

# The Reliability and Validity of a Questionnaire of Health-Related Quality of Life: Concerning for Diabetes Patient in Vietnamese

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## Abstract:-

### ➤ Introduction

In spite of plentiful health-related quality of life (HRQoL) implements are disposable for diabetic patients, the longitude of these measurements may restrict their feasibility to habitual application. Also, these instruments do not differentiate the elements for the diabetes-generic and specific HRQoL. This study reports the reliability and validity analyses of Vietnamese Diabetes Quality of Life (VNDQOL) questionnaire on type 2 diabetic patients in Tam Binh district health center, Vinh Long province, Vietnam. **Methods:** An initial supply of the elements has been germinated place on a literature review. Both English and Vietnamese versions were inspected by five experts, then a try out was carried on 45 type 2 diabetic patients from 35 to 65 years old to validate the VNDQOL questionnaire. The IBM SPSS 22.0 software was used the statistical analysis. The Cronbach's alpha has been used the reliability evaluation. **Results:** After the review of the generic and specific QoL measures, a new questionnaire was developed that was VNDQOL. Then the English and Vietnamese versions were assessed by 5 medical professionals. The 41 HRQoL questions had the Cronbach's Alpha >0.95. Consequently, the reliability of the VNDQOL is more than sufficient. The  $\chi^2/df$  of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity was 2540.62/820 ( $p < 0.0001$ ). Therefore, the VNDQOL achieved acceptable construct validity. **Conclusion:** The VNDQOL has adequate reliability and tolerable validity. Evaluating the diabetic influence on a particular domain of life and its significance on the individual patient could lead to more correctly individualized QoL measurements in diabetic patients.

**Keywords:-** Diabetes Mellitus, VNDQOL, HRQoL, Vietnamese.

## I. INTRODUCTION

Quality of life (QoL) is a key health outcome in its own right, equivalent to the ultimate goal of any health interference [1] [2] which is undergoing the accelerating concentricity in the scientific reports, including medical science writings [1]. The World Health Organization defined the QoL as “an individual's cognizance of his/her position in life in the background of the culture and value systems”. General devices contain a range of QoL aspects in a single questionnaire, while disease-specific implements quantify only suitable features belonging to the exact ailment [3]. Before the development of QoL tools, the result judgment of the disease has habitually depended on mortality, morbidity, clinical characteristics or complications [3] [4]. These methods do not glint the cognitive and communal conditions of the patients. However, QoL assessment persists the indefinable factors that are dependent on the individual's cognizance. The problem lies in the undoubtedly speculating individual perception of QoL into the impartial scores for the assessing. Thus, the apparatus must be the responsiveness and pertinence with the inhabitants about various languages, races, cultures, socio-economic improvement and religious conscience which can have mainly direct or indirect domination on the QoL [3].

Diabetes mellitus (DM) is a generality public health concern in Vietnam as well as globally. DM is associated with long-term damage to multiple organ systems and increased age-adjusted death rate. Its complications, which are the neuropathy, retinopathy, stroke, heart disease, and kidney disease affect both individual and social issues [5]. Traditional analysis for diabetic patients depends on clinical scales, e.g., glycemic control and diabetic complications. Nonetheless, using clinical measurements solitary for diabetes surveillance is restricted because they cannot completely describe the patient's health results [6], particularly psychology injuries.

The HRQoL measurements, which stress the quotidian function and health, are available accessories of the clinical gauges for the assessment of the diabetic health consequences. A number of instruments are advantageous for appreciating diabetic HRQoL that include the generic and diabetes-specific implements. General tools assess widely essential HRQoL realms beyond diseases, but diabetic-specific tools compute the special effects of diabetes on function and well-being. Distinctive implements may be more responsive to participants' score falsities by the time [6].

There is a great need to establish and validate diabetic HRQoL gadgets for the Vietnamese population. In spite of fact that more than a dozen of diabetic HRQoL tools have been built, only one instrument is expendable on the Vietnamese language that is a translated SF-36 on the research of Tran Ngoc Hoang and Nguyen Thi Bich Dao (2014). This tool evaluates the general QoL which is short form 36 Vietnamese version including 8 domains that were physical activities, physical role, body pain, common health, social play, emotional role, spiritual health, and vitality [7]. Therefore, it is significant to develop and validate the specific instruments to better catch discriminatory diabetic HRQoL on the Vietnamese diabetes population.

This study objective develops a valid and reliable diabetic-specific HRQoL questionnaire. This report analyses the reliability and validity of VNDQOL questionnaire on type 2 diabetic patients in Tam Binh district health center, Vinh Long province, Vietnam.

**II. RESEARCH DESIGN AND METHODS**

The framework of the research design is presented in figure 1.

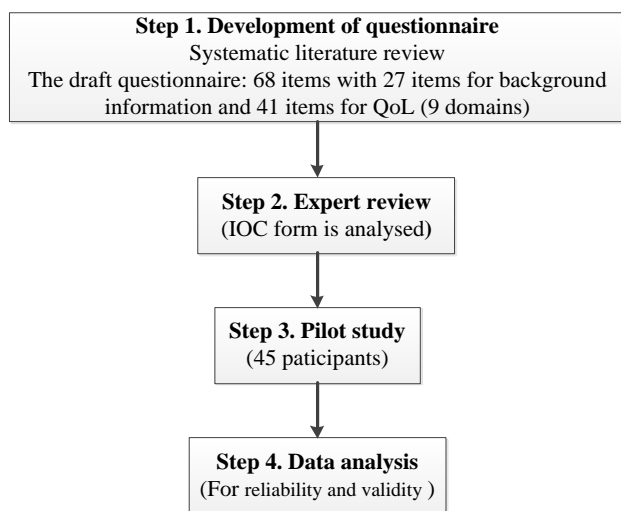


Fig 1:- The flowchart of the study design

*A. Development of Target Questionnaire: Vietnam Diabetes Quality of Life, VNDQOL*

The literature reviewed for the generic and specific QoL measures, and found the seventeen instruments for our paper. Based on these review, we developed a new questionnaire to evaluate the HRQoL of diabetes Vietnamese population. This questionnaire comprises two parts: part 1 queries about the background information with 27 questions; part 2 measures the QoL on 41 questions. Particularly, the part 2 has 9 domains that are the general health, activity limitation, physical endurance, diet and eating habits, treatment, symptom burden, financial aspects, emotional/mental health, inter-personal relationship. Each question response was scored a 5-point Likert scale from 1 to 5. For the subscale score calculation, the total score of each subscale question was reflected in a figure between 0 and 100. A higher subscale score reflects the better QoL. This questionnaire was translated to English and Vietnamese languages.

*B. Expert Review*

A total of 68 items on this questionnaire was evaluated by a group of five experts who hold a doctorate degree including Dr. Ngo Van Truyen PhD, MD, Dean of Faculty of Medicine; Dr. Le Van Minh PhD, MD, Vice-Dean of Faculty of Medicine and Deputy-Head of the Department of Interventional Cardiology-Neurology; Dr. Tran Kim Son PhD, MD, Department of Internal Medicine; Dr. Vo Pham Minh Thu PhD, MD, Head of the Personal Department and Dean of Department of General Medicine; Dr. Nguyen Thi Diem PhD, MD, Faculty of Medicine, then send the English and Vietnamese version of this questionnaire and the form for evaluation to contain three Likert scale with -1: not agree; 0: not sure; 1: agree and comment column. Then we use the Item Objective Congruence (IOC) Index for screening the item quality. The qualified items should have the IOC equal to or greater than 0.50.

*C. The Pilot Research*

At the final step, for basic pilot evaluation research of questionnaire was performed. After adjusting the questionnaire received from experts, we conducted a pilot study on type 2 diabetic patients at the examination department of Tam Binh district health center. A 45 diabetic-patients was selected for the pilot research. The type 2 diabetic patients who were diagnosed more than half a year ago and the participants' age from 35 to 65 years old were included in the research. The volunteers with any other chronic illness which they were necessarily admitted more than two weeks in the hospital one year ago, gestational DM or communicating inability due to physical or mental disability were excluded from the study. This questionnaire is used for evaluation the HRQoL of these patients. After that, the data is analyzed to confirm its valuation.

#### D. Data Analysis

To evaluate the reliability of the VNDQOL questionnaire, its internal consistency was analyzed by using Cronbach's alpha coefficient [8]. Evaluating its validity, the structure of the questionnaire was identified by factor analysis. Eventually, confirmatory factor analysis (CFA) was carried on the examination of the construct validity [9]. The IBM SPSS statistics 22 software has used the data analysis.

### III. RESULTS

#### A. Development of Vietnam diabetes quality of life (VNDQOL) questionnaire

We reviewed 17 questionnaires which include the generic and specific questionnaire (Table 1). Also, we wrote two papers and presented on the ISER 151st International

Conferences on Medical and Health Science (ICMHS) in London, UK in 18<sup>th</sup> – 19<sup>th</sup>, August 2018 [10] and the 10th International Conference On Public Health Among Greater Mekong Sub-Regional Countries in Kunming, China in November 2018 about the systematic literature review for the questionnaire [11].

From this questionnaire, we developed a new questionnaire that was VNDQOL for Vietnamese population in Tam Binh district. This instrument covered two parts which were the background information that collects the personal information of diabetic people and the QoL part to assess the HRQoL of these patients. It comprises 27 items about background information and 41 items for the evaluation for the QoL (Supplement 1). We designed this questionnaire on two languages that were the English and Vietnamese versions.

No.	Instrument	Type	Number of Domains/Subscales
1	15D (15 dimensions instrument)	Generic	15 dimensions
2	EQ-5D (EuroQOL-5D Health Utility Index)	Generic	EQ-5D: 5 dimensions EQ-thermometer: 1 dimension
3	SF-12 (MOS 12-item Short Form Health Survey)	Generic	12 dimensions
4	SF-36 (MOS 36-item Short Form Health Survey)	Generic	36 items in 8 domains
5	SF-6D (MOS 6-item Short Form Health Survey)	Generic	Six dimensions
6	WHOQOL-BREF (World Health Organization Quality of Life Brief)	Generic	26 items in 4 domains
7	ADDQoL-18 (Audit of Diabetes-Dependent Quality of Life-18)	Specific	18 items
8	ADDQoL-19 (Audit of Diabetes-Dependent Quality of Life-19)	Specific	19 items
9	AsianDQOL (Asian Diabetes Quality of Life)	Specific	21 items in 5 dimensions
10	D-39 (Diabetes 39)	Specific	39 items
11	DQLCTQ (Diabetes Quality of Life Clinical Trial Questionnaire)	Specific	57 items in 8 domains
12	DQOL (Diabetes Quality of Life)	Specific	36 dimensions
13	DQoL-BCI (Diabetes Quality of Life-Brief Clinical Inventory)	Specific	15 items in 4 dimensions
14	IDI (In-depth interviews)	Specific	A deeper understanding of the patients
15	IVI (Impact of Visual Impairment)	Specific	28 items in three subscales
16	MENQOL (Menopause-specific quality of life)	Specific	29 items in 4 dimensions
17	PAID (Problem Areas in Diabetes Scale)	Specific	20 items

Table 1:- The questionnaire data

#### B. The Expert Review

After that, both versions are assessed by 5 medical professionals, who received doctoral level, at Can Tho University of Medicine and Pharmacy, Can Tho City, Vietnam. The result of the expert evaluations is analyzed by the IOC Index (Supplement 2). The qualified items have the IOC equal to or greater than 0.50 to keep for the questionnaire. Table 2 showed that all items will keep for the pilot research.

#### C. The Pilot Research

##### 1) Participant's characteristics

Totally 45 patients with type 2 diabetes visiting an examination department of Tam Binh district health center on February 2019 were screened for eligibility for the study. The characteristics of recruited participants were described on table 2.

The mean age of the respondents was 52.49 (SD: 8.385) years. The proportion of female was 62.2%. Almost they married (86.7%) and lived on the small family which were 1 – 2 generations. Kinh people occupied the majority of the research group (93.3%). Most participants in the study were literate, accounting for 91.1% and had jobs including both full-time and part-time jobs which the monthly income of 3 groups accounting was nearly equal proportions, in which dominant rather than high income group (42.2%). The average of glycemic level was 9.2 (SD: 3.88) and duration of diabetes was 3.4 (SD =3.49). The result showed that 40% of patients had hypoglycemia, of which 22.2% suffered 1 time per week,

13.3% suffered 2-3 times a week, 4.4% suffered daily. Only about 37.8% of the participants were aware of diabetes information through various sources. Moreover, most diabetic patients (88.9) have other medical problems associated with hypertension, dyslipidemia, poor sexual desire, neuropathy, heart, small blood vessels, eye problems, kidneys, endocrine diseases and other problems. In our study, most patients were treated with oral hypoglycemic agents, 86.7% and they were usually checked the blood glucose at the government clinics or hospitals (86.7%). In addition, the major of these people were not smoking and drinking.

Sex Male Female	17 (37.8%) 28 (62.2%)	Ethnicity Kinh Khomer	42 (93.3%) 3 (6.7%)
Marriage Never married Married Separated/Divorced Widowed/Widower	1 (2.2%) 39 (86.7%) 2 (4.4%) 3 (6.7%)	Education level Illiterate Primary Secondary Tertiary and above	4 (8.9%) 15 (33.3%) 13 (28.9%) 13 (28.9%)
Type of family Big ( $\geq$ 3 generations) Small (1-2 generations)	15 (33.3%) 30 (66.7%)	Diabetic information Yes No	17 (37.8%) 28 (62.2%)
Employment status Full-time Part-time Unemployed Retired	13 (28.9%) 19 (42.2%) 7 (15.6%) 6 (13.3%)	Treatment Diet Oral medication Insulin No	2 (4.4%) 39 (86.7%) 1 (2.2%) 3 (6.7%)
Monthly Income Low Medium High	13 (28.9%) 13 (28.9%) 19 (42.2%)	Duration (year) Mean Minimum Maximum	3.7 $\pm$ 3.49 0.5 15
Medical problem beside diabetes Yes No	40 (88.9%) 5 (11.1%)	Smoking Yes No	10 (22.2%) 35 (77.8%)
Glycemic Mean Minimum Maximum	9.2 $\pm$ 3.88 4.92 22.0	Checking place Government hospital Private hospital Both	39 (86.7%) 1 (2.2%) 5 (11.1%)
Sign of hypoglycemia Never One/Few months One/Week 2 – 3 times/Week Daily	27 (60%) 10 (22.2%) 6 (13.3%) 2 (4.4%)	Drinking Yes No Age	14 (31.1%) 31 (68.9%) 52.49 $\pm$ 8.385

Table 2:- Participants' characteristic (N=45)

## 2) Reliability of the VNDQOL

The VNDQOL item structure was inspected by the Cronbach's alpha coefficient, and the question results about HRQoL were presented on table 3. It showed that 41 HRQoL

questions had the Cronbach's Alpha  $>0.95$ . This means the indicating that the reliability of the VNDQOL is more than sufficient.

Question (Q)	Mean	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q28. In general would you say your health is	153.62	0.799	0.953
Q29. How well are you able to concentrate in everything?	153.51	0.702	0.953
Q30. Have you had fatigue/felt very tired on the past three months?	152.73	0.823	0.952
Q31. How often do you miss your work because of your diabetes?	152.62	0.813	0.952
Q32. How does your eating and medication schedule affect your work?	152.29	0.663	0.953
Q33. How often does diabetes affect your efficiency at work?	152.76	0.826	0.952
Q34. How often do you find diabetes limiting your social life?	152.29	0.744	0.953
Q35. To what extent do you avoid traveling (business tour, holiday, general outings) because of your diabetes?	152.53	0.812	0.952
Q36. Compared to others of your age are your social activities (visiting friends/partying) limited because of your diabetes?	152.51	0.790	0.953
Q37. How often in last three months has your overall health problems limited the kind of vigorous activities you can do like lifting heavy bags/objects, running, skipping, jumping	153.09	0.778	0.952
Q38. How often in last three months has your overall health problems limited the kind of moderate activities you can do like moving a table, carrying groceries or utensils	152.64	0.838	0.952
Q39. How often in last three months has your overall health problems limited you from walking uphill or climbing 1-2 floors	152.44	0.792	0.953
Q40. How often in last three months has your overall health problems limited you from walking 1-2 km at a stretch	152.20	0.787	0.953
Q41. How often in last three months has your overall health problems limited you from bending, squatting, or turning	151.98	0.739	0.953
Q42. How often in last three months has your overall health problems limited you from eating, dressing, bathing, or using the toilet	151.64	0.595	0.955
Q43. How satisfied are you with your current diet?	152.96	0.755	0.953
Q44. How happy are you with current eating habits as compared to before the onset of diabetes?	152.98	0.720	0.953
Q45. Do you find it a burden to follow the diet you are supposed to take?	152.67	0.681	0.953
Q46. Are you still able to enjoy the food you like to eat now, as compared to before the onset of diabetes?	153.38	0.471	0.955
Q47. Do you feel sad that you are unable to eat freely as before?	152.82	0.696	0.953
Q48. Do you feel left out that you are unable to eat what others do?	152.27	0.643	0.954
Q49. How satisfied are you with your current diabetes treatment?	152.91	0.511	0.954
Q50. How satisfied are you with amount of time it takes to manage your diabetes?	153.04	0.638	0.954
Q51. How satisfied are you with the amount of time you spend getting regular checkups (once in 3 months)?	152.98	0.342	0.955
Q52. A person with diabetes needs to exercise for 35-45 minutes, 4 times a week. Keeping this in mind how satisfied are you with the time you spend exercising?	153.40	0.267	0.956
Q53. How many times in the past three months have you had thirst/dry mouth?	152.40	0.516	0.954
Q54. How many times in the past three months have you felt excessive hunger?	152.38	0.454	0.955
Q55. How many times in the past three months have you had frequent urination related to diabetes management?	152.40	0.513	0.954
Q56. Do you spend time worrying about your medical cost?	152.00	0.475	0.954
Q57. Do you feel that diabetes have increased your financial burden?	151.98	0.432	0.955
Q58. Do you have difficulties in paying for your medical expenses?	151.71	0.178	0.955

Q59. Do you spend time worrying about your future medical expenses?	152.02	0.494	0.954
Q60. Are you in constant fear that you may be a burden financially to your family?	152.04	0.509	0.954
Q61. How satisfied are you with yourself?	152.71	0.840	0.952
Q62. How satisfied are you with your personal relationships (family, friends, relatives and acquaintances)?	152.44	0.638	0.954
Q63. How satisfied are you with the emotional support you get from your friends and family?	152.38	0.355	0.955
Q64. How often are you discouraged by your health problem?	153.60	0.194	0.957
Q65. To what extent do you feel that you have been able to fulfill certain roles and lead your lives in a purposeful manner?	153.29	0.690	0.953
Q66. How do you find your relationship with your spouse/partner?	153.91	0.083	0.957
Q67. How would you describe your sexual relationship now as compared to before the onset of diabetes?	154.36	0.057	0.957
Q68. How is your sexual desire as compared to before the onset of diabetes?	154.33	0.070	0.957

Table 3:- Descriptive analysis of the VNDQOL (N=45)

3) *Validity of the VNDQOL*

To evaluate furthermore the validity of the VNDQOL, the CFA was conducted. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett’s Test of Sphericity have used for the evaluation of the overall model fit:  $\chi^2/df$  was 2540.62/820, statistical significance ( $p < 0.0001$ ) (Table 4).

Since the overall fit indices were adequate, we concluded that the VNDQOL achieved acceptable construct validity.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.612
Bartlett's Test of Sphericity	Approx. Chi-Square	2540.624
	df	820
	Sig.	0.000

Table 4:- KMO and Bartlett’s Test validated the VNQOL

**IV. DISCUSSION AND CONCLUSION**

*A. Discussion*

This study provides for the reliability and validity of the VNDQOL questionnaire that developed for use on the pilot research on type 2 diabetic patients in Tam Binh District Health Center. Particularly, we found out that the VNDQOL instruments had high internal consistency, as measured by Cronbach's alpha  $> 0.95$ . There was also strong proof of the test-retest reliability of the measurement. Using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett’s Test of Sphericity, we have shown the evidence for the convergent validity of the VNDQOL. Because no specific measure assesses the diabetes-related QoL, we do not have a "gold standard" to assess validity. These theoretically relevant approaches have provided us with a network of QoL approximating evaluation on type 2 DM population.

The developed and validated questionnaire consisted of 41 items covered on nine domains which included the aspects of QoL, namely role limitations of the general health, activity limitation, physical sustaining, diet and eating habits, treatment, symptom burden, financial aspects, emotional/mental health, inter-personal relationship. These

domains and items had high internal consistency (Cronbach’s alpha  $> 0.95$ ). The questionnaire expressed a QoL tool covering the HRQOL of type 2 diabetic population to develop and validate in Vietnam using standard methodology. The psychometric measurement of this equipment was explained variability, factor loadings, item-total correlations, concordant and discriminant validity within desirable range and above-suggested cutoff [12]. The questionnaire psychometric strength is strongly enhanced by the use of a standard Likert scale (five Likert scales) for all questions.

The research is restricted by the shortage of the number of study volunteers, so this may lead the selection bias i.e. highly motivated participants to fill the questionnaire. Also, the study population was selected from a specific health center and may not deputize for the community response. In spite of these, this tool is the first reliable, validated and sensitive implement for the comprehensive health-related and diabetes-specific to assess the QoL of type 2 diabetic patients in Vietnam. This can be applied to practice-based care as an outcome scale on assessing the impact on the QoL for more or less intense treatment options.

The factor analysis and Cronbach's alpha were exposed to satisfactory results. In particular, Cronbach's alpha of the VNDQOL outperformed over 0.95, which added the strength of accuracy and cultural adaptation. In addition, the KMO and Bartlett's Test were significant, which found out that criterion-related validity was instituted.

### B. Conclusion

In conclusion, we determined that the VNDQOL had allowable reliability and acceptable validity. Examining the impact of diabetes on a specific domain of life and its importance on each patient could lead to more accurate individualized QoL measurements in diabetic patients. Further studies are looked for confirming the validity of the VNDQOL on the large community.

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Supplementation 1

## VNDQOL VIETNAMESE DIABETES QUALITY OF LIFE QUESTIONNAIRE

Participant Number (Office use): \_\_\_\_\_

Date: \_\_\_\_\_

### A. BACKGROUND INFORMATION

In this section, questions will be asked about your basic personal information such as your age, the area you are living and about your diabetes. **The information of your province will be kept confidential at all times.**

Kindly put a tick “” in the box of your choice.

Example: i) What is the color of your hair?

Black     Blue     Yellow     Green    **Or**

Fill in your answers in the space (\_\_\_\_\_) provided

Example: ii) What year are you born in?    Year 1980

1. Age: \_\_\_\_\_ (years)
2. Gender:  Male     Female
3. Ethnicity:     Kinh     Khomer     Other
4. Location:     Tam Binh Town     My Thanh Trung     Hoa Loc  
 Tuong Loc     My Loc     Phu Loc  
 Hau Loc     Tan Loc     Song Phu  
 Long Phu     Tan Phu     Phu Thinh  
 Hoa Hiep     Hoa Thanh     Ngai Tu  
 Loan My     Binh Ninh
5. Marital status:  
 Never married     Married     Separated/Divorced     Widowed/Widower
6. Type of family:  
 Small (1-2 generations)     Big (≥ 3 generations)
7. Education level:  
 Illiterate     Primary     Secondary     Tertiary and above
8. Employment status:  
 Working (full time)     Working (par-time/some days)  
 Unemployed/Not working     Retired
9. Income monthly (Vietnam dong):  
 Low (<1,000,000)     Medium (1,000,000-1,500,000)     High (>1,500,000)
10. Year having diabetes: \_\_\_\_\_ (years)
11. Have you ever received diabetes-related information?     Yes     No
12. Which following medical problems do you have besides diabetes? (You can tick **more than one**)  
 Hypertension/high blood pressure  
 High cholesterol  
 Heart disease/heart block (previous episode of heart attack/chest pain)  
 Visual problems (cataract/diabetic eye problems)  
 Nerve problems (feeling tingling sensation of ant crawling/pain/numbness/feeling hot on extremities)  
 Problems with achieving/maintaining erection (**For males only**)  
 Recurrent vaginal infection/itchiness (**For female only**)  
 Poor sexual desire  
 Peripheral vascular disease (ulcers on extremities/amputations/gangrene)  
 Other endocrine problems (thyroid problems)  
 Renal problems (on haemodialysis/recurrent lower limbs swelling)  
 Others (please state) \_\_\_\_\_
13. What type of treatment are you currently on for diabetes?  
 Diet therapy only  
 Oral medications only (**Proceed to Q14 and Q15**)  
 Insulin only (**Proceed to Q16 and Q17**)  
 Oral medications + insulin (**Proceed to Q18, Q19 and Q20**)  
 Not on any treatment



- Others (please state) \_\_\_\_\_
- 14. Oral medications only  
How many types of medications are you currently taking for diabetes? \_\_\_\_ types
- 15. Oral medications only  
How many times a day you need to take the medications? \_\_\_\_ (**Proceed to Q21**)
- 16. Insulin only  
How long have you been on insulin? \_\_\_\_\_ year(s)
- 17. Insulin only  
How many times a day you need to inject yourself? \_\_\_\_ time(s) (**Proceed to Q21**)
- 18. Oral medications + insulin  
How many types of oral medications are you currently taking for diabetes? \_\_\_\_\_
- 19. Oral medications + insulin  
How many times a day you need to take your medications? \_\_\_\_\_ time(s)
- 20. Oral medications + insulin  
How many times a day you need to inject yourself? \_\_\_\_ time(s) (**Proceed to Q21**)
- 21. What type(s) of traditional medicine/herbs are you taking? (please list) \_\_\_\_\_ **(If NONE please fill in**

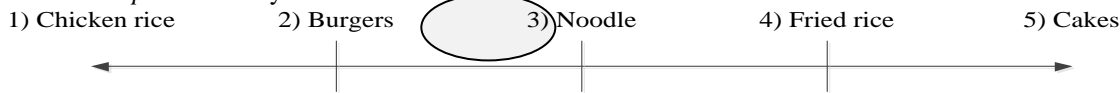
**“N” and proceed to Q22)**

- 22. How frequent do you monitor your blood sugar at home?  
\_\_\_\_\_ times/day  
\_\_\_\_\_ times/week  
\_\_\_\_\_ times/month  
Others: please specify \_\_\_\_\_
- 23. What is your average blood sugar reading? \_\_\_\_\_ mmol/L
- 24. How frequent do you experience signs of hypoglycemia (feeling of light-headedness, dizzy, extreme hunger, fainting due to low blood sugar)?  
 Never  Once/few months  One time/week  2-3 times/week  Daily
- 25. Where do you go for check-up/medications for your diabetes?  
 Government clinic/hospital  
 Private clinic/hospital  
 Others (please state): \_\_\_\_\_
- 26. Are you smoking?  Yes  No
- 27. Are you drinking?  Yes  No

**B. QUALITY OF LIFE**

The follow questions will ask you about your quality of life, health, or other areas of your life. Please answer all the questions. If you are sure about which response to give to a question, please **CIRCLE** the answer you choose.

*Example: What is your favorite food?*



**I. General health**

- 28. In general, would you say your health is  
1) Poor                      2) Fail                      3) Good                      4) Very good                      5) Excellent
- 29. How well are you able to concentrate in everything?  
1) Not at all                      2) A little                      3) Moderate                      4) Very much                      5) An extreme amount
- 30. Have you had fatigue/felt very tired on the past three months?  
1) Always                      2) Frequently                      3) Often                      4) Sometimes                      5) Never

<b>Score</b>	
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**II. Activity limitation**

31. How often do you miss your work because of your diabetes?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
32. How does your eating and medication schedule affect your work?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
33. How often does diabetes affect your efficiency at work?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
34. How often do you find diabetes limiting your social life?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
35. To what extent do you avoid traveling (business tour, holiday, general outings) because of your diabetes?  
 1) A lot      2) Highly      3) Little      4) Very little      5) Not at all
36. Compared to others of your age are your social activities (visiting friends/partying) limited because of your diabetes?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never

Score	
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**III. Physical endurance**

37. How often in last three months has your overall health problems limited the kind of vigorous activities you can do like lifting heavy bags/objects, running, skipping, jumping  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
38. How often in last three months has your overall health problems limited the kind of moderate activities you can do like moving a table, carrying groceries or utensils  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
39. How often in last three months has your overall health problems limited you from walking uphill or climbing 1-2 floors  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
40. How often in last three months has your overall health problems limited you from walking 1-2 km at a stretch  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
41. How often in last three months has your overall health problems limited you from bending, squatting, or turning  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
42. How often in last three months has your overall health problems limited you from eating, dressing, bathing, or using the toilet  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never

Score	
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**IV. Diet and eating habits**

43. How satisfied are you with your current diet?  
 1) Very dissatisfied      2) Dissatisfied      3) Unsure      4) Satisfied      5) Very satisfied

44. How happy are you with current eating habits as compared to before the onset of diabetes?  
 1) Very unhappy      2) Unhappy      3) Unsure      4) Happy      5) Very happy
45. Do you find it a burden to follow the diet you are supposed to take?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
46. Are you still able to enjoy the food you like to eat now, as compared to before the onset of diabetes?  
 1) Never      2) Sometimes      3) Often      4) Frequently      5) Always
47. Do you feel sad that you are unable to eat freely as before?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
48. Do you feel left out that you are unable to eat what others do?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never

Score	
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**V. Treatment**

49. How satisfied are you with your current diabetes treatment?  
 1) Very dissatisfied      2) Dissatisfied      3) Unsure      4) Satisfied      5) Very satisfied
50. How satisfied are you with amount of time it takes to manage your diabetes?  
 1) Very dissatisfied      2) Dissatisfied      3) Unsure      4) Satisfied      5) Very satisfied
51. How satisfied are you with the amount of time you spend getting regular checkups (once in 3 months)?  
 1) Very dissatisfied      2) Dissatisfied      3) Unsure      4) Satisfied      5) Very satisfied
52. A person with diabetes needs to exercise for 35-45 minutes, 4 times a week. Keeping this in mind how satisfied are you with the time you spend exercising?  
 1) Very dissatisfied      2) Dissatisfied      3) Unsure      4) Satisfied      5) Very satisfied

Score	
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**VI. Symptom burden**

53. How many times in the past three months have you had thirst/dry mouth?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
54. How many times in the past three months have you felt excessive hunger?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
55. How many times in the past three months have you had frequent urination related to diabetes management?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never

Score	
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**VII. Financial aspects**

56. Do you spend time worrying about your medical cost?  
 1) Always      2) Frequently      3) Often      4) Sometimes      5) Never
57. Do you feel that diabetes have increased your financial burden?

- 1) Always                      2) Frequently                      3) Often                      4) Sometimes                      5) Never
- ←-----|-----|-----|-----|----->
58. Do you have difficulties in paying for your medical expenses?  
1) Always                      2) Frequently                      3) Often                      4) Sometimes                      5) Never
- ←-----|-----|-----|-----|----->
59. Do you spend time worrying about your future medical expenses?  
1) Always                      2) Frequently                      3) Often                      4) Sometimes                      5) Never
- ←-----|-----|-----|-----|----->
60. Are you in constant fear that you may be a burden financially to your family?  
1) Always                      2) Frequently                      3) Often                      4) Sometimes                      5) Never
- ←-----|-----|-----|-----|----->

<b>Score</b>	
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**VIII. Emotional/mental health**

61. How satisfied are you with yourself?  
1) Very dissatisfied                      2) Dissatisfied                      3) Unsure                      4) Satisfied                      5) Very satisfied
- ←-----|-----|-----|-----|----->
62. How satisfied are you with your personal relationships (family, friends, relatives and acquaintances)?  
1) Very dissatisfied                      2) Dissatisfied                      3) Unsure                      4) Satisfied                      5) Very satisfied
- ←-----|-----|-----|-----|----->
63. How satisfied are you with the emotional support you get from your friends and family?  
1) Very dissatisfied                      2) Dissatisfied                      3) Unsure                      4) Satisfied                      5) Very satisfied
- ←-----|-----|-----|-----|----->
64. How often are you discouraged by your health problem?  
1) Always                      2) Frequently                      3) Often                      4) Sometimes                      5) Never
- ←-----|-----|-----|-----|----->
65. To what extent do you feel that you have been able to fulfill certain roles and lead your lives in a purposeful manner?  
1) Not at all                      2) A little                      3) Moderate                      4) Very much                      5) An extreme amount
- ←-----|-----|-----|-----|----->

<b>Score:</b>	
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**IX. Inter-personal relationship**

66. How do you find your relationship with your spouse/partner?  
1) Very poor                      2) Worse                      3) No change                      4) Better                      5) Much better
- ←-----|-----|-----|-----|----->
- Not applicable (kindly proceed to question 67)**
67. How would you describe your sexual relationship now as compared to before the onset of diabetes?  
1) Very bad                      2) Worse                      3) No change                      4) Better                      5) Much better
- ←-----|-----|-----|-----|----->
- Not applicable (kindly proceed to question 68)**
68. How is your sexual desire as compared to before the onset of diabetes?  
1) Very bad                      2) Worse                      3) No change                      4) Better                      5) Much better
- ←-----|-----|-----|-----|----->
- Not applicable**

<b>Score</b>	
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<b>TOTAL SCORE</b> (For office use only)	
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**THANK YOU FOR YOUR HELP**

Supplement 2. The Item Objective Congruence (IOC) Index

Item No.	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Total Score	The IOC Index Mean of Expert Score
1	1	1	0	1	1	4	IOCI = 4/5 = 0.8
2	1	1	1	1	1	5	IOCI = 5/5 = 1
3	1	1	1	1	1	5	IOCI = 5/5 = 1
4	1	1	1	1	1	5	IOCI = 5/5 = 1
5	1	1	1	1	1	5	IOCI = 5/5 = 1
6	1	1	1	1	1	5	IOCI = 5/5 = 1
7	1	1	0	1	1	4	IOCI = 4/5 = 0.8
8	1	1	1	0	1	4	IOCI = 4/5 = 0.8
9	1	1	-1	1	1	3	IOCI = 3/5 = 0.6
10	1	1	0	1	1	4	IOCI = 4/5 = 0.8
11	1	1	0	1	0	3	IOCI = 3/5 = 0.6
12	1	1	0	0	1	3	IOCI = 3/5 = 0.6
13	1	1	0	1	1	4	IOCI = 4/5 = 0.8
14	1	1	1	1	0	4	IOCI = 4/5 = 0.8
15	1	1	1	1	0	4	IOCI = 4/5 = 0.8
16	1	1	1	1	1	5	IOCI = 5/5 = 1
17	1	1	1	1	1	5	IOCI = 5/5 = 1
18	1	1	1	1	-1	3	IOCI = 3/5 = 0.6
19	1	1	1	1	-1	3	IOCI = 3/5 = 0.6
20	1	1	1	1	1	5	IOCI = 5/5 = 1
21	1	1	1	1	1	5	IOCI = 5/5 = 1
22	1	1	0	1	1	4	IOCI = 4/5 = 0.8
23	1	1	1	1	1	5	IOCI = 5/5 = 1
24	1	1	1	1	1	5	IOCI = 5/5 = 1
25	1	1	1	1	1	5	IOCI = 5/5 = 1
26	1	1	1	1	1	5	IOCI = 5/5 = 1
27	1	1	1	1	1	5	IOCI = 5/5 = 1
28	1	1	1	1	0	4	IOCI = 4/5 = 0.8
29	1	1	1	0	0	3	IOCI = 3/5 = 0.6
30	1	1	1	1	0	4	IOCI = 4/5 = 0.8
31	1	1	1	1	1	5	IOCI = 5/5 = 1
32	1	1	1	1	1	5	IOCI = 5/5 = 1
33	1	1	1	1	0	4	IOCI = 4/5 = 0.8
34	1	1	1	1	0	4	IOCI = 4/5 = 0.8
35	1	1	1	1	0	4	IOCI = 4/5 = 0.8
36	1	1	1	1	1	4	IOCI = 4/5 = 0.8
37	1	1	1	1	1	4	IOCI = 4/5 = 0.8
38	1	1	1	1	1	4	IOCI = 4/5 = 0.8
39	1	1	1	1	1	4	IOCI = 4/5 = 0.8
40	1	1	1	1	1	4	IOCI = 4/5 = 0.8
41	1	1	1	1	1	4	IOCI = 4/5 = 0.8
42	1	1	1	1	1	4	IOCI = 4/5 = 0.8
43	1	1	1	1	1	5	IOCI = 5/5 = 1
44	1	1	0	1	1	4	IOCI = 4/5 = 0.8
45	1	1	1	1	0	4	IOCI = 4/5 = 0.8
46	1	1	1	1	1	5	IOCI = 5/5 = 1
47	1	1	1	1	1	5	IOCI = 5/5 = 1
48	1	1	1	1	1	5	IOCI = 5/5 = 1
49	1	1	1	1	1	5	IOCI = 5/5 = 1
50	1	1	1	1	1	5	IOCI = 5/5 = 1
51	1	1	0	1	1	4	IOCI = 4/5 = 0.8

52	1	1	0	1	0	3	IOCI = $3/5 = 0.6$
53	1	1	1	1	1	5	IOCI = $5/5 = 1$
54	1	1	1	1	1	5	IOCI = $5/5 = 1$
55	1	1	1	1	0	4	IOCI = $4/5 = 0.8$
56	1	1	1	1	1	5	IOCI = $5/5 = 1$
57	1	1	1	1	1	5	IOCI = $5/5 = 1$
58	1	1	1	1	1	5	IOCI = $5/5 = 1$
59	1	1	1	1	1	5	IOCI = $5/5 = 1$
60	1	1	1	1	1	5	IOCI = $5/5 = 1$
61	1	1	0	1	1	4	IOCI = $4/5 = 0.8$
62	1	1	1	1	1	5	IOCI = $5/5 = 1$
63	1	1	-1	1	1	3	IOCI = $3/5 = 0.6$
64	1	1	-1	1	1	3	IOCI = $3/5 = 0.6$
65	1	1	0	1	0	3	IOCI = $3/5 = 0.6$
66	1	1	1	1	1	5	IOCI = $5/5 = 1$
67	1	1	1	1	1	5	IOCI = $5/5 = 1$
68	1	1	1	1	1	5	IOCI = $5/5 = 1$