Prevalence and Risk Factors for Depression Among Filipino Adults with Diabetes Mellitus Type 2 at the Makati Medical Center Outpatient Department

Stanlee James Dy Nieva, M.D.*; Maria Leonora D. Capellan, M.D.*; Carolyn N. Montano, M.D.*

Abstract

Objective: To determine the prevalence of depression in Filipino adult patients with type 2 diabetes mellitus (DM) and the risk factors associated in its development.

Methods: This is a prospective cross-sectional study. Adult patients (age 19 and above) with type 2 DM being seen at the outpatient department of the Makati Medical Center from January to March 2015 were included, taking into account the following: age, gender, marital status, body mass index, waist circumference, blood pressure, duration of diabetes, presence of other co-morbid illnesses, pill burden, insulin use, educational attainment, employment status, family income, and glycemic status. They were then screened for depression using the standardized PHQ-9 questionnaire. Bivariate analyses through Chi-square Test (for categorical variables) and Analysis of Variance (for interval/ratio variables) were used to determine which among the risk factors are significant for the development of depression. Significant risk factors were treated for multivariate and univariate analyses through ordinal logistic regression.

Results: A total of 110 adult patients with type 2 DM were enrolled in this study. There were no drop-outs. Sixty-nine percent of the patients had none to minimal depression, 24% had mild depression, and 7% had moderate depression. None of the patients had depression that warranted anti-depressants or psychotherapy. After step-wise analysis, increased BMI, elevated diastolic blood pressure and uncontrolled blood sugar were found to be associated with higher PHQ-9 scores while unemployment was associated with decreased PHQ-9 score.

Conclusion: The prevalence of depression among Filipino type 2 diabetic patients is higher than in non-diabetic patients. Being obese, having an elevated diastolic blood pressure, and the presence of uncontrolled blood sugar were significant predictors and were associated with an increased likelihood of developing major depressive disorder. Being unemployed appears to have the opposite effect.

Keywords: depression, type 2 diabetes mellitus, PHQ-9

Introduction

Depression is defined by the International Classification of Diseases, Tenth Revision (ICD-10) as having at least two of the three symptoms considered typical of depression: depressive mood, loss of interest and ability to enjoy, and increase in fatigability for at least two weeks. It is recognized by the World Health Organization (WHO) as the leading cause of disability in the world and is the fourth leading contributor to the global burden of disease.[1,2] It often coexists with other chronic diseases and can worsen their associated health outcomes.[3] In a study among Chinese patients aged 55 and older, the prevalence of depressive symptoms in patients with chronic illnesses was between 13.2-24.2%, significantly higher compared to those without co-morbidities (7.5%).[4] Local studies done among chronically ill patients utilizing different standardized questionnaires revealed a prevalence of 26.9 to 32%.[5,6]

Diabetes mellitus (DM) is a chronic disease characterized by hyperglycemia and its associated complications. According to the International Diabetes Foundation, the global prevalence of diabetes is 8.3% and is projected to rise to 10.1% in 2035.[7] In Southeast Asia, 8.2% of the adult population or 72.1 million people, have diabetes.[7] Based on the Eigth National Nutrition Survey, the prevalence of diabetes in the Philippines is 5.4%. This number is significantly higher compared to the same survey conducted in 2008, with the urban poor having a higher prevalence compared to their rural counterparts.[8] The WHO estimates that by the year 2030, the prevalence rate in our country will rise to 8.9% or 6.16 million cases.[7]

The prevalence of mood and anxiety disorders is higher in patients with diabetes compared to those without.[9,10,11] Studies done in India, Sri Lanka, and Bangladesh, which comprise most of diabetic population in the Southeast Asian Region, show a prevalence rate of 23-59%.[12,13] Risk factors associated with the development of depression in patients with type 2 DM include age, female sex, being

*Department of Medicine, Section of Endocrinology, Diabetes, and Metabolism, Makati Medical Center
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Corresponding author: Stanlee James Dy Nieva, M.D., Makati Medical Center, Makati, Philippines
Email: stanleenievamd@gmail.com

single, central obesity, elevated HbA1c, diabetes-specific complications (neuropathy, nephropathy, peripheral vascular disease, diabetic foot disease, erectile dysfunction), physical impairment, pill burden (the number of pills taken for glycemic control), reliance on insulin, the absence of adequate social support, lower educational attainment, low socioeconomic status, elevated systolic and diastolic blood pressure, and previous history of depression.[12,13,14] Variations were evident, as these different studies utilized different validated scales to evaluate for depression.

Depressive symptoms appear to be more prevalent in patients with type 2 DM compared to those with type 1.[12] In a study among 33 Filipino patients with type 2 DM, there was no significant correlation between the blood sugar levels and presence of depression, although fasting blood sugar was higher among depressed patients. Furthermore, longer duration of diabetes and presence of certain complications such as hypertension, diabetic retinopathy, and diabetic neuropathy tend to influence occurrence of depression. The prevalence of depression in this study was 85%.[16] Another local study suggested that the physical limitations that accompany diabetes resulted to emotional disturbances, such as depression.[18] Younger age, shorter duration of diabetes, absence of diabetic complications and better social support from the family of diabetic patients significantly influenced a better quality of life among patients.

The available data regarding the prevalence of depression in type 2 DM patients in our country is limited. In this paper, we investigated the prevalence and determinants of depression in patients with type 2 DM being seen in a tertiary care hospital and its relationship with glycemic control and diabetic complications. Demographic and socioeconomic factors were also examined.

Objectives

The objectives of this study is to determine the prevalence of depression in patients with type 2 DM seen in the outpatient setting, also to determine the risk factors for the development of depression in patients with type 2 DM.

Methodology

STUDY DESIGN

This research is a prospective cross-sectional study, utilizing a structured questionnaire for data collection.

PARTICIPANTS

Adult patients (age 19 and above) with type 2 DM who were seen at the outpatient department of the Makati Medical Center from January 2015 to March 2015 were included in the study after securing their informed consent. Patients who were unable to comprehend the questionnaire and those who had hearing impediments were excluded from the study.

All participants were given a short briefing on the study objectives. It was considered that the study involves a vulnerable population, and steps were taken so as not to cause any harm during their participation. During the course of the study, the participants were free to withdraw at anytime with or without any valid reasons. Should they choose to withdraw, the standard medical care being provided were to be continued without any consequences to them. All participants were able to receive available information during the course of the research relevant to their participation.

ETHICAL CONSIDERATIONS

This study was adherent with the guidelines for the ethical conduct of research (Declaration of Helsinki 2008, WHO Operational Guidelines, ICH-GCP, National Ethics Guidelines for health Research). The participants' inclusion in this study was voluntary and did not include any monetary or material compensation. Denial of inclusion did not result to denial of any medical services to the patient. The study was considered safe and no complications were expected to arise during the study period.

In case of an unfavorable incident, the participant was to be given the standard medical care needed. This included explanation of abnormal results and its possible course, prescription of medications if needed and scheduling of follow-up visits. Standard medications for the illness will be prescribed, but no free medications will be given since the objectives of this study do not include the use of medications.

After securing informed consent, the following patient parameters were elicited:

1. Age
2. Gender
3. Marital status
4. Body mass index
5. Waist circumference
6. Blood pressure
7. Duration of diabetes
8. Presence of other co-morbid illnesses
9. Pill burden (number of oral medications being taken for diabetes)
10. Use of insulin
11. Educational attainment
12. Employment status
13. Family income

14. Glycemic status - controlled or uncontrolled.

The patients' latest HbA1c and FBS (within four months of the last clinic visit) were recorded whichever was available; if not, a random capillary blood sugar test was taken instead. The standards set by the 2015 American Diabetes Association Guidelines were used to classify the patients' glycemic status.[17] These include an HbA1c of less than 7%, a fasting blood sugar of 80 to 130 mg/dL, and a peak postprandial blood sugar of less than 180 mg/dL. Patients exceeding these cut offs were classified as uncontrolled.

Depression was screened for by administering the nine-item PHQ-9 (Appendix B and C), a self-report version of PRIME-MD which assesses the presence of major depressive disorder using modified Diagnostic and Statistical Manual, Fourth edition (DSM-IV) criteria.[20] It is available in both English and Filipino.[21,23]

The original test from which it was derived, the Primary Care Evaluation of Mental Disorders (PRIME-MD), was an instrument developed and validated in the early 1990s to efficiently diagnose five of the most common types of mental disorders presenting in medical populations: depressive, anxiety, somatoform, alcohol, and eating disorders.20 However, the test proved cumbersome in actual general medicine outpatient practice because it consisted of a two-stage process that took an average of five to six minutes of clinician time in patients without a mental disorder diagnosis and around 11-12 minutes in patients with a diagnosis.

Recognizing this, Spitzer and colleagues summarized the major components of the original PRIME-MD instrument into a nine-item questionnaire which the patient could understand.[22] There was good agreement reported between the PHQ diagnosis and those of independent psychiatry health professionals (for the diagnosis of any one or more PHQ disorder, kappa=0.65; overall accuracy, 85%; sensitivity, 75%; specificity, 90%). A validated Filipino version of the test is available for patients who could not comprehend instructions in English (Appendix C).[23]

The PHQ-9 Depression Severity was calculated by assigning scores of 0, 1, 2, and 3, to the response categories of "not at all", "several days", "more than half the days", and "nearly every day", respectively. PHQ-9 total score for the nine items ranges from 0 to 27. Scores of 5, 10, 15, and 20 represent cutpoints for mild, moderate, moderately severe and severe depression, respectively.

The PHQ-9 questionnaire yielded a two-fold result. First, it established a provisional diagnosis of depressive disorder. Second, it provided a symptoms severity score. Similar to the work done by Raval et al,[13] the diagnosis of clinically significant depression adapted for this study prompting for a Psychiatry referral was defined as:

1. Score of 8-9: minor depression
2. Score of 10 or greater: moderate depression
3. Score of 15 or more and one of the two cardinal symptoms (either depressed mood or anhedonia) as definite major depression.

For patients attaining a score of eight to nine (minor depression by the PHQ-9 questionnaire), a psychiatry referral was offered. However, should they opt to defer the referral, they will be given reassurance and continued medical management. On the other hand, patients attaining a score of 10 or greater were to be referred to the Psychiatry hospital service program (HSP) service for further evaluation and counseling.

Statistical Analysis

All valid data were included in the analysis. Missing values were not replaced nor estimated during analysis. Summary statistics were presented in tables and reported as mean ± SD, median (IQR) or proportion (%) as appropriate, for patient characteristics and prevalence of depression and associated factors. Bivariate analyses through chi-square test (for categorical variables) and analysis of variance (for interval/ratio variables) were used to determine which among the risk factors are significant for the development of depression in Filipino patients with type 2 DM. After these were determined, significant risk factors were treated for multivariate and univariate analyses through Ordinal Logistic Regression to determine which factors were associated with depression in Filipino patients with type 2 DM.

Frequency and percentages, median (range), and mean + SD were used to describe nominal, ordinal, and interval/ratio variables, respectively. PHQ-9 scores were calculated based on its standardized and validated scoring system. STATA 12 was used for data processing and analysis.

Results

There were a total of 110 adult patients with type 2 DM enrolled in this study. Average age of 65.10 ± 11.56 years, and were predominantly females (76 of 110, 69%). More than half (57%) were married had attained at least college education (61 of 110, 55%) and were retired from work (67%), and had a monthly family income of below 10,000 PHP (52%).

The subjects had a mean BMI of 26.02 ± 5.32, and 17% of the patients were obese. The mean waist circumference was at 82.78 cm, or 32.28 inches. The average systolic blood pressure was pre-hypertensive at 127.36 ± 10.89 mmHg, and 65% of the subjects had cardiovascular disease (Table II).

The subjects have been known diabetics for a median of 10 years, with 19% needing three or more pills for the control

Table I. General characteristics of 110 adult type 2 diabetic patients at the Makati Medical Center Endocrinology Outpatient Clinic

	Mean + SD, Frequency (%) Age
Age	65.10 ± 11.56
Gender	
- Male	34 (30.91)
- Female	76 (69.09)
Marital status	
- Single	11 (10.00)
- Married	63 (57.27)
- Annulled/Separated	8 (7.27)
- Widowed	28 (25.45)
Educational attainment	
- Elementary School	7 (6.36)
- High School	42 (38.18)
- College	61 (55.45)
Employment	
- Contractual	2 (1.81)
- Regular	15 (13.64)
- Unemployed	19 (17.27)
- Retired	74 (67.27)

Table II. Clinical profile of110 adult diabetic patients at the Makati Medical Center Endocrinology Outpatient Clinic

	Mean + SD, Frequency (%)
Height in meters	1.57 ± 0.09
Weight in kilograms	63.91 ± 14.09
Waist circumference in cm	82.78 ± 11.44
BMI	26.02 ± 5.32
BMI Category	
1 - Underweight	3 (2.73)
2- Normal	53 (48.18)
3- Overweight	37 (33.64)
4- Obese	17 (15.45)
Systolic blood pressure	127.36 ± 10.89
Diastolic blood pressure	78.73 ± 8.03

of their diabetes (pill burden). Of the 110 patients, 24 were insulin requiring.

Based on the validated and translated PHQ-9 questionnaire, 69% of the patients had none to minimal depression, 24% had mild depression, and 7% had scores suggestive of moderate depression. In the PHQ-9 questionnaire, most of the subjects replied "not at all" to several items. Some items were reported to be more frequent than others, particularly sleeping problems and having little energy (Table V).

When asked regarding the level of difficulty that the patients encounter in activities of daily living, 70.9% replied

Table III. Diabetes profile of 110 adult diabetic patients at the Makati Medical Center Endocrinology Outpatient Clinic

	Median (range), frequency (%)
Duration of diabetes mellitus	10 (1-26)
Pill burden	
- 0 to 2	89 (80.91)
- 3 or more	21 (19.09)
Insulin use	24 (21.82)
24 (21.82)	
Glycemic control	
- controlled	63 (57.27)
- uncontrolled	47 (42.73)

Table IV. Results of screening for depression among 110 diabetics according to PHQ-9

PHQ-9 Screening for Depression	Frequency (%)
None to minimal depression	76 (69.09)
Mild depression	26 (23.64)
Moderate depression	8 (7.27)
Moderately severe depression	0
Severe depression	0

"not difficult at all," 25.5% replied "somewhat difficult," and 3.64% answered "Very difficult."

In order to determine factors associated with increased or decreased PHQ-9 scores, a multiple linear regression analysis was performed, taking into account general characteristics as well as clinical profiles. From the initial analysis, age, income, BMI, diastolic BP and uncontrolled glycemic status were significantly related to PHQ9 score (Table VII). This model had 33.17% predicting ability to depression. However, given that there were 19 independent variables in the model, the overall results may be spurious. In order to reduce the presence of spurious regression in the model, a step-wise regression analysis was done (Table VIII).

After the step-wise analysis, the following variables were retained: BMI, diastolic BP, employment status, and uncontrolled glycemic status. Increased BMI, increased diastolic blood pressure and uncontrolled blood sugar were found to be associated with higher PHQ-9 scores while unemployment was associated with decreased PHQ-9 score.

Discussion

This is a cross-sectional study conducted in the diabetes clinic of the outpatient department of the Makati Medical Center. The aim of the study Is to determine the prevalence of depression among adult persons with type 2 DM and to identify risk factors associated with its development. Adult patients (age 19 and above) with type 2 DM who were being

Table V. Results from PHQ-9 questionnaire among 110 diabetic adults seen at the Makati Medical Center

Over the last 2 weeks, how often have you been bothered by any of the ff problems?	0 - Not at all (%)	1 - Several days (%)	2- More than half the days (%)	3 - Nearly every day (%)
Little interest or pleasure in doing things	77 (70.00)	20 (18.18)	12	(10.91)
Feeling down, depressed, or hopeless	75 (68.18)	29 (26.36)	5 (4.55)	1 (0.91)
Trouble falling or staying asleep, or sleeping too much	56 (50.91)	37 (33.64)	12 (10.91)	5 (4.55)
Feeling tired or having little energy	64 (58.18)	33 (30.00)	8 (7.27)	5 (4.55)
Poor appetite or overeating	82 (74.55)	15 (13.64)	8 (7.27)	5 (4.55)
Feeling bad about yourself, or that you are a failure or have let yourself or your family down	82 (74.55)	22 (20.00)	6 (5.45)	0 (0.00)
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Feeling bad about yourself, or that you are a failure or have let yourself or your family down	82 (74.55)	22 (20.00)	6 (5.45)	0 (0.00)

Table VI. Difficulty in activities of daily living reported by the 110 diabetic patients

	Not difficult at all (%)	Somewhat difficult (%)	Very difficult (%)	Extremely difficult (%)
How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	78 (70.9)	28 (25.5)	4 (3.64)	0

Table VII. Results from PHQ-9 questionnaire among 110 diabetic adults seen at the Makati Medical Center

Over the last two weeks, how often have you been bothered by any of the ff problems?	0 - Not at all (%)	1 - Several days (%)	2- More than half the days (%)	3 - Nearly every day (%)
Little interest or pleasure in doing things	77 (70.00)	20 (18.18)	12	(10.91)
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Poor appetite or overeating	82 (74.55)	15 (13.64)	8 (7.27)	5 (4.55)
Feeling bad about yourself, or that you are a failure or have let yourself or your family down	82 (74.55)	22 (20.00)	6 (5.45)	0 (0.00)
Feeling bad about yourself, or that you are a failure or have let yourself or your family down	82 (74.55)	22 (20.00)	6 (5.45)	0 (0.00)
Feeling bad about yourself, or that you are a failure or have let yourself or your family down	82 (74.55)	22 (20.00)	6 (5.45)	0 (0.00)
Feeling bad about yourself, or that you are a failure or have let yourself or your family down	82 (74.55)	22 (20.00)	6 (5.45)	0 (0.00)

Table VIII. Final linear regression model of PHQ9 scores

PHQ9	Coef.	[95% Conf. Interval]		P-value
BMI	0.148	0.040	0.257	0.008
Diastolic	0.084	0.012	0.156	0.022
Employment Status (Unemployed)	-1.589	-3.107	-0.071	0.040
Uncontrolled glycemic level	0.771	-0.383	-1.925	0.188
Constant	-7.055	-13.261	-0.849	0.026

seen at the outpatient department of the Makati Medical Center from January 2015 to March 2015 were included in the study. All of the patients who participated in this study belonged to the elderly population whose ages ranged from 65 to 75 years, and were predominantly females (76 of 110, 69%).

Based on the validated and translated PHQ-9 questionnaire, 69% of the patients had none to minimal depression, 24% had mild depression, and 7% had scores suggestive of moderate depression. All patients had no previous diagnosis of depression. The prevalence of depression among this population appeared higher in comparison to a local study done by Oro-Josef et al, who used the Geriatric Depression Scale Short Form 15 to evaluate 196 elderly patients in Rizal.[26] Their participants were not necessarily diabetics but rather had other co-morbid illnesses, such as hypertension, arthritis, and heart disease. They noted a 6.6% rate of depression, and concluded that this prevalence rate among the elderly in Rizal, Philippines showed that depression can be present even in apparently healthy Filipino communities.

Elevated diastolic blood pressure was found to be associated with higher PHQ-9 scores, suggestive of higher risk of depression. This was similar with the study done by Niraula et al in Nepal,[14] although the study they performed utilized a different scale (Beck Depression Inventory, BDI). Their study showed that high blood pressure, either systolic or diastolic, was associated with greater depression severity.

Patients with a higher BMI also tend to have higher PHQ-9 scores. In the study of Sweileh et al using the Beck Depression Inventory (BDI), their score was significantly higher among obese patients. Depression was more common among diabetic women especially if they were overweight and that body weight was a predictor of depression more than diabetes itself. Similarly, recent studies have found that higher BMI was a predictor of depression in type 2 DM. Uncontrolled blood sugar, determined by elevated HbA1c, fasting blood sugar, or by random capillary blood sugar determination, was also associated with higher PHQ-9 scores. This was consistently associated with depression in almost all studies done among type 2 DM patients. HbA1c in particular was strongly associated with depression in Niraula's paper. They hypothesize that HbA1c may be serve as a proxy for disease severity.[14]

Previous studies have shown that type 2 diabetic patients with lower socioeconomic status have a higher risk of depression.[15] Depression is greater among low-income persons with diabetes, likely influenced by both greater financial stressors and also by impaired access to diabetes care. In contrast, however, our study showed that unemployment was associated with decreased PHQ-9 score, suggestive of a decreased tendency for depression among patients with type 2 DM. A possible explanation for this is that since the participants in the study are elderly and are either retired or unemployed, the economic burden may have fallen on the relatives taking care of them. In contrast to other studies, however, marital status, educational attainment, duration of diabetes, the presence of co-morbid illnesses, pill burden and the use of insulin were not associated with higher PHQ-9 scores.[12,13,14,15]

Conclusion

The prevalence of depression among Filipino type 2 diabetic patients is higher than in non-diabetic communities. Being obese, having an elevated diastolic blood pressure, and the presence of uncontrolled blood sugar were significant predictors and were associated with an increased likelihood of developing major depressive disorders. Being unemployed has the opposite relation. We highly recommend the incorporation of evaluating the psychological aspect among the standard diabetic health care plan in order to reduce the number of the depressed or the unrecognized depressed diabetic patients and consequently offer them a better quality of life.

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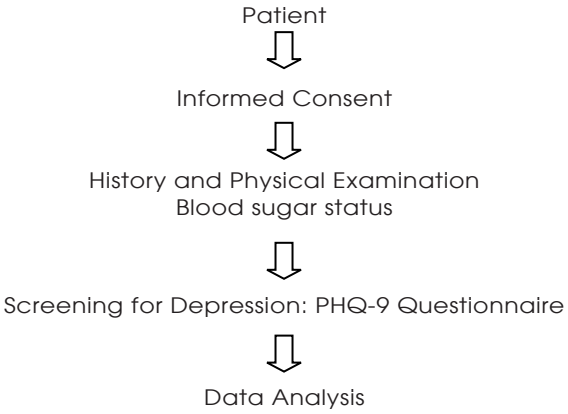
APPENDIX A

Protocol Flow Chart



APPENDIX B

PATIENT HEALTH QUESTIONNAIRE - 9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✔" indicate your answer)*	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself - or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite - being fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3
FOR OFFICE CODING	_____0_____	+ _____	+ _____	+ _____
			=Total Score:	_____

APPENDIX C
PALATANUNGAN TUNGKOL SA KALUSUGAN NG PASYENTE - 9 (PHQ-9)

Nitong nakaraang 14 na araw, gaano ka kadalas binagabag ng alinman sa mga sumusunod na mga problema? *(Lagyan ng "✔" ang iyong sagot)*	Hindi kailanman	Maraming Araw	Lagpas sa kalahati ng bilang ng mga Araw	Halos araw-araw
1. Di gaanong interesado o nasisiyahan sa paggawa ng mga bagay	0	1	2	3
2. Pakiramdam na nalulungkot, nadidipress o nawawalan ng pag-asa	0	1	2	3
3. Hirap na makatulog o manatiling tulog, o labis na pagtulog	0	1	2	3
4. Pagkaramdam ng pagod o walang lakas	0	1	2	3
5. Kawalan ng ganang kumain o labis na pagkain	0	1	2	3
6. Pagkaramdam ng masama tungkol sa iyong sarili — o na bigo ka o nabigo mo ang iyong sarili o ang iyong pamilya	0	1	2	3
7. Hirap magtuon ng pansin sa mga bagay, tulad ng pagbabasa ng dyaryo or pan-onood ng telebisyon	0	1	2	3
8. Pagkilos o pagsasalita ng mabagal na maaring napansin ng ibang tao? O ang kabaligtaran — pagiging alumpihit o di mapakali kaya ikot nang ikot nang higit sa karaniwan	0	1	2	3
9. Nag-iisip na mas mabuting mamatay ka na lang o saktan mo ang iyong sarili sa ilang paraan	0	1	2	3

FOR OFFICE CODING _____0_____ + _____ + _____ + _____

=Total Score: _____

Kung may tsinekan kang anumang mga problema, gaano ka pinahirapan ng mga problemang ito na gawin ang iyong trabaho, asikasuhin ang mga bagay sa bahay, o makisama sa ibang tao?

Hinding-hindi pinahirapan	Medyo Pinahirapan	Masyadong Pinahirapan	Labis na Pinahirapan
□	□	□	□