*Table 8*). The mean scores for all QOL domains except role emotional, mental health and mental component summary were lower in patients who had been diagnosed with diabetes for longer duration. The worst values were reached after 10 years as shown in Appendix E.

#### **4.16 Duration of using insulin use**

ANOVA test (Appendix F) showed that there was no significant relationship between the duration of using insulin and QoL.

#### **4.17 Diabetes type**

The mean scores for all QoL domains were higher for type 2 diabetes as shown in Appendix E. The relationship between QoL and diabetes type was significant in PF, RP, BP, GH, VT, SF and PCS according to the ANOVA test (Appendix F).

#### **4.18 HbA<sub>1c</sub> level**

T- test (Appendix F) was performed to examine the effect of HbA<sub>1c</sub> level on QoL. As seen in table 8 there was no significant relationship between QoL and HbA<sub>1c</sub> levels.

#### **4.19 Number of insulin types used by the patient**

T-Test (Appendix F) was performed to examine the effect of number of insulin types used on QoL domains. The majority of patients (78.7%) had been using one type of insulin, Mixtard<sup>®</sup>, and 21.2% had been using two types of insulin to control their blood sugar. As shown in table 8 there was a significant relationship between PF, PR and PCS QoL domains and the number of insulin types, the mean scores of QoL domains for the patients use two types was higher than those use one type.

#### 4.20 Insulin regimen

Patients use insulin once daily had a higher score in GH domain compared to the other regimens (Appendix F). In other domains the difference was not significant (*Table 8*).

#### 4.21 Patients' choice to use insulin pens

The relationship between patients' choice to use insulin pens or syringes was assessed by t-test (appendix F). The results showed a significant relation with the physical functioning and physical component summary domains. The mean score for the PF domain among participants that chose pens was 62.6 compared to 53.77 for those who chose syringes. The same trend applies to the PCS domain; the mean score for patients chose pens was 42.56 and 39.8 for patients chose syringes.

#### 4.22 Diabetes complications

According to the ANOVA test (appendix F), in all QoL domains there was a significant relationship between the number of diabetes complications the patient's had and QoL. The mean scores for all QoL domains were higher for patients with lower number of complications.

**Table 7:** summary of the associations between independent variables of the socio-demographic characteristics of participants with QOL domains.

Eight Aspects Demographic Characteristics	PF	RF	BP	GH	VT	SF	RE	MH	PCS	MCS
Age	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Gender	NS	NS	0.000	NS	NS	NS	NS	NS	NS	NS
Place of residency (Bethlehem/Hebron)	NS	0.001	NS	0.012	0.037	NS	NS	0.027	0.012	0.037
Marital status	0.000	0.000	0.001	NS	NS	0.029	0.043	NS	0.000	NS

Education level	0.000	0.000	0.001	0.008	0.000	0.002	0.009	0.000	0.000	0.001
Employment status	0.000	0.002	0.001	0.003	0.006	0.001	0.008	NS	0.000	NS
Place of living	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Number of family members	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Monthly income	0.018	0.039	NS	NS	NS	0.004	0.006	NS	NS	NS

NS: Non significant

**Table 8:** summary of the associations between independent variables of the health profile of participants with QoL domains

Eight Aspects Health profile	PF	RF	BP	GH	VT	SF	RE	MH	PCS	MCS
Diabetes duration	0.000	0.014	0.038	NS	NS	NS	NS	NS	0.000	NS
Duration of using insulin	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diabetes type	0.000	0.000	0.000	0.000	0.000	0.001	NS	NS	0.000	NS
HbA1c level	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Number of insulin types	0.001	0.022	NS	NS	NS	NS	NS	NS	0.009	NS
Insulin regimen	NS	NS	NS	0.025	NS	NS	NS	NS	NS	NS
Patient's choice pens/syringes	0.013	NS	NS	NS	NS	NS	NS	NS	0.045	NS
Diabetes complications	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000

NS: Non significant

#### 4.23 Multiple regression analysis

Multiple regression analysis was used to test which variables significantly predicted PCS and MCS.

The results of the regression (table 9) indicated the type of diabetes, duration of diabetes, level of education and employment were significant predictors of PCS. These four predictors explained 26.9% of the variance in PCS; type of diabetes caused 14.2% of the variance followed by duration of diabetes (5.8%), level of education (4.7%) and employment (2.2%).

**Table 9: Multiple regression analysis of PCS.**

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.377 <sup>a</sup>	.142	.140	10.827	.142	50.773	1	306	.000
2	.447 <sup>b</sup>	.200	.195	10.474	.058	21.972	1	305	.000
3	.497 <sup>c</sup>	.247	.240	10.178	.047	19.000	1	304	.000
4	.519 <sup>d</sup>	.269	.260	10.044	.022	9.181	1	303	.003

a. Predictors: (Constant), type of diabetes

b. Predictors: (Constant), type of diabetes, duration of diabetes

c. Predictors: (Constant), type of diabetes , duration of diabetes , level of education

d. Predictors: (Constant), type of diabetes , duration of diabetes , level of education, employment

Dependent Variable: PCS

On the other hand MCS was significantly predicted by level of education as seen in table 10.

**Table 10: Multiple regression analysis of MCS.**

#### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R	F	df1	df2	Sig. F
	.196 <sup>a</sup>	.038	.035	11.972	.038	12.215	1	306	.001

a. Predictors: (Constant), level of education  
 Dependent variable: MCS

## Chapter 5: Discussion

### 5.1 Health-related quality of life among patients with T1DM and T2DM Taking Insulin

In this study, the domain that had the highest score was social functioning ( $M = 65.6$ ,  $SD = 36.2$ ) and the lowest was vitality ( $M = 40.7$ ,  $SD = 27$ ). The mean scores for physical component summary ( $M = 41.42$ ,  $SD = 11.671$ ) and for mental component summary ( $M = 41.32$ ,  $SD = 12.18$ ). In all dimensions and the two components summary scores, except social functioning, most of participants had scores of quality of life lower than the general population norm. When compared to a recent study assessed QoL in general population in the West Bank that used SF36 in university students (ASI, 2015) this study scores as seen in *Table* were lower in all domains except RE.

*Table 11: QoL mean scores of general population in the West Bank (ASI, 2015)*

<b>Domains</b>	<b>Mean</b>	<b>SD<sup>3</sup></b>
Physical Component	72.2	17
Physical Functioning (PF)	77.4	24.5
Role Physical (RP)	68.2	34.7
Bodily Pain (BP)	77.2	20.7
General Health (GH)	63.2	15.6
Mental Component	55.3	20.2
Vitality (VT)	53.6	18.5
Social Functioning (SF)	66.6	23.4
Role Emotional (RE)	50.2	41.7
Mental Health (MH)	56.1	20.3

These results agrees with a previous study that used SF36 to assess QoL of type 2 diabetics in North West Bank (Showli, 2013). Previous study in Gaza (Eljedi et al., 2006) used WHOQOL-BREF questionnaire and found that diabetic patients scored lower than

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<sup>3</sup> SD: Standard deviation

controls in physical and psychological domains and a smaller difference was identified in social relationships.

These results are also consistent with other studies that examined QoL in diabetic patients and found that diabetes mellitus affected health-related quality of life of the participants (Glasgow et al., 1997; Porojan, Poantă, & Dumitrașcu, 2012).

When compared to a study in New Delhi (Gautam, Sharma, Agarwal, Bhatnagar, & Trehan, 2009) that used SF36 to assess QoL of diabetic patients all domains except general health were lower in our study.

Compared to a recent study in Saudi Arabia, the scores of our study were lower in all domains except social functioning compared to the Saudi patients' scores that used insulin alone and lower in all domains compared to patients used insulin and oral hypoglycemic drugs together (Al Hayek et al., 2014).

## **5.2 Factors related to QoL**

### **5.2.1 Glycemic control**

We found no significant relationship between glucose control (HbA<sub>1c</sub> levels) and QoL. Most studies found no relationship between glucose control and QoL (Ahroni, Boyko, Davignon, & Pecoraro, 1994; Cong et al., 2012; Rubin & Peyrot, 1999; Weinberger et al., 1994). On the other hand some studies suggested that a relationship does exist (Alkarmi, 2013).

A study that used both disease specific questionnaire (Diabetes Quality of Life Scale) and the generic SF-36 found a significant relationship between DQOL and HbA<sub>1c</sub> while no significant relationship between HbA<sub>1c</sub> and any domain of SF36 (Trief, Grant, Elbert, & Weinstock, 1998). These results could be due to the fact that SF36 is not as sensitive as disease specific questionnaires to therapy related effects on QoL.

### **5.2.2 Complications**

77% of participants reported having complications. This study showed that complications had a very clear significant effect on all QoL domains. It is found that

patients who did not develop any complications had better means of the QoL domains than those who had only one complication, and as the number of complications increase the QoL mean scores decrease. Similar results were observed in a study conducted in Gaza camps (Eljedi et al., 2006) and in a study conducted with type 1 diabetic patients in North West Bank (Alkarmi, 2013).

There are also many other studies that showed a negative impact of complications on QoL (Ahroni et al., 1994; Graff & McClanahan, 1998; E. S. Huang et al., 2007).

### **5.2.3 Number of insulin injections per day**

Our data showed that the only aspect affected by the number of insulin injections was general health; the mean score of once daily was better than that of twice and three injections while in the other aspects there was no significant difference. Some studies showed that the number of insulin injections negatively affected QoL (Alkarmi, 2013; E. S. Huang et al., 2007; G.-H. Huang, Palta, Allen, LeCaire, & D'Alessio, 2004). In contrast, other studies found no significant relationship between daily injections and QoL (Eiser et al., 1992).

### **5.2.4 Number of insulin types used by patients**

In our study, patients who used two types of insulin achieved higher PF, PR and PCS QoL domains mean scores than those used one type. Some studies reported a better quality of life with a more intensified regimens (Wagner, Müller–Godeffroy, Von Sengbusch, Häger, & Thyen, 2005). This better QoL could be related to the more flexible diet and a better glycemic control with intensive insulin treatment.

### **5.2.5 Diabetes type**

This study found that the mean scores of PF, RP, BP, GH, VT, SF and PCS QoL domains were higher for type 2 than type 1 diabetes. These results are consistent with other studies that found that Type 2 diabetic patients had a significantly better quality of life than type 1 patients on the physical functioning and social functioning QoL domains (Jacobson, De Groot, & Samson, 1994). On the other hand another study found that depression and anxiety does not differ significantly between diabetes types (Peyrot & Rubin, 1997). The



differences between the two types could be due to the differences in age and treatment regimens (Rubin & Peyrot, 1999).

### **5.2.6 Duration of diabetes**

The longer duration of diabetes had a negative effect on QoL, our study showed that PF, RP, BP and PCS QoL domains mean scores were significantly lower for patients with longer duration of disease, these results agreed with a previous study in Gaza that assessed the QoL of type 2 diabetes patients and showed that after 10 years of diabetes diagnosis, QoL started to decrease significantly (Eljedi et al., 2006). Many other studies reported that with longer duration of diabetes QoL decreased (Glasgow et al., 1997; G.-H. Huang et al., 2004).

On the other hand some studies found no significant relationship between QoL and diabetes duration (Ahroni et al., 1994; Wredling et al., 1995).

### **5.2.7 Duration of using insulin**

Our results showed no significant relationship between the duration of using insulin and QoL. These results agrees with other studies that confirmed that QoL does not change with the follow up of patients after initiation of insulin (De Sonnaville et al., 1998). Another study showed that with time the QoL for patients that use insulin decreased (Davis, Clifford, & Davis, 2001).

### **5.2.8 Income**

Patients with higher income scored higher in PF, RF, SF and RE. In all QoL domains patients with a monthly income more than ₪3000 scored better than patients with income less than ₪3000 this was consistent with a study that found that diabetic patients who had more than ₪1800 monthly income had better QoL than who have no regular income (Eljedi et al., 2006). Many studies reported that less income was associated with lower QoL in diabetic patients (Glasgow et al., 1997). These results are consistent with another study used SF-36 to assess the effect of socio-economic status on QoL and indicated that low income correlated with lower QoL (Pappa, Kontodimopoulos, Papadopoulos, & Niakas, 2009).

### **5.2.9 Gender**

As shown in appendix E there was no significant relationship between gender and QoL except in BP domain, this result is consistent with other studies that assessed the QoL of diabetic patients in Gaza (Eljedi et al., 2006) and in northern districts in the West Bank (Alkarmi, 2013). On the other hand, it is the opposite of a previous study conducted with type 2 diabetic patients in Northern Palestine that confirmed that females had a lower QoL compared to males (Showli, 2013). Many studies in other populations showed there was no significant relationship between gender and QoL in diabetic patients while others showed a lower QoL in women (G.-H. Huang et al., 2004; Jacobson et al., 1994; Peyrot & Rubin, 1997; Wredling et al., 1995).

### **5.2.10 Age**

This study indicated no significant relationship between QoL and age. Other studies showed that older age was associated with higher risk of being more depressed (Peyrot & Rubin, 1997), another study used SF20 questionnaire indicated that lower age was associated with better physical functioning (Glasgow et al., 1997) and the same result was shown using DQOL (Diabetes quality of life questionnaire) (Davis et al., 2001). This study disagreed with results obtained from studies in Palestine; in Gaza (Eljedi et al., 2006) and in North West Bank (Showli, 2013), which showed that age affected social and physical domains of QoL significantly.

Other studies agreed with this study indicating no effect of age on any domain of QoL using SF-36 questionnaire on patients of type 1 and 2 diabetes (Jacobson et al., 1994). These results also agreed with a Swedish study with diabetic patients (Wredling et al., 1995).

### **5.2.11 Education**

In this study it was found that better education was linked to better QoL in all domains, which agreed with another study assessed QoL of diabetic patients using SF-20 (Glasgow et al., 1997), other studies also found that being less educated was associated with higher risk of being anxious and depressed (Peyrot & Rubin, 1997). SF-36 was used in assessing QoL in type 1 diabetics (Alkarmi, 2013) and found that higher education was

related to only higher scores in emotional well being domain, it also was used in assessing type 2 diabetic patients QoL (Showli, 2013), which concluded that higher education affected social and physical domains of QoL.

These results could be due to the possibility that educated people have better self-esteem, better opportunity for employment, higher income and better social life.

Our results disagreed with other studies that found no effect of education on QoL (Jacobson et al., 1994).

#### **5.2.12 Marital status**

This study showed that single patients had higher scores in all domains compared to married and widow. There was a significant relationship in PF, RF, BP, SF, RE and PCS. These results consisted with another study that assessed the effect of insulin therapy on QoL and indicated that being married inversely affected QoL using DQOL instrument (Davis et al., 2001).

On the other hand, other studies indicated that married patients scored better in the well being scale and treatment satisfaction than widowed and divorced (Bott, Mühlhauser, Overmann, & Berger, 1998; Jacobson et al., 1994).

#### **5.2.13 Employment**

Our study as shown in appendix E showed that being employed was associated with better QoL in all domains, this result agrees with the findings of Eljedi et.al (Eljedi et al., 2006) in Gaza and with other studies (Trief et al., 1998).

#### **5.2.14 Residency**

Diabetic patients living in Bethlehem had better QoL in RF, GH, VT, MH, PCS and MCS. These results disagrees with the results of a study examined the relationship between type 2 diabetes QoL and residency (Showli, 2013).

### **5.2.15 Place of living**

There was no significant difference in QoL between patients lives in village, city or camps in this study. These results agreed with a previous study in Iran that concluded no significance different between patients lived in rural or urban areas (Nejhad, Vardanjani, Abolhasani, Hadipour, & Sheikhzadeh, 2013).

### **5.3 Hypoglycemia**

54% reported hypoglycemia in the past month, consisted with other studies reported almost the same percentage (Weinberger et al., 1994).

### **5.4 Willingness to pay**

58% of patients preferred insulin pens over syringes to administer insulin, the results of this study are consistent with previous studies that assessed the preference of patients for insulin pens and more than 70% of patients preferred to use pens (Graff & McClanahan, 1998; Korytkowski et al., 2003) (Stockl et al., 2007). 35% of patients reported they will pay more to get insulin pens but mostly from ₪10-20. Patients were not willing to make a substantial out-of-pocket payment might be because diabetic patients registered in the MOH clinics are used to paying only a co-payment out of pocket for the prescription each month.

The major reason for choosing pens was that they found pens easier to use and inject than syringes. Those who preferred syringes stated their comfort with the insulin syringes as the major reason.

## Chapter 6: Conclusion and recommendations

In the present study, we interviewed 311 patients, who administer insulin by vial/syringe, including type 1 and 2 diabetic patients. The interviews took place in the MOH clinics in Bethlehem and Hebron. Type 2 diabetes was present in 86.5% of subjects. Seventy four percent of the respondents were above 40 years old, 52% were females, the majority (85%) was living with their partners at the time of the study, 35.4% of patients were illiterate. 79% of them were unemployed, most participants 60% were living in cities, the majority 81.7% had an income of less than ₪3000 per month. The mean duration of diabetes among respondents in the present study was  $14.9 \pm 13.6$  years. 77% of patients had complications and the most common complication observed in our diabetic patients was eye problems (58%).

The majority of participants had lower QoL than the general population norms and the scores of all domains except the physical and social functioning were below 50, which indicated a low QoL.

QoL of Diabetic patients using insulin was influenced by residency, marital status, level of education, employment, monthly income, diabetes duration, diabetes type, diabetes complications and insulin regimen. On the other hand it was not affected by gender, age, duration of using insulin and glycemic control.

Most patients (58%) preferred to use pens if it was available as a choice for insulin administration, and the majority of them were not willing to pay more than what they pay now for their insulin prescription monthly.

The number of diabetic patients in Palestine is increasing. One of the main objectives of DM treatment program is to promote the QoL in diabetic patients, our results indicated a low QoL. A close look at the health care system is needed in order to try to improve QoL by possible introduction of insulin pens as a choice for diabetic patients using insulin. The introduction of insulin pens will make insulin self-administration easier and will decrease the discomfort of injection, which will increase compliance and as a result diabetes complications in the future.

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## Appendices

### Appendix A

معلومات شخصية عن المريض:

الجنس

○ ذكر

○ أنثى

العمر .....

الحالة الاجتماعية الراهنة:

○ متزوج ○ أرمل

○ أعزب ○ مطلق

المستوى التعليمي

○ غير متعلم

○ ثانوي فأقل

○ دبلوم ( مثل دبلوم العناية بالأطفال أو موظف تقني)

○ مهني أو متدرب ( حلاق أو طباح )

○ شهادة جامعية ( بكالوريوس )

○ دراسات عليا

○ غير ذلك حدد .....

ما هو أفضل وصف لوضعك الوظيفي ؟

○ تعمل ( بدوام كامل)

○ تعمل بدوام جزئي

○ لا تعمل

○ غير ذلك حدد .....

مكان السكن

○ قرية

○ المدينة

○ مخيم

عدد افراد الاسرة .....

أي من المعدلات التالية يصف دخل الأسرة الشهري بالشيكول من جميع المصادر:

○ أقل من قل من 3000

○ 4000 - 3001

○ اكثر من 4000

### الحالة الصحية:

منذ كم عام تم تشخيصك بالاصابة بالسكري؟

..... سنة

ما هو نوع السكري الذي تعاني منه ؟

○ النوع الثاني الذي يحتاج إلى الإنسولين

○ النوع الأول

هل حصلت على توعية بخصوص مرض السكري؟

○ لا

○ نعم ؛ أين ؟ ..... متى ؟ .....

هل حصلت على معلومات عن كيفية استخدام حقن الانسولين؟

نعم لا

هل تتأكد من عدم وجود فقاعات الهواء داخل السرنج قبل حقنها تحت الجلد.

نعم لا

مستوى ال HbA1c في الدم. ....

ما أنواع الانسولين الذي تستخدمه؟

○ NPH

Actrapid ○

Mixtard ○

منذ متى وانت تستخدم الانسولين؟

..... سنة / شهر

خلال اخر شهر هل حدث معك هبوط في السكر في الدم واي من هذه الاعراض :

○ نعم ○ لا

○ تعرق	○ خفقان القلب بشكلٍ سريع	○ الجوع
○ دوخة	○ الصداع	○ عدم وضوح الرؤيا والزغلة
○ العصبية وسرعة الغضب	○ غثيان	○ تتأوب مستمر
○ الشعور بالبرد	○ التعب والنعاس	
○ فرط الاكل	○ صعوبة في الكلام	

كم مرة تحقن الانسولين في اليوم:

○ مرة واحدة

○ مرتين

○ ثلاث مرات

هل حصل وتم تشخيص أي من المضاعفات التالية عندك بعد الاصابة بالسكري؟

○ مشاكل في العينين ( مثل اعتلال الشبكية أو إعتام العدسة الكنتارات أو الزرق الغلوغوما).

- أمراض الكلى
- تلف الاعصاب أو الإعتلال العصبي
- أمراض القلب (مثل الذبحة الصدرية أو النوبة القلبية)
- الجلطة
- تقرح في القدمين
- الغرغرينا أو بتر أحد الساقين
- لا أعاني أي من الأعراض المذكورة أعلاه.

## Appendix B

# صحتك ورفاهيتك

يسأل هذا الاستبيان عن وجهة نظرك حول صحتك. ستساعد هذه المعلومات في تتبع شعورك وكيف كنت قادرا على القيام بنشاطاتك الاعتيادية بشكل جيد. شكرا لإكمالك هذا الاستبيان!  
في كل واحد من الأسئلة التالية، الرجاء وضع إشارة  في المربع الذي يصف بأفضل شكل إجابتك.

1. بشكل عام، تود أن تقول أن صحتك...

ضعيفة	معتدلة	جيدة	جيدة جدا	ممتازة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	4	3	2	1

2. بالمقارنة مع السنة الماضية، كيف تقيم صحتك الآن بشكل عام؟

أفضل بكثير الآن بالمقارنة مع العام الماضي	أفضل نوعا ما الآن بالمقارنة مع العام الماضي	تقريبا نفس العام الماضي	أفضل نوعا ما الآن بالمقارنة مع العام الماضي	أسوأ بكثير الآن بالمقارنة مع العام الماضي
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	4	3	2	1



3. الأسئلة التالية تدور حول نشاطات من الممكن أن تقوم بها خلال يوم عادي. هل تقيدك صحتك الآن في النشاطات التالية؟ إذا كانت كذلك، فإلى أي مدى؟

نعم، تقيدني كثيرا	نعم، تقيدني قليلا	لا، لا تقيدني على الإطلاق
▼	▼	▼

- ا. النشاطات القوية، مثل الركض، رفع أشياء ثقيلة، المشاركة في رياضة شاقة..... 1  ..... 2  ..... 3
- ب. النشاطات معتدلة الشدة، مثل تحريك طاولة، دفع مكنسة كهربائية، السباحة أو ركوب الدراجة..... 1  ..... 2  ..... 3
- ج. رفع أو حمل مواد البقالة..... 1  ..... 2  ..... 3
- د. صعود الدرج عدة طوابق..... 1  ..... 2  ..... 3
- هـ. صعود الدرج طابق واحد..... 1  ..... 2  ..... 3
- و. الانحناء، الركوع، أو طأطأة الرأس والكتفين..... 1  ..... 2  ..... 3
- ز. المشي أكثر من كيلومتر واحد..... 1  ..... 2  ..... 3
- ح. المشي عدة مئات من الأمتار..... 1  ..... 2  ..... 3
- ط. المشي مئة متر..... 1  ..... 2  ..... 3
- ي. الاستحمام أو ارتداء الملابس..... 1  ..... 2  ..... 3

4. خلال الأسابيع الأربعة الماضية، كم من الوقت واجهت أيًا من المشاكل التالية في عملك أو نشاطاتك اليومية الاعتيادية الأخرى نتيجة لصحتك الجسدية؟

ولا في أي وقت	قليل من الوقت	بعض الوقت	معظم الوقت	كلّ الوقت
---------------	---------------	-----------	------------	-----------



ا. انخفاض في كمية الوقت الذي قضيته في

العمل أو النشاطات الأخرى 1  ..... 2  ..... 3  ..... 4  ..... 5

ب. أنجزت أقل مما تريد 1  ..... 2  ..... 3  ..... 4  ..... 5

ج. كنت مقيداً/ة في نوع العمل أو النشاطات

الأخرى 1  ..... 2  ..... 3  ..... 4  ..... 5

د. واجهت صعوبة في أداء عملك أو النشاطات

الأخرى (مثلاً، أخذت منك جهداً إضافياً) 1  ..... 2  ..... 3  ..... 4  ..... 5

5. خلال أسابيع الأربعة الماضية، كم من الوقت واجهت أيًا من الصعوبات التالية أثناء قيامك بعملك أو بأنشطتك العادية اليومية الأخرى بسبب أي مشاكل متعلقة بالعاطفة (مثل الإحساس بالإكتئاب أو القلق)؟

ولا في أي وقت	قليل من الوقت	بعض الوقت	معظم الوقت	كلّ الوقت
---------------	---------------	-----------	------------	-----------



ا. انخفاض في كمية الوقت الذي قضيته في

العمل أو النشاطات الأخرى 1  ..... 2  ..... 3  ..... 4  ..... 5

ب. أنجزت أقل مما كنت ترغب 1  ..... 2  ..... 3  ..... 4  ..... 5

ج. قمت بعمل أو نشاطات أخرى بحذر أقل

من المعتاد 1  ..... 2  ..... 3  ..... 4  ..... 5

6. خلال الأسابيع الأربعة الماضية، إلى أي مدى تدخلت مشاكلك الجسدية أو العاطفية في نشاطاتك الاجتماعية الاعتيادية مع العائلة، الأصدقاء، الجيران، أو المجموعات؟

لا على الإطلاق	قليلًا	بشكل معتدل	كثيرًا	بشدة
▼	▼	▼	▼	▼
1 □	2 □	3 □	4 □	5 □

7. كم من الألم الجسدي عانيت خلال الأسابيع الأربعة الماضية؟

لا شيء	خفيف جدا	خفيف	متوسط	شديد	شديد جدا
▼	▼	▼	▼	▼	▼
1 □	2 □	3 □	4 □	5 □	6 □

8. خلال الأسابيع الأربعة الماضية، إلى أي مدى تدخل الألم بعملك الاعتيادي (بما فيه العمل خارج البيت أو العمل البيتي)؟

لا على الإطلاق	قليلًا	بشكل معتدل	كثيرًا	بشدة
▼	▼	▼	▼	▼
1 □	2 □	3 □	4 □	5 □

9. هذه الأسئلة تستفسر عن شعورك وكيف سارت الأمور معك خلال الأسابيع الأربعة الماضية. لكل سؤال، الرجاء إعطاء الجواب الأقرب إلى الطريقة التي شعرت بها. كم من الوقت خلال الأسابيع الأربعة الماضية...

كلّ الوقت	معظم الوقت	بعض الوقت	قليل من الوقت	ولا في أي وقت
-----------	------------	-----------	---------------	---------------

- ا. شعرت بالحيوية؟
- ب. شعرت بأنك عصبي/ة جداً؟
- ج. شعرت بأنك محبطة/ة جداً بحيث انه لاشيء يمكنه إسعادك؟
- د. شعرت بالهدوء والطمأنينة؟
- هـ. كانت لديك طاقة كبيرة؟
- و. شعرت بأنك حزين/ة ومكتئب/ة؟
- ز. شعرت بأنك منهك/ة؟
- ح. شعرت بالسعادة؟
- ط. شعرت بالتعب؟

10. خلال الأسابيع الأربعة الماضية، كم من الوقت تدخلت صحتك الجسدية أو مشاكلك العاطفية في نشاطاتك الاجتماعية (مثل القيام بزيارات للأصدقاء، الأقارب، الخ)؟

كلّ الوقت	معظم الوقت	بعض الوقت	قليل من الوقت	ولا في أي وقت
1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

11. ما مدى صحة أو خطأ كل من العبارات الآتية بالنسبة لك؟

بشكل مطلق خاطئة	على الأغلب خاطئة	لا أعرف	على الأغلب صحيحة	بشكل مطلق صحيحة
▼	▼	▼	▼	▼

- ا. يبدو أنني أكثر سهولة في التعرض للمرض من أشخاص آخرين. .... 1  ..... 2  ..... 3  ..... 4  ..... 5
- ب. أنا سليم/ة بنفس قدر السلامة التي يتمتع بها أي شخص أعرفه. .... 1  ..... 2  ..... 3  ..... 4  ..... 5
- ج. أتوقع أن تزداد صحتي سوءا. .... 1  ..... 2  ..... 3  ..... 4  ..... 5
- د. صحتي ممتازة. .... 1  ..... 2  ..... 3  ..... 4  ..... 5

شكرا لإكمالك هذه الأسئلة!

## Appendix C

الاستعداد لدفع مبلغ من المال مقابل الحصول على اقلام الانسولين بدلا من الابر

نفترض توفر اقلام الانسولين كاداة لحقن الانسولين (بوجود القلم والشرح للمريض عنه وعن كيفية استخدامه)

استخدام الاقلام مقارنة بالإبر:

اقلام الانسولين	الابر العادية المستخدمة من قبلك حاليا
يتوجب عليك حمل القلم بالإضافة الى عبوة انسولين.	يجب عليك حمل زجاجة الانسولين والمحقن (السرنج).
لتحديد الجرعة المطلوبة تحتاج الى اختيار الجرعة من زر الجرعة الموجود على القلم.	يجب سحب هواء الى داخل الحقنة بمقدار الجرعة , ادخل الابرة الى داخل علبة الانسولين عبر الغطاء المطاطي, اسحب الانسولين من العلبة بمقدار الجرعة المطلوبة , لاحظ الانسولين داخل الحقنة . عند وجود فقاعات هوائية يجب ازالتها والتأكد من زوالها.
لحقن الانسولين تغرز الإبرة تحت جلدك وتنقر من ثم على زر في طرف القلم لتوصيل الأنسولين.	أمسك الحقنة مثل قلم الرصاص. أغرز بسرعة كل الإبرة في طية جلدك وفق زاوية قدرها 90 درجة . أفلت الجلد واحقن الأنسولين من خلال دفع المكبس برفق وبوتيرة معتدلة ومطرّدة.
من السهل استخدام القلم, ويحتاج وقت اقل لحقن الانسولين.	استخدام الابر يحتاج وقت اكبر من الاقلام.
استخدام القلم يسبب ألم أقل عند الحقن.	حقن الابر يسبب ألم اكبر.
عليك تعلم كيفية استخدام القلم.	انت اصلا تستخدم ابر الانسولين وتعرف كيفية استخدامها.

ما الذي تختاره كوسيلة لحقن الانسولين:

○ الاقلام ○ الابر

هل عندك استعداد لدفع مبلغ اكبر من الذي تدفعه حاليا مقابل الابر والانسولين للحصول على قلم

الانسولين كوسيلة للحقن

○ نعم

○ لا

ضع باعتبارك دخلك الشهري, كم المبلغ بالشيكال الذي تستطيع دفعه زيادة على المبلغ الذي تدفعه حاليا مقابل اختيار القلم كوسيلة لحقن الانسولين:

- 10     20     40     60     100     150     أكثر من 200  
 15     30     50     70     120     200

إذا كان اختيارك الاقلام

ما هي الصفات المهمة التي حددت اختيارك للاقلام:

لا	نعم	الصفة
		سهولة التعامل مع القلم من ناحية سهولة الحمل مقارنة بالابر
		سهولة الحقن مقارنة بالابر
		أثق أكثر بانني احقن الجرعة المطلوبة بدقة اكبر من الابر
		استخدام القلم يحتاج وقت اقل
		الالم عند الحقن يكون اقل
		عدم تأثير القلم على حياتك ونشاطاتك اليومية
		سهولة قراءة الجرعة

إذا كان اختيارك الابر

ما هي الصفات المهمة التي حددت اختيارك للابر والسرنج:

لا	نعم	الصفة
		اعتيادك على استخدام الابر
		التكلفة الاقل للابر
		صعوبة تعلم استخدام الاقلام
		سهولة التعامل مع الابر
		سهولة الحقن
		أثق أكثر بانني احقن الجرعة المطلوبة بدقة اكبر من الاقلام
		الالم عند الحقن يكون اقل
		عدم تأثير الابر على حياتك ونشاطاتك اليومية

		سهولة قراءة الجرعة
		القدرة على التحكم بمستوى السكر في الدم اكثر



## Appendix D



This is to certify that the IQOLA Project has prepared a true translation from English (for the United States) into Arabic (for Palestine) of the SF-36v2<sup>®</sup> Health Survey. Arabic translations of the SF-36v2<sup>®</sup> Health Survey were developed at the same time for Palestine and for Israel. These translations were developed using the standard IQOLA translation methodology, which involves multiple independent forward translations by native speakers; reconciliation of the independent forward translations into one form; backward translation of the translated form into English to check for conceptual equivalence with the source form; qualitative debriefing interviews with a small number of native Arabic-speaking lay people; and final proofreading.

Further details of the general IQOLA translation process can be found in the following peer-reviewed article:

Bullinger M, Alonso J, Apolone G, Lepège A, Sullivan M, Wood-Dauphinee S, et al.  
Translating health status questionnaires and evaluating their quality: The International Quality of Life Assessment Project approach. *J Clin Epidemiol* 1998; 51:913-923.

Sincerely,

A handwritten signature in black ink that reads 'Barbara Gandek'.

Barbara Gandek, M.S.  
Director, IQOLA Project

Appendix E

<p>State of Palestine Ministry of Health P.H.D./Bethlehem Tel : 02/2741756 Fax: 02/2741023</p>		<p>دولة فلسطين وزارة الصحة مديرية صحة محافظة بيت لحم هاتف : 2741756-02 فاكس : 2741023-02</p>
--	--	--

حضرة مدير عام الرعاية الصحية الأولية والصحة العامة المحترم ،،،

تحية وبعد،،،

بفضل عطفه ورحمته  
الرحيم حفظه الله

10-09-2018

الموضوع : جمع معلومات لرسالة الماجستير

بالإشارة إلى الموضوع أعلاه ، وبناء على كتابكم حول تعبئة الاستمارة للحصول على الموافقة لاجراء بحث علمي ، ارفق لكم استمارة الصيدلانية سلمى جمعة للحصول على موافقة اللجنة .

لعلمكم،،،

واقبلوا الاحترام ،،،،



مدير صحة محافظة بيت لحم

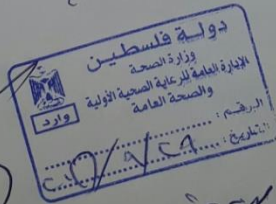
د. محمد عيسى ربيع



مع الاحترام  
مدير الصحة  
محافظة بيت لحم

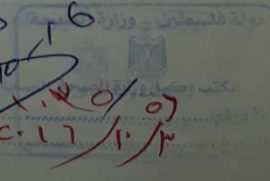


مدير الصحة  
محافظة بيت لحم



18-10-2018  
10/9/2018

مدير الصحة  
محافظة بيت لحم



## Appendix F

### Results Appendix

#### Gender

The averages of QoL domains and T-test for the relationship between gender and QoL domains.

QOL domains	Gender	N <sup>4</sup>	Mean	Std. deviation	T	df <sup>5</sup>	Sig. (2- tailed)
PF	F	162	56.61	31.57	-1.310	309	.191
	M	149	61.24	30.73			
RP	F	162	46.95	35.89	1.282	309	.201
	M	149	41.61	37.57			
BP	F	161	42.43*	30.68	-3.805	308	.000
	M	149	56.23	33.18			
GH	F	162	46.76	21.41	-1.330	309	.184
	M	149	50.07	22.53			
VT	F	160	38.98	27.84	-1.211	307	.227
	M	149	42.70	25.99			
SF	F	162	64.20	36.21	-.730	309	.466
	M	149	67.20	36.20			
RE	F	162	56.40	34.27	-1.353	308	.177
	M	148	61.71	34.72			
MH	F	160	52.75	24.37	-1.105	307	.270
	M	149	55.81	24.19			
PCS	F	160	40.72	11.74	-1.117	307	.265
	M	149	42.20	11.56			
MCS	F	160	40.52	11.86	-1.198	307	.232
	M	149	42.18	12.47			

#### Age

The averages of QoL domains and ANOVA test for the effect of age on QoL domains

QOL	Age	N <sup>6</sup>	Mean	Std. Deviation
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<sup>4</sup> N: Number of subjects

<sup>5</sup> Df: degree of freedom

domains				
PF	17-40	78	56.22	31.97
	41-59	120	62.21	30.97
	>60 more	110	57.23	31.18
RP	17-40	78	45.19	35.91
	41-59	120	44.06	37.68
	>60 more	110	43.75	36.87
BP	17-40	78	54.05	31.12
	41-59	120	49.78	33.35
	>60 more	109	44.92	32.84
GH	17-40	78	49.97	23.38
	41-59	120	49.05	22.00
	>60 more	110	46.62	21.08
VT	17-40	77	43.51	28.25
	41-59	119	41.75	27.64
	>60 more	110	37.78	25.57
SF	17-40	78	61.38	37.21
	41-59	120	70.42	33.80
	>60 more	110	64.20	37.61
RE	17-40	78	57.16	36.85
	41-59	119	57.14	34.23
	>60 more	110	61.33	33.32
MH	17-40	77	54.68	27.04
	41-59	119	54.29	24.42
	>60 more	110	54.23	22.37
PCS	17-40	77	42.08	11.87
	41-59	119	42.23	11.75
	>60 more	110	40.16	11.53
MCS	17-40	77	41.01	13.18
	41-59	119	41.36	12.08
	>60 more	110	41.52	11.77

#### ANOVA

QOL domains		Sum of Squares	df	Mean Square	F	Sig.
PF	Between Groups	2181.594	2	1090.797	1.113	.330
	Within Groups	298822.573	305	979.746		
	Total	301004.167	307			
RP	Between Groups	100.926	2	50.463	.037	.964
	Within Groups	416466.647	305	1365.464		

	Total	416567.573	307			
BP	Between Groups	3874.559	2	1937.279	1.821	.164
	Within Groups	323388.418	304	1063.778		
	Total	327262.977	306			
GH	Between Groups	593.193	2	296.596	.611	.544
	Within Groups	148137.612	305	485.697		
	Total	148730.805	307			
VT	Between Groups	1672.597	2	836.298	1.141	.321
	Within Groups	222090.679	303	732.973		
	Total	223763.276	305			
SF	Between Groups	4359.047	2	2179.524	1.676	.189
	Within Groups	396748.907	305	1300.816		
	Total	401107.955	307			
RE	Between Groups	1231.622	2	615.811	.515	.598
	Within Groups	363826.421	304	1196.797		
	Total	365058.043	306			
MH	Between Groups	10.248	2	5.124	.009	.991
	Within Groups	180490.487	303	595.678		
	Total	180500.735	305			
PCS	Between Groups	285.213	2	142.606	1.042	.354
	Within Groups	41483.037	303	136.908		
	Total	41768.250	305			
MCS	Between Groups	12.015	2	6.008	.040	.961
	Within Groups	45524.008	303	150.244		
	Total	45536.023	305			

### Place of residency

Averages and T-Test to evaluate the effect of residency on QOL.

QOL domain	Residency	N <sup>7</sup>	Mean	Std. Deviation	T	df	Sig. (2-tailed)
PF	Bethlehem	114	63.33	30.24	1.961	308	.051
	Hebron	196	56.15	31.60			
RP	Bethlehem	114	53.73*	37.97	3.431	308	.001
	Hebron	196	39.13	35.02			
BP	Bethlehem	113	53.04	32.27	1.659	307	.098
	Hebron	196	46.66	32.67			
GH	Bethlehem	114	52.36*	23.00	2.532	308	.012
	Hebron	196	45.87	21.02			
VT	Bethlehem	112	44.98*	28.53	2.099	306	.037
	Hebron	196	38.30	25.87			
SF	Bethlehem	114	70.39	34.25	1.814	308	.071
	Hebron	196	62.69	37.05			
RE	Bethlehem	114	63.16	37.28	1.700	307	.090
	Hebron	195	56.26	32.61			
MH	Bethlehem	112	58.17*	24.14	2.215	306	.027
	Hebron	196	51.84	24.13			
PCS	Bethlehem	112	43.63*	11.60	2.515	306	.012
	Hebron	196	40.18	11.56			
MCS	Bethlehem	112	43.17*	12.48	2.100	306	.037
	Hebron	196	40.17	11.84			

\*Significant at 0.05 level.

<sup>7</sup> N: Number of subjects

## Marital status

Averages and ANOVA test to assess the effect of marital status on QOL.

QOL domain	Marital status	N	Mean	Std. Deviation
PF	MARRIED	264	56.82	30.55
	WIDOW	21	45.24	33.22
	SINGLE	25	90.80	12.05
RP	MARRIED	264	40.63	36.31
	WIDOW	21	49.11	35.15
	SINGLE	25	80.00	21.50
BP	MARRIED	263	48.33	32.52
	WIDOW	21	35.86	27.64
	SINGLE	25	69.04	29.78
GH	MARRIED	264	47.63	22.10
	WIDOW	21	48.43	16.94
	SINGLE	25	57.60	21.81
VT	MARRIED	262	39.89	27.00
	WIDOW	21	38.69	24.42
	SINGLE	25	52.50	27.48
SF	MARRIED	264	64.30	36.71
	WIDOW	21	61.90	36.12
	SINGLE	25	84.00	25.14
RE	MARRIED	263	57.27	35.14
	WIDOW	21	58.33	31.95
	SINGLE	25	75.33	25.40
MH	MARRIED	262	54.39	24.28
	WIDOW	21	58.81	21.09
	SINGLE	25	49.60	27.00
PCS	MARRIED	262	40.55	11.33
	WIDOW	21	37.64	10.88

	SINGLE	25	54.09	7.65
MCS	MARRIED	262	41.21	12.42
	WIDOW	21	43.17	9.33
	SINGLE	25	41.09	12.14

**ANOVA**

		Sum of Squares	Df	Mean Square	F	Sig.
PF	Between Groups	30498.712	2	15249.356	17.270	.000
	Within Groups	271078.963	307	882.993		
	Total	301577.675	309			
RP	Between Groups	35911.272	2	17955.636	14.411	.000
	Within Groups	382522.321	307	1246.001		
	Total	418433.594	309			
BP	Between Groups	13779.134	2	6889.567	6.720	.001
	Within Groups	313715.410	306	1025.214		
	Total	327494.544	308			
GH	Between Groups	2270.684	2	1135.342	2.394	.093
	Within Groups	145606.764	307	474.289		
	Total	147877.448	309			
VT	Between Groups	3734.577	2	1867.288	2.585	.077
	Within Groups	220276.178	305	722.217		
	Total	224010.755	307			
SF	Between Groups	9192.524	2	4596.262	3.566	.029
	Within Groups	395706.669	307	1288.947		
	Total	404899.194	309			
RE	Between Groups	7452.320	2	3726.160	3.173	.043
	Within Groups	359372.413	306	1174.420		
	Total	366824.733	308			
MH	Between Groups	981.391	2	490.695	.831	.437
	Within Groups	180193.528	305	590.798		
	Total	181174.919	307			
PCS	Between Groups	4513.256	2	2256.628	18.455	.000
	Within Groups	37294.300	305	122.276		
	Total	41807.557	307			
MCS	Between Groups	76.515	2	38.258	.256	.774
	Within Groups	45524.474	305	149.261		
	Total	45600.989	307			



LSD test for the differences of QOL domains by participants' marital status

Dependant variable	(I) marital status	(J) marital status	Mean Difference (I-J)	Std. Error	Sig.
PF	MARRIED	widow	11.5783766	6.7373567	.230
		single	-33.9821758 *	6.2180710	.000
	widow	married	-11.5783766	6.7373567	.230
		single	-45.5605524 *	8.7958534	.000
RP	married	widow	-8.48214	8.00332	.571
		single	-39.37500 *	7.38646	.000
	widow	married	8.48214	8.00332	.571
		single	-30.89286 *	10.44861	.013
BP	married	widow	12.470	7.261	.230
		single	-20.713 *	6.701	.009
	widow	married	-12.470	7.261	.230
		single	-33.183 *	9.478	.002
SF	married	widow	2.3945	8.1401	.958
		single	-19.7008 *	7.5127	.033
	widow	married	-2.3945	8.1401	.958
		single	-22.0952	10.6271	.117
RE	married	widow	-1.062	7.771	.991
		single	-18.061 *	7.172	.043
	widow	married	1.062	7.771	.991
		single	-16.999	10.144	.247
PCS	married	widow	2.906	2.508	.512
		single	-13.544 *	2.315	.000
	widow	married	-2.906	2.508	.512
		single	-16.450 *	3.273	.000

\*The mean difference is significant at the 0.05 level.

### Level of education

The averages, ANOVA and LSD test to assess the effect of education level on QoL domains

QOL domain	Level of education	N	Mean	Std. Deviation
PF	No schooling	110	46.55	30.99
	Elementary school and diploma	160	61.84	29.13
	university	15	74.33	32.06
	university	26	83.27	20.69
RP	No schooling	110	32.84	32.98
	Elementary school and diploma	160	46.45	36.36
	university	15	70.42	36.02
	university	26	65.63	37.05
BP	No schooling	109	43.31	32.24
	Elementary school and diploma	160	48.36	32.06
	diploma	15	67.07	28.75

	university	26	67.15	30.92
GH	No schooling	110	43.35	21.13
	Elementary school and diploma	160	49.81	22.24
	university	15	53.47	23.85
VT	university	26	57.58	18.77
	No schooling	110	31.36	25.72
	Elementary school and diploma	160	42.89	25.81
	university	15	58.75	25.20
SF	university	24	58.59	25.06
	No schooling	110	57.50	38.47
	Elementary school and diploma	160	67.50	34.63
	university	15	91.67	17.47
RE	university	26	73.56	34.52
	No schooling	110	53.52	33.90
	Elementary school and diploma	159	58.60	35.07
	university	15	75.56	31.26
MH	university	26	74.36	29.43
	No schooling	110	46.32	23.90
	Elementary school and diploma	160	57.63	23.50
	university	15	63.67	23.18
PCS	university	24	61.88	23.49
	No schooling	110	37.93	10.81
	Elementary school and diploma	160	41.91	11.55
	university	15	47.89	10.81
MCS	university	24	50.26	10.20
	No schooling	110	38.17	11.85
	Elementary school and diploma	160	42.18	12.37
	university	15	48.22	7.69
	university	24	45.78	10.90

#### ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
PF	Between Groups	37186.968	3	12395.656	14.379	.000
	Within Groups	264653.157	307	862.062		
	Total	301840.125	310			
RP	Between Groups	37232.718	3	12410.906	9.994	.000
	Within Groups	381232.414	307	1241.799		
	Total	418465.133	310			
BP	Between Groups	17054.890	3	5684.963	5.590	.001
	Within Groups	311174.687	306	1016.911		
	Total	328229.577	309			
GH	Between Groups	5700.549	3	1900.183	4.049	.008
	Within Groups	144061.946	307	469.257		
	Total	149762.495	310			
VT	Between Groups	22925.950	3	7641.983	11.577	.000

	Within Groups	201334.517	305	660.113		
	Total	224260.467	308			
SF	Between Groups	19632.831	3	6544.277	5.204	.002
	Within Groups	386060.497	307	1257.526		
	Total	405693.328	310			
RE	Between Groups	13568.997	3	4522.999	3.899	.009
	Within Groups	354947.259	306	1159.958		
	Total	368516.256	309			
MH	Between Groups	11468.270	3	3822.757	6.847	.000
	Within Groups	170295.322	305	558.345		
	Total	181763.592	308			
PCS	Between Groups	3877.059	3	1292.353	10.382	.000
	Within Groups	37965.439	305	124.477		
	Total	41842.499	308			
MCS	Between Groups	2402.085	3	800.695	5.651	.001
	Within Groups	43213.880	305	141.685		
	Total	45615.964	308			

#### LSD test for the differences of QOL domains by education level

Dependent variable	(I) level of education	(J) level of education level	Mean Difference (I-J)	Std. Error	Sig.
PF	No schooling	Elementary and	-15.2972614 *	3.6365947	.001
		diploma	-27.7879697 *	8.0813215	.009
		university	-36.7238671 *	6.4025914	.000
	Elementary and secondary	No schooling	15.2972614 *	3.6365947	.001
		diploma	-12.4907083	7.9283489	.480
		University	-21.4266058 *	6.2083924	.008
	diploma	No schooling	27.7879697 *	8.0813215	.009
		Elementary and	12.4907083	7.9283489	.480
		university	-8.9358974	9.5198253	.830
RP	No schooling	Elementary and	-13.60440 *	4.36467	.022
		diploma	-37.57576 *	9.69926	.002
		university	-32.78409 *	7.68444	.001
	Elementary and secondary	No schooling	13.60440 *	4.36467	.022
		diploma	-23.97135	9.51566	.098
		University	-19.17969	7.45136	.087
	diploma	No schooling	37.57576 *	9.69926	.002
		Elementary and	23.97135	9.51566	.098
		University	4.79167	11.42577	.981
BP	No schooling	Elementary and	-5.051	3.960	.654
		diploma	-23.755	8.782	.065
		university	-23.842 *	6.960	.009
	Elementary and	No schooling	5.051	3.960	.654
		diploma	-18.704	8.611	.196

	secondary	University	-18.791	6.743	.053
	diploma	No schooling	23.755	8.782	.065
		Elementary and	18.704	8.611	.196
		University	-.087-	10.340	1.000
	university	No schooling	23.842 *	6.960	.009
		Elementary and	18.791	6.743	.053
diploma		.087	10.340	1.000	
GH	No schooling	Elementary and	-6.461	2.683	.124
		diploma	-10.121	5.962	.412
		university	-14.231 *	4.724	.030
	Elementary and secondary	No schooling	6.461	2.683	.124
		diploma	-3.660	5.850	.942
		university	-7.771	4.581	.412
	diploma	No schooling	10.121	5.962	.412
		Elementary and	3.660	5.850	.942
		university	-4.110	7.024	.952
VT	No schooling	Elementary and	-11.527 *	3.182	.005
		diploma	-27.386 *	7.072	.002
		university	-27.230 *	5.788	.000
	Elementary and secondary	No schooling	11.527 *	3.182	.005
		diploma	-15.859	6.938	.158
		university	-15.703	5.624	.052
	diploma	No schooling	27.386 *	7.072	.002
		Elementary and	15.859	6.938	.158
		university	0.156	8.456	1.000
university	No schooling	27.230 *	5.788	.000	
	Elementary and	15.703	5.624	.052	
	diploma	-.156	8.456	1.000	
SF	No schooling	Elementary and	-10.0000	4.3922	.161
		diploma	-34.1667 *	9.7605	.007
		university	-16.0577	7.7329	.232
	Elementary and secondary	No schooling	10.0000	4.3922	.161
		diploma	-24.1667	9.5757	.097
		university	-6.0577	7.4984	.884
	diploma	No schooling	34.1667 *	9.7605	.007
		Elementary and	24.1667	9.5757	.097
		university	18.1090	11.4979	.480
RE	No schooling	Elementary and	-5.073	4.224	.696
		diploma	-22.033	9.374	.140
		university	-20.836	7.427	.051
	Elementary and secondary	No schooling	5.073	4.224	.696
		diploma	-16.960	9.199	.336
		university	-15.763	7.205	.190
	diploma	No schooling	22.033	9.374	.140
		Elementary and	16.960	9.199	.336
		university	1.197	11.043	1.000
MH	No schooling	Elementary and	-11.307 *	2.927	.002
		diploma	-17.348	6.504	.070
		university	-15.557 *	5.324	.038

	Elementary and secondary	No schooling	11.307 *	2.927	.002
		diploma	-6.042	6.381	.826
		university	-4.250	5.172	.879
	diploma	No schooling	17.348	6.504	.070
		Elementary and	6.042	6.381	.826
		university	1.792	7.777	.997
PCS	No schooling	Elementary and	-3.975 *	1.382	.042
		diploma	-9.955 *	3.071	.016
		university	-12.323 *	2.514	.000
	Elementary and secondary	No schooling	3.975 *	1.382	.042
		diploma	-5.980	3.013	.270
		university	-8.348 *	2.442	.009
	diploma	No schooling	9.955 *	3.071	.016
		Elementary and	5.980	3.013	.270
		university	-2.368	3.672	.937
MCS	No schooling	Elementary and	-4.012	1.474	.062
		diploma	-10.050 *	3.276	.026
		university	-7.611 *	2.682	.047
	Elementary and secondary	No schooling	4.012	1.474	.062
		diploma	-6.037	3.214	.319
		university	-3.598	2.606	.593
	diploma	No schooling	10.050 *	3.276	.026
		Elementary and	6.037	3.214	.319
		university	2.439	3.918	.943

## Occupation

Averages, ANOVA and LSD tests to evaluate the effect of occupation on QOL domains

QOL domain	Current occupation	N	Mean	Std.
PF	Full time job	47	80.85	20.83
	Part time job	17	75.29	23.35
	Not working	247	53.60	31.18
RP	Full time job	47	60.90	36.24
	Part time job	17	51.10	38.48
	Not working	247	40.60	35.88
BP	Full time job	47	62.83	31.00
	Part time job	17	61.12	33.65
	Not working	246	45.54	32.09
GH	Full time job	47	57.17	21.85
	Part time job	17	54.35	22.81
	Not working	247	46.19	21.56
VT	Full time job	47	51.20	25.63
	Part time job	17	47.43	18.50
	Not working	245	38.24	27.29
SF	Full time job	47	82.98	27.26
	Part time job	17	74.26	33.21
	Not working	247	61.69	36.95
RE	Full time job	46	73.19	31.08
	Part time job	17	61.76	31.74
	Not working	247	56.05	34.84
MH	Full time job	47	59.26	25.43
	Part time job	17	54.12	21.30
	Not working	245	53.30	24.28
PCS	Full time job	47	48.24	10.63
	Part time job	17	47.06	12.85
	Not working	245	39.71	11.21
MCS	Full time job	47	44.92	12.17
	Part time job	17	41.14	9.95
	Not working	245	40.64	12.26

**ANOVA**

		Sum of Squares	Df	Mean Square	F	Sig.
PF	Between Groups	34133.271	2	17066.635	19.633	.000
	Within Groups	266873.250	307	869.294		
	Total	301006.520	309			
RP	Between Groups	17112.546	2	8556.273	6.575	.002
	Within Groups	399488.386	307	1301.265		
	Total	416600.932	309			
BP	Between Groups	14420.508	2	7210.254	7.035	.001
	Within Groups	313641.285	306	1024.972		
	Total	328061.793	308			
GH	Between Groups	5414.956	2	2707.478	5.766	.003
	Within Groups	144160.541	307	469.578		
	Total	149575.497	309			
VT	Between Groups	7420.754	2	3710.377	5.225	.006
	Within Groups	216599.513	305	710.162		
	Total	224020.267	307			
SF	Between Groups	19237.907	2	9618.953	7.643	.001
	Within Groups	386367.436	307	1258.526		
	Total	405605.343	309			
RE	Between Groups	11533.429	2	5766.714	4.944	.008
	Within Groups	356922.854	306	1166.415		
	Total	368456.283	308			
MH	Between Groups	1398.386	2	699.193	1.183	.308
	Within Groups	180279.861	305	591.082		
	Total	181678.247	307			
PCS	Between Groups	3440.816	2	1720.408	13.672	.000
	Within Groups	38379.818	305	125.835		
	Total	41820.634	307			
MCS	Between Groups	721.906	2	360.953	2.452	.088
	Within Groups	44890.998	305	147.184		
	Total	45612.904	307			

QOL domains	(I) job	(J) job	Mean Difference (I-J)	Std. error	Sig.
PF	1	2	5.5565207	8.3444926	.801
		3	27.2537684 *	4.6935415	.000
	2	1	-5.5565207	8.3444926	.801

		3	21.6972477 *	7.3938255	.014
RP	1	2	9.80131	10.20938	.631
		3	20.30466 *	5.74249	.002
	2	1	-9.80131	10.20938	.631
		3	10.50335	9.04625	.510
BP	1	2	1.712	9.061	.982
		3	17.291 *	5.098	.004
	2	1	-1.712	9.061	.982
		3	15.579	8.030	.154
GH	1	2	2.817	6.133	.900
		3	10.979 *	3.450	.007
	2	1	-2.817	6.133	.900
		3	8.162	5.434	.325
VT	1	2	3.770	7.542	.883
		3	12.954 *	4.245	.010
	2	1	-3.770	7.542	.883
		3	9.184	6.685	.390
SF	1	2	8.7140	10.0403	.686
		3	21.2917 *	5.6474	.001
	2	1	-8.7140	10.0403	.686
		3	12.5777	8.8965	.369
RE	1	2	11.424	9.694	.500
		3	17.142 *	5.486	.008
	2	1	-11.424	9.694	.500
		3	5.718	8.565	.800
PCS	1	2	1.181	3.175	.933
		3	8.531 *	1.787	.000
	2	1	-1.181	3.175	.933
		3	7.350 *	2.814	.034

\*The mean difference is significant at the 0.05level, 1: full time job, 2: part time job and 3: unemployed.



## Place of living

Averages and ANOVA test to evaluate the effect of place of living on QOL domains

QOL domains	Place of living	N	Mean	Std. Deviation
PF	Village	116	61.90	30.86
	city	190	56.58	31.32
	camp	4	83.75	22.87
RP	Village	116	49.57	36.47
	city	190	40.79	36.32
	camp	4	54.69	52.88
BP	Village	116	50.42	33.19
	city	189	47.71	32.23
	camp	4	70.75	34.85
GH	Village	116	47.16	22.89
	city	190	48.68	21.41
	camp	4	63.50	23.23
VT	Village	116	41.54	27.23
	city	188	39.56	26.50
	camp	4	71.88	32.87
SF	Village	116	69.40	34.94
	city	190	63.09	36.96
	camp	4	75.00	35.36
RE	Village	116	56.86	35.06
	city	189	59.83	34.39
	camp	4	75.00	31.92
MH	Village	116	52.80	22.16
	city	188	54.63	25.47
	camp	4	78.75	20.16
PCS	Village	116	42.95	11.82
	city	188	40.34	11.46
	camp	4	47.63	13.86
MCS	Village	116	40.46	11.90
	city	188	41.64	12.28
	camp	4	51.27	14.34

### ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
PF	Between Groups	4535.411	2	2267.705	2.348	.097
	Within Groups	296471.110	307	965.704		
	Total	301006.520	309			
RP	Between Groups	5992.858	2	2996.429	2.240	.108
	Within Groups	410608.074	307	1337.486		
	Total	416600.932	309			

BP	Between Groups	2441.746	2	1220.873	1.147	.319
	Within Groups	325620.046	306	1064.118		
	Total	328061.793	308			
GH	Between Groups	1104.237	2	552.119	1.142	.321
	Within Groups	148471.260	307	483.620		
	Total	149575.497	309			
VT	Between Groups	4213.165	2	2106.582	2.923	.055
	Within Groups	219807.102	305	720.679		
	Total	224020.267	307			
SF	Between Groups	3220.446	2	1610.223	1.229	.294
	Within Groups	402384.897	307	1310.700		
	Total	405605.343	309			
RE	Between Groups	1683.625	2	841.812	.702	.496
	Within Groups	366772.658	306	1198.603		
	Total	368456.283	308			
MH	Between Groups	2671.121	2	1335.560	2.276	.104
	Within Groups	179007.126	305	586.909		
	Total	181678.247	307			
PCS	Between Groups	643.668	2	321.834	2.384	.094
	Within Groups	41176.965	305	135.006		
	Total	41820.634	307			
MCS	Between Groups	500.971	2	250.486	1.694	.186
	Within Groups	45111.933	305	147.908		
	Total	45612.904	307			

### Number of family members

QOL domain	Pearson coefficient	Sig.
PF	.033	.281
RP	.016	.389
BP	.056	.165
GH	-.005	.465
VT	-.005	.464
SF	.090	.057
RE	-.062	.141
MH	-.035	.274
PCS	.062	.141
MCS	-.037	.260

## Monthly income

Averages, ANOVA and LSD test to assess the effect of income on QOL domains

QOL domains	Monthly income	N	Mean	Std. deviation
PF	<3000	254	56.67	31.43
	3000-4000	40	71.37	26.43
	>4000	16	63.44	32.75
RP	<3000	254	41.83	36.81
	3000-4000	40	53.44	34.41
	>4000	16	59.77	35.43
BP	<3000	253	47.40	32.65
	3000-4000	40	56.85	32.08
	>4000	16	55.19	32.25
GH	<3000	254	47.45	21.89
	3000-4000	40	50.63	23.95
	>4000	16	56.00	17.58
VT	<3000	252	39.96	26.98
	3000-4000	40	44.06	26.96
	>4000	16	44.53	28.40
SF	<3000	254	62.84	36.40
	3000-4000	40	83.13	28.10
	>4000	16	65.63	41.21
RE	<3000	253	56.08	34.30
	3000-4000	40	74.17	31.74
	>4000	16	65.63	37.13
MH	<3000	252	53.63	24.51
	3000-4000	40	58.00	22.67
	>4000	16	54.69	26.11
PCS	<3000	252	40.73	11.80
	3000-4000	40	44.21	10.58
	>4000	16	45.27	11.07
MCS	<3000	252	40.65	12.06
	3000-4000	40	45.40	10.95
	>4000	16	41.62	15.56

### ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
PF	Between Groups	7814.059	2	3907.029	4.091	.018
	Within Groups	293192.461	307	955.024		
	Total	301006.520	309			
RP	Between Groups	8714.810	2	4357.405	3.280	.039
	Within Groups	407886.123	307	1328.619		
	Total	416600.932	309			

BP	Between Groups	3725.576	2	1862.788	1.757	.174
	Within Groups	324336.217	306	1059.922		
	Total	328061.793	308			
GH	Between Groups	1347.189	2	673.594	1.395	.249
	Within Groups	148228.308	307	482.828		
	Total	149575.497	309			
VT	Between Groups	826.628	2	413.314	.565	.569
	Within Groups	223193.638	305	731.782		
	Total	224020.267	307			
SF	Between Groups	14213.610	2	7106.805	5.574	.004
	Within Groups	391391.732	307	1274.892		
	Total	405605.343	309			
RE	Between Groups	12062.522	2	6031.261	5.178	.006
	Within Groups	356393.761	306	1164.685		
	Total	368456.283	308			
MH	Between Groups	662.131	2	331.065	.558	.573
	Within Groups	181016.116	305	593.495		
	Total	181678.247	307			
PCS	Between Groups	669.810	2	334.905	2.482	.085
	Within Groups	41150.823	305	134.921		
	Total	41820.634	307			
MCS	Between Groups	778.421	2	389.211	2.648	.072
	Within Groups	44834.483	305	146.998		
	Total	45612.904	307			

QOL dimension	(I) income	(j) income	Mean Difference (I-J)	Std. error	Sig.
PF	<3000	3000-4000	-14.7019409*	5.2569521	.021
		>4000	-6.7649409	7.9654854	.698
	3000-4000	<3000	14.7019409*	5.2569521	.021
		>4000	7.9370000	9.1413690	.686
RP	<3000	3000-4000	-11.60679	6.20051	.175
		>4000	-17.93492	9.39518	.163
	3000-4000	<3000	11.60679	6.20051	.175
		>4000	-6.32813	10.78212	.842
SF	<3000	<3000	-20.2805*	6.0738	.004
		>4000	-2.7805	9.2033	.955
	3000-4000	<3000	20.2805*	6.0738	.004
		>4000	17.5000	10.5619	.255
RE	<3000	3000-4000	-18.090*	5.807	.008
		>4000	-9.548	8.798	.556
	3000-4000	<3000	18.090*	5.807	.008
		>4000	8.542	10.095	.699

## Duration of diabetes

Averages and ANOVA test to examine the effect of diabetes duration on QOL

QOL domain	Duration of diabetes (years)	N	Mean	Std. Deviation
PF	0-5	52	69.13	30.30
	6-10	73	68.01	28.46
	11-60	185	52.46	30.98
RP	0-5	52	55.17	39.87
	6-10	73	48.29	37.13
	>10	185	39.59	34.96
BP	0-5	52	56.75	34.40
	6-10	73	53.07	32.18
	>10	184	45.24	31.90
GH	0-5	52	53.19	22.76
	6-10	73	49.03	21.47
	>10	185	46.64	21.89
VT	0-5	51	44.73	27.23
	6-10	73	41.87	27.98
	>10	184	39.16	26.57
SF	0-5	52	71.88	34.47
	6-10	73	70.38	35.81
	>10	185	61.96	36.60
RE	0-5	52	55.77	35.14
	6-10	73	66.10	33.14
	>10	184	56.95	34.78
MH	0-5	51	51.08	21.31
	6-10	73	55.14	25.33
	>10	184	54.78	24.75
PCS	0-5	51	46.76	13.06
	6-10	73	43.33	10.18
	>10	184	39.18	11.25
MCS	0-5	51	39.46	10.95
	6-10	73	42.27	12.35
	>10	184	41.46	12.46

## ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
PF	Between Groups	19187.071	2	9593.535	10.451	.000
	Within Groups	281819.449	307	917.979		
	Total	301006.520	309			
RP	Between Groups	11398.414	2	5699.207	4.318	.014
	Within Groups	405202.519	307	1319.878		

	Total	416600.932	309			
BP	Between Groups	6933.907	2	3466.954	3.304	.038
	Within Groups	321127.886	306	1049.438		
	Total	328061.793	308			
GH	Between Groups	1791.021	2	895.510	1.860	.157
	Within Groups	147784.476	307	481.383		
	Total	149575.497	309			
VT	Between Groups	1361.437	2	680.718	.932	.395
	Within Groups	222658.830	305	730.029		
	Total	224020.267	307			
SF	Between Groups	6165.069	2	3082.534	2.369	.095
	Within Groups	399440.274	307	1301.108		
	Total	405605.343	309			
RE	Between Groups	4987.593	2	2493.797	2.099	.124
	Within Groups	363468.689	306	1187.806		
	Total	368456.283	308			
MH	Between Groups	622.626	2	311.313	.524	.592
	Within Groups	181055.621	305	593.625		
	Total	181678.247	307			
PCS	Between Groups	2643.812	2	1321.906	10.291	.000
	Within Groups	39176.822	305	128.449		
	Total	41820.634	307			
MCS	Between Groups	245.897	2	122.949	.827	.439
	Within Groups	45367.007	305	148.744		
	Total	45612.904	307			

### Duration of using insulin

Averages and ANOVA test to examine the effect of the duration of using insulin and QOL domains.

QOL domain	Duration of using insulin (years)	N	Mean
PF	0-5	184	58.97
	6-10	69	59.71
	11-60	55	56.27
RP	0-5	184	43.55
	6-10	69	44.38
	>10	55	44.43
BP	0-5	183	49.43

	6-10	69	46.58
	>10	55	48.91
GH	0-5	184	48.63
	6-10	69	45.39
	>10	55	50.07
VT	0-5	182	39.97
	6-10	69	41.21
	>10	55	41.59
SF	0-5	184	67.12
	6-10	69	64.49
	>10	55	60.68
RE	0-5	183	58.17
	6-10	69	65.22
	>10	55	52.58
MH	0-5	182	52.23
	6-10	69	57.25
	>10	55	56.64
PCS	0-5	182	41.70
	6-10	69	40.06
	>10	55	41.47
MCS	0-5	182	40.81
	6-10	69	43.12
	>10	55	40.48

**ANOVA**

		Sum of Squares	Df	Mean Square	F	Sig.
PF	Between Groups	406.753	2	203.377	.209	.812
	Within Groups	297202.510	305	974.434		
	Total	297609.263	307			
RP	Between Groups	54.736	2	27.368	.020	.980
	Within Groups	410290.612	305	1345.215		
	Total	410345.348	307			
BP	Between Groups	409.107	2	204.554	.193	.825
	Within Groups	322422.111	304	1060.599		
	Total	322831.218	306			
GH	Between Groups	770.870	2	385.435	.795	.452
	Within Groups	147807.013	305	484.613		
	Total	148577.883	307			
VT	Between Groups	150.671	2	75.336	.103	.902
	Within Groups	221585.568	303	731.306		
	Total	221736.239	305			
SF	Between Groups	1825.127	2	912.563	.693	.501
	Within Groups	401398.798	305	1316.062		
	Total	403223.925	307			

RE	Between Groups	5043.431	2	2521.716	2.120	.122
	Within Groups	361656.791	304	1189.660		
	Total	366700.222	306			
MH	Between Groups	1675.782	2	837.891	1.415	.245
	Within Groups	179453.303	303	592.255		
	Total	181129.085	305			
PCS	Between Groups	136.638	2	68.319	.506	.604
	Within Groups	40931.212	303	135.087		
	Total	41067.850	305			
MCS	Between Groups	310.172	2	155.086	1.041	.354
	Within Groups	45124.790	303	148.927		
	Total	45434.962	305			

### Type of diabetes

T-test to assess the relationship between QOL and diabetes type.

QOL domain	Type of diabetes	N	Mean	Std. Deviation	T	df	Sig. (2-tailed)
PF	1	269	54.720520	30.0246501	-6.453	308	.000
	2	41	86.463171	24.2705194			
RP	1	269	40.0325	35.49283	-5.418	308	.000
	2	41	71.9512	32.68941			
BP	1	268	45.92	32.135	-4.400	307	.000
	2	41	69.32	28.672			
GH	1	269	46.13	20.892	-4.597	308	.000
	2	41	62.56	23.977			
VT	1	267	38.04	26.112	-4.601	306	.000
	2	41	58.23	26.533			
SF	1	269	62.965	36.5842	-3.340	308	.001
	2	41	82.927	28.6078			
RE	1	268	57.98	34.948	-1.219	307	.224
	2	41	65.04	31.854			
MH	1	267	53.28	24.187	-1.804	306	.072
	2	41	60.61	24.576			
PCS	1	267	39.69	10.907	-7.126	306	.000



	2	41	52.63	10.280			
MCS	1	267	41.02	12.237	-1.085	306	.279
	2	41	43.24	11.842			

### HbA<sub>1c</sub> level

T-test to examine the effect of HbA<sub>1c</sub> level on QOL domains

QOL domain	HbA <sub>1c</sub> level	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
PF	<7	8	71.25	35.93	1.077	260	.282
	>7	254	59.25	30.86			
RP	<7	8	58.59	39.38	1.124	260	.262
	>7	254	43.92	36.25			
BP	<7	8	49.75	37.48	.068	259	.946
	>7	253	48.97	31.64			
GH	<7	8	62.63	20.71	1.957	260	.051
	>7	254	47.50	21.55			
VT	<7	7	39.29	35.49	-.120	258	.904
	>7	253	40.51	26.38			
SF	<7	8	57.81	48.61	-.662	260	.509
	>7	254	66.54	36.32			
RE	<7	8	73.96	30.03	1.228	259	.220
	>7	253	58.51	35.14			
MH	<7	7	60.71	15.92	.684	258	.495
	>7	253	54.39	24.30			
PCS	<7	7	45.59	14.95	.976	258	.330
	>7	253	41.34	11.27			
MCS	<7	7	44.38	8.94	.663	258	.508
	>7	253	41.32	12.12			

## Number of insulin types

T-test to examine the effect of the number of insulin types the patient use and QoL

QOL domains	Number of insulin types used	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
PF	1 type	222	56.17	31.12	-3.226	280	.001
	2 type	60	70.67	29.98			
RP	1 type	222	42.17	36.20	-2.300	280	.022
	2 type	60	54.27	35.94			
BP	1 type	221	47.83	32.41	-1.099	279	.273
	2 type	60	53.02	32.48			
GH	1 type	222	47.27	22.66	-1.175	280	.241
	2 type	60	51.03	19.22			
VT	1 type	221	40.19	27.17	-.661	278	.509
	2 type	59	42.80	26.00			
SF	1 type	222	63.68	36.58	-1.314	280	.190
	2 type	60	70.63	35.34			
RE	1 type	221	58.01	35.66	-1.305	279	.193
	2 type	60	64.58	30.17			
MH	1 type	221	53.71	24.97	-.220	278	.826
	2 type	59	54.49	21.25			
PCS	1 type	221	40.56	11.29	-2.629	278	.009
	2 type	59	45.00	12.32			
MCS	1 type	221	41.12	12.59	-.295	278	.768
	2 type	59	41.64	10.40			

## Insulin regimen

Averages and ANOVA test to examine the effect of insulin regimen on QOL.

QOL domain	regimen	N	Mean	Std. Deviation
PF	once	30	55.33	34.01
	twice	209	58.71	30.45
	Three times	71	61.06	32.48
RP	once	30	40.83	34.65
	twice	209	42.17	36.99
	Three times	71	51.85	36.20
BP	once	30	52.90	34.16
	twice	208	47.92	32.12
	Three times	71	50.62	33.75
GH	once	30	56.40	17.87
	twice	209	46.15	22.07
	Three times	71	51.23	22.50
VT	once	30	42.92	25.68
	twice	208	39.39	27.32
	Three times	70	43.75	26.73
SF	once	30	72.08	34.85
	twice	209	63.70	36.96
	Three times	71	68.49	34.58
RE	once	29	65.23	33.26
	twice	209	56.18	34.98
	Three times	71	64.38	33.42
MH	once	30	57.33	24.63
	twice	208	54.06	24.89
	Three times	70	53.50	22.69
PCS	once	30	40.95	11.84
	twice	208	40.96	11.45
	Three times	70	42.96	12.28
MCS	once	30	44.49	12.13
	twice	208	40.55	12.52
	Three times	70	42.26	11.05

### ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
PF	Between Groups	719.474	2	359.737	.368	.693
	Within Groups	300287.047	307	978.134		
	Total	301006.520	309			
RP	Between Groups	5358.151	2	2679.075	2.000	.137
	Within Groups	411242.782	307	1339.553		
	Total	416600.932	309			
BP	Between Groups	883.591	2	441.796	.413	.662

	Within Groups	327178.202	306	1069.210		
	Total	328061.793	308			
GH	Between Groups	3543.500	2	1771.750	3.725	.025
	Within Groups	146031.996	307	475.674		
	Total	149575.497	309			
VT	Between Groups	1153.668	2	576.834	.789	.455
	Within Groups	222866.599	305	730.710		
	Total	224020.267	307			
SF	Between Groups	2609.858	2	1304.929	.994	.371
	Within Groups	402995.485	307	1312.689		
	Total	405605.343	309			
RE	Between Groups	4838.016	2	2419.008	2.036	.132
	Within Groups	363618.267	306	1188.295		
	Total	368456.283	308			
MH	Between Groups	331.893	2	165.946	.279	.757
	Within Groups	181346.354	305	594.578		
	Total	181678.247	307			
PCS	Between Groups	217.123	2	108.562	.796	.452
	Within Groups	41603.510	305	136.405		
	Total	41820.634	307			
MCS	Between Groups	486.970	2	243.485	1.646	.195
	Within Groups	45125.934	305	147.954		
	Total	45612.904	307			

### Patients' choice to use insulin pens or syringes

T-test to assess the relationship between patient's choice and QOL.

QOL domain	Choice	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
PF	pen/syringe						
	pens	180	62.64	30.09	2.489	308	.013
	syringe	130	53.77	32.11			
RP	pens	180	46.88	35.04	1.482	308	.139
	syringe	130	40.63	38.77			
BP	pens	180	49.25	31.76	.142	307	.887
	syringe	129	48.71	33.95			
GH	pens	180	47.82	21.72	-.452	308	.651
	syringe	130	48.97	22.46			

VT	pens	179	41.86	27.07	.871	306	.385
	syringe	129	39.15	26.96			
SF	pens	180	66.39	34.79	.448	308	.655
	syringe	130	64.52	38.25			
RE	pens	179	57.22	33.37	-1.012	307	.312
	syringe	130	61.25	36.19			
MH	pens	179	53.52	24.67	-.623	306	.534
	syringe	129	55.27	23.90			
PCS	pens	179	42.55	11.22	2.010	306	.045
	syringe	129	39.85	12.15			
MCS	pens	179	40.58	12.16	-1.246	306	.214
	syringe	129	42.34	12.20			

### Diabetes complications:

Averages and ANOVA test to examine the effect of diabetes complications on QOL domains.

QOL domain	Number of complications	N	Mean
PF	0	71	77.61
	1.00	67	72.16
	2.00	74	57.29
	3.00	54	41.67
	4.00	28	34.82
	5-7	16	28.44
RP	0	71	63.56
	1.00	67	59.61
	2.00	74	41.55
	3.00	54	28.94
	4.00	28	11.38
	5-7	16	16.02
BP	0	71	62.35
	1.00	67	57.55
	2.00	73	48.64
	3.00	54	34.15
	4.00	28	37.54
	5-7	16	26.25
GH	0	71	61.10

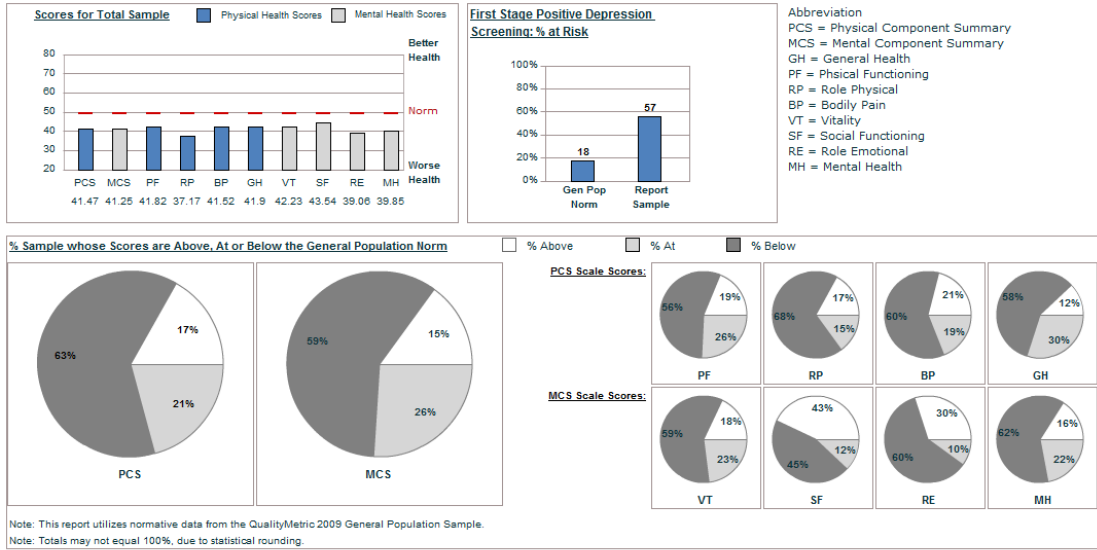
	1.00	67	51.82
	2.00	74	48.59
	3.00	54	37.85
	4.00	28	38.71
	5-7	16	27.50
VT	0	70	54.82
	1.00	66	43.84
	2.00	74	42.65
	3.00	54	27.66
	4.00	28	29.91
	5-7	16	20.31
SF	0	71	77.29
	1.00	67	75.00
	2.00	74	68.92
	3.00	54	51.85
	4.00	28	47.32
	5-7	16	37.50
RE	0	71	71.13
	1.00	66	60.80
	2.00	74	58.22
	3.00	54	52.78
	4.00	28	52.08
	5-7	16	32.81
MH	0	70	61.43
	1.00	66	52.27
	2.00	74	59.46
	3.00	54	48.61
	4.00	28	48.39
	5-7	16	36.25
PCS	0	70	48.56
	1.00	66	47.14
	2.00	74	40.32
	3.00	54	34.55
	4.00	28	31.88
	5-7	16	31.50
MCS	0	70	45.17
	1.00	66	40.42
	2.00	74	43.27
	3.00	54	38.61
	4.00	28	39.43
	5-7	16	31.61

## ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
PF	Between Groups	83938.853	5	16787.771	23.511	.000
	Within Groups	217067.668	304	714.038		
	Total	301006.520	309			
RP	Between Groups	98470.829	5	19694.166	18.819	.000
	Within Groups	318130.103	304	1046.481		
	Total	416600.932	309			
BP	Between Groups	41439.510	5	8287.902	8.761	.000
	Within Groups	286622.283	303	945.948		
	Total	328061.793	308			
GH	Between Groups	27856.969	5	5571.394	13.915	.000
	Within Groups	121718.528	304	400.390		
	Total	149575.497	309			
VT	Between Groups	33982.692	5	6796.538	10.801	.000
	Within Groups	190037.575	302	629.263		
	Total	224020.267	307			
SF	Between Groups	48631.076	5	9726.215	8.283	.000
	Within Groups	356974.266	304	1174.257		
	Total	405605.343	309			
RE	Between Groups	25098.278	5	5019.656	4.430	.001
	Within Groups	343358.005	303	1133.195		
	Total	368456.283	308			
MH	Between Groups	13735.123	5	2747.025	4.940	.000
	Within Groups	167943.124	302	556.103		
	Total	181678.247	307			
PCS	Between Groups	12488.870	5	2497.774	25.717	.000
	Within Groups	29331.764	302	97.125		
	Total	41820.634	307			
MCS	Between Groups	3376.052	5	675.210	4.828	.000
	Within Groups	42236.852	302	139.857		
	Total	45612.904	307			

## Appendix G

Quality metric health outcome scoring software results of norm based scoring.





## تقييم لاستخدام الانسولين في وزارة الصحة الفلسطينية ومضاعفات مرض السكري

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إشراف: د. حسين حلاق

### الملخص

أعداد مرضى السكري في ازدياد حول العالم وهؤلاء المرضى بحاجة للالتزام بالادوية والحمية الغذائية والزيارات الدورية للأطباء وذلك للوصول الى المستوى الطبيعي للسكر في الدم مما يؤثر على نوعية الحياة لهم من عدة نواحي: جسدية، اجتماعية ونفسية. مع تطور المرض يحتاج المرضى لاستخدام الانسولين. حسب احصائيات وزارة الصحة الفلسطينية 12% من الفلسطينيين مصابون بالسكري. 20% من مراجعي عيادات الصحة يستخدمون علاج الانسولين بينما 12% يستخدمون علاج الاقراص والانسولين. وزارة الصحة توفر الابر لحقن الانسولين في حين خيار الاقلام غير متوفر. معظم دراسات نوعية الحياة لمرضى السكري تمت في الدول المتقدمة وعدد قليل منها في الدول النامية.

**هدف الدراسة:** الهدف من هذه الدراسة كان لتقييم نوعية حياة مرضى السكري المستخدمين للانسولين والعوامل المؤثرة عليها.

**اجراءات الدراسة:** اجريت هذه الدراسة على عينة عشوائية تتكون من 311 مريض سكري يستخدمون الابر لحقن الانسولين واعمارهم اكبر من 14 سنة ويتلقون العلاج في عيادات السكري التابعة لوزارة الصحة في محافظة بيت لحم والخليل. الاستبيان المستخدم في الدراسة كان يشمل اربع اجزاء: معلومات ديموغرافية عن المرضى، معلومات المريض الصحية، نوعية الحياة للمرضى، استعداد

المرضى لدفع مبلغ من المال مقابل استخدام اقلام الانسولين. تم الحصول على موافقة وزارة الصحة لعمل الدراسة وموافقة المريض الشفهية قبل تعبئة الاستمارة. تم تحليل النتائج باستخدام برنامج QualityMetric Health Outcomes™ Scoring Software 4.0 وكذلك برنامج SPSS.

## النتائج والتوصيات

تراوحت متوسطات قيم نوعية الحياة من 40.7 الى 65.6. اعلى قيمة كانت للمجال الذي يقيم الحالة الاجتماعية بمعدل 65.6 يليها الصحة الجسدية والنفسية بمعدل 58.9. اقل القيم كانت للمجال المتعلق بالحيوية والطاقة بمعدل 40.7. كانت معدلات نوعية الحياة في جميع المجالات ,عدا المجال الاجتماعي, لمرضى السكري في هذه الدراسة اقل من المعدلات العامة للسكان في فلسطين. وقد كانت نوعية الحياة لمعظم المرضى في هذه الدراسة اقل من المعدل العام.

لقد اوضحت النتائج ان الجنس والعمر والتحكم بمستوى السكر في الدم لا يؤثر على نوعية الحياة للمرضى. نوعية الحياة للمرضى غير المتزوجين كانت افضل من المتزوجين, نوعية الحياة للمرضى السكري في بيت لحم كانت افضل من المرضى سكان الخليل. زيادة المستوى التعليمي, الدخل الشهري وكون المريض يعمل كان لها اثر ايجابي على نوعية الحياة. في حين كانت نوعية الحياة اقل للمرضى اللذين يعانون من السكري لفترة اطول. وجود مضاعفات السكري كانت لها تأثير سلبي على نوعية الحياة للمرضى. نوعية الحياة للمرضى اللذين يعانون من النوع الثاني كانت افضل منها لمرضى النوع الاول. 85% من المرضى في هذه الدراسة فضلوا استخدام اقلام الانسولين بدلا من الابرة اذا وفرته وزارة الصحة. 35% من هؤلاء المرضى كان لديهم الاستعداد لدفع مبلغ من المال مقابل الحصول على الاقلام.

اوضحت هذه الدراسة ان نوعية الحياة لمرضى السكري اللذين يستخدمون الانسولين كانت متدنية. كثير من الدراسات اوضحت ان استخدام اقلام الانسولين بدلا من الابر يزيد من نوعية الحياة, فاضافة اقلام الانسولين كخيار للمرضى اللذين يتلقون العلاج في عيادات وزارة الصحة قد يزيد من نوعية الحياة لهم.