

DEPRESSION AND ITS ASSOCIATION WITH NUTRITIONAL STATUS, STRESS AND ANXIETY AMONG MALAY WOMEN IN THE RURAL AREA OF SAMARAHAN DISTRICT, SARAWAK

Dr Ainaa Anum Araffin Bakar
Department of Community Medicine and Public Health
Faculty of Medicine and Health Science
University Malaysia Sarawak (UNIMAS), 94300 Kota Samarahan, Sarawak, Malaysia
Email: ainaaanum@gmail.com,

Associate Professor Dr Noorzilawati Sahak
Department of Community Medicine and Public Health
Faculty of Medicine and Health Science
University Malaysia Sarawak (UNIMAS), 94300 Kota Samarahan, Sarawak, Malaysia
Email: snoorzilawati@unimas.my,

Professor Dr. Siti Raudzah Ghazali
Centre for Student Development
University Malaysia Sarawak (UNIMAS), 94300 Kota Samarahan, Sarawak, Malaysia
Email: gsraudzah@fmhs.unimas.my,

ABSTRACT

Depression is a significant contributor to mental illness as well as to the overall global burden of disease as it can affect anyone at any time. Research on depression and its association with nutritional status, stress and anxiety among Malay women in the rural area in Malaysia especially in Sarawak is limited. Therefore, this study was conducted to determine the prevalence of depression and its association with nutritional status, stress and anxiety among Malay women in the rural area of Samarahan district. A community-based cross-sectional survey was carried out among 502 Malay women in the rural area of Samarahan district selected using multistage random sampling. A self-administered questionnaire was used for data collection. Nutritional status was measured using Body Mass Index. Stress and anxiety were measured by Depression Anxiety and Stress Scales (DASS), meanwhile Center of Epidemiological Studies Depression (CES-D) scale was used to screen for depression. Multiple logistic regression was conducted to determine the association between studied factors and depression. The prevalence of depression among respondents was 18.1%. The odds of having depression among single women were 0.58 times [adj. OR 0.58; CI 0.34 – 0.99] compared to married women. Women with stress were six times [adj. OR 6.09; CI 2.93 – 12.66] more likely to have depression. The odds of having depression among women with anxiety were 4.15 times [adj. OR 4.15; CI 2.33 – 7.39] compared to women without anxiety. However, there was no significant association between nutritional status and depression. The study findings can be used to help in designing health programmes and healthcare services to tackle mental health issues in community settings, particularly in the rural area of Samarahan district for prevention measures, early detection and early intervention.

Key words: depression, nutritional status, stress, anxiety

INTRODUCTION

Non-communicable disease (NCD) is a type of illness which does not transmit to another individual. Mental health problem is one of the common NCD risk factors which affect millions of people worldwide, especially increases in developing countries, including Malaysia. The National Health Morbidity Survey (NHMS) in 2015 revealed that the prevalence of common mental health problems among adult in Malaysia was 29.2%, where 30.8% of Malaysian adult women suffered from common mental health problems. Depression is one of the common mental health problems as it is highly prevalent in the population. The worldwide prevalence of depression has been increasing in recent decades (Vos *et al.*, 2016).

Depression can affect all ages, and multiple factors can predispose it. Based on a previous study, more women experience depression when compared to men (Stegenga *et al.*, 2012) and depression can be due to various causes such as social, psychological and biological factors (Accortt *et al.*, 2008). Some aspects that may contribute to the higher prevalence of depression among women and rural community may be due to the exposure of women from this area to specific environments, circumstance and behaviour that may make them more susceptible to depression (Winters *et al.*, 2010). To date, the study on the depression and its associated factors among Malay women in the rural area are very scarce in Malaysia, generally in Sarawak and particularly in Samarahan. Although depression is one of the most common mental health problems in Malaysia, depression prevalence among Malay women in the rural area is understudied.

The connection between common mental health problems and abnormal body weight is a significant public health concern (Sachs-Ericsson *et al.*, 2007). Both of these conditions have significant implications for health care systems and intervention strategies for both physical health and mental health of the community should be considered. These strategies need to include

prevention, screening for early detection and co-treatment for targeted people and eventually help to reduce the burden of both conditions.

Depression as a Public Health issue

Depression is distinguished as a public health burden and is predicted to be the second distinct significant contributor to global disability by 2020 (WHO, 2017). In 2015, people with depression was estimated to be 300 million worldwide, which was equivalent to 4.4% of the world's population. In Malaysia, there is no exception as depression is a typical mental health problem, and it projected to impact about 2.3 million humans, as at some period of lives although most of the cases are under detected and untreated (Mukhtar *et al.*, 2011). The increasing of the prevalence of depression is a significant public health concern. Depression causes a massive burden of disease and enormous economic cost nationwide.

Depression could be a serious health condition, especially when long-lasting and with moderate or severe intensity. The affected person can suffer much and function poorly at any places as well as in the community as it causes impairment in the functional well-being and leads to the low quality of life. Depression is also associated with numerous health complications, including leading causes for disability and increased risk of mortality. Depression is a mental disorder that should not be taken lightly due to its morbidity and burden of disease to a country (WHO, 2018). Chronic depression may lead to suicide as the thought of death can occur during the period of depression. Although the majority of people who have depression did not die from suicide, having major depression does increase the suicide risk compared to those without depression (NIMH, 2019).

One previous study in America has shown that depression may be more severe among the rural communities as the suicide rate in rural America were higher than those in an urban and suburban area of the country (Weaver *et al.*, 2015). However, it was unclear whether rural Americans depression was associated with rural residence itself or with health and resource disparities common in rural areas. Although in Malaysia the suicide rate is still well below the 2016 global crude suicide rate of 10.6 per 100,000 people, the suicide trend in Malaysia has been increasing since 2010 (DOSM). National surveys examining urbanity differences in depression prevalence indicate that rural Malaysians experience depression at similar or greater rates than their urban counterparts (IPH, 2015; Swami *et al.*, 2010). Malays, the largest ethnicity in Malaysia, together with other Bumiputra population, comprise approximately 69.1% of the population (DOSM). The most recent Malaysian National Health and Morbidity Survey (2015) estimated that 28.2% of Malay adults were experiencing mental health problems.

Women, rural area and depression

Depression in women is common as women experienced depression twice the rate of men. Nearly one in four women is likely to have an episode of depression at some period of her life (APA, 2013). Before puberty, depression is rare and occurs about the same rate in girls and boys. However, with the onset of puberty, a girl's risk of developing depression increases two folds as compared to a boy. Women are unique and not every woman develops similar symptoms of depression. Some may experience mild or few symptoms, and some may have more severe or more symptoms. The frequency and duration of symptoms also depend on the person, her specific illness or even the stage of the disease. According to the National Institutes of Health (2019), factors that increase the risk of depression in women include reproductive, genetic, or other biological factors; interpersonal factors; social factors; and specific psychological and personality characteristics. Also, women juggling work with raising kids and women who are single parents suffer more stress that may trigger symptoms of depression (Sumra & Schillaci, 2015). The combination of low income, poor education and poverty may also compound the negative mental health effect on women as compared to men (Din & Noor, 2010).

Environment plays an influential role in society. Comparing people who live in urban areas, there are some disadvantages among the rural community in terms of earning lower incomes, lack of education level, or limited accessibility to health services. Mental health problems are still pervasive in all countries; however, the rural community may receive lesser services compared to urban residents because of the limited mental health professionals, and this may lead to many undiagnosed and undetected cases among the rural population (Yee & Lin, 2011). Although depression is one of the most common mental health illness globally, including Malaysia, depression prevalence among women and rural residents are understudied. Due to this issue, the diagnosis for depression or other mental illness among the rural population remains very challenging, and under-detection is common even though effective treatment exists. A previous international study by Probst *et al.* (2006) showed that the prevalence of depression was significantly higher in residents of the rural areas compared to urban area as the rural population experience more adverse living conditions than the urban population.

A study conducted by Din and Noor (2010) stated that depression among Malay women using CES-D was 34.5% in current depressive symptoms and while lifetime significant depressive symptoms were 27.5%. Furthermore, the percentage of depression among rural women was 30.2%, and urban women were 38.8%. The mental health of Malay women living in rural communities seldom treated, and most are neglected. It is a concern because of Malay women, and rural residents are more likely than other ethnicity and urban counterparts to experience circumstances and conditions that may increase risk for depression, including living in poverty, having lower levels of educational attainment, and poor health (Din & Noor, 2010). Furthermore, rural women with depression may be less likely to receive mental health services than urban residents due to limited mental health professionals in rural area (Yee *et al.*, 2011). Hence, undiagnosed and untreated symptoms may further develop chronic psychological distress and suicidal mindsets (Winters *et al.*, 2010).

Nutritional status and depression

Depression is a multifactorial disease, and nutrition is an essential factor in its development and progression (Othman *et al.*, 2018). Malnutrition is a condition that results from a nutrient deficiency or overconsumption. Micronutrient deficiencies can also occur with over-nutrition due to foods that contribute to over-nutrition, such as fried and sugary foods, tend to be high in calories and fat but low in other nutrients (Ahmed *et al.*, 2012). Malnutrition can be classified to underweight, overweight, and obesity. In adults, body mass index (BMI) is an excellent way to estimate total body fat as it correlates adequately with a straight measure of total body fat.

Common mental health problems (depression and anxiety disorder) and obesity are distinguished as a public health burden (Fezeu *et al.*, 2015). The relationship between BMI and depression is still inconclusive and complex. One study done among Scottish adult population in 2013 stated that the adverse association between adiposity and mental health are specific to women (Ul-Haq *et al.*, 2014). Although obesity and depression are significant global health problems, most researchers are unable to prove whether obesity is the main contributing factor to depression as there are multifactorial to consider or vice versa. A study conducted found that the obese are the higher risk for depression and concluded that poor physical health might lead to an increased risk of having mental health problems. (NOO, 2011). Askhrif *et al.* (2016) who did a study among high school girls in Ahvaz, Iran showed the significant relationship between obesity and depression. Dr Dong Price (2004) did a family-based study in America also showed the same result. One systemic review and meta-analysis of longitudinal studies of overweight, obesity and depression did by Luppino *et al.*, (2010) reported that obesity was found to increase the risk of depression. However, there was no study done among premenopausal female adults in Korea between 2010-2012 demonstrated that the prevalence of mental illness was significantly in underweight women (Lee *et al.*, 2018). Another previous study, also found that people categorised as underweight might be one of the factors associated with higher mortality rates as it had twice as likely to report mental health disorder than normal BMI (Kelly *et al.*, 2010). According to Neovius *et al.* (2008), skinny people mostly experienced alcohol abuses and mental health disorder, and this might identify a higher risk of mortality, especially people with disability pension. Such evidence supports that the underweight has more mental health problems compared to others.

Stress and anxiety as contributing factors of depression

Stress can affect your mental health, and it can change everyone at any time and place. Stress can be defined as a point to which you feel unable to handle the feelings of overwhelm as a result of pressure that is unmanageable (MHF, 2015). Stress is a response to demanding life event or stressful events that happen in a certain period of life, such as divorce or money worries which may lead to depression. Stress and depression have a complex and circular relationship. Stress may have linked with depression in which continued, or chronic stress may lead to persistent elevation of hormones such as cortisol which also known as “stress hormone” and the reduction of serotonin and other neurotransmitters such as dopamine (Bruno, 2011). Some people can deal with stress more effectively and recover quickly, and some people, especially in susceptible people, take a long period to cope with it. Prolonged stress causes health problems and becomes chronic if a person continues to be untreated. Routine stress occurs when the factors appear more persistent in an acute or traumatic event, and continuous strain to the body and this may lead to serious health problems such as diabetes, cardiovascular disease, and others including common mental disorders (NIMH, 2019).

Anxiety disorder and depression are two common mental health problems, and both psychiatric conditions frequently co-exist (NICE, 2011). Anxiety is a natural reflex to stress, and it is a normal and often healthy emotion. It usually occurs when an individual feeling of fear or apprehension about the future outcome. Anxiety disorder is a long-term condition that causes an individual to feel anxious that intense and sometimes debilitating at all time (Felman, 2018). Based on the American Psychological Association (APA) (2019), anxiety defines as an emotion characterised by feelings of tension, anxious thought, and physical changes. There is a strong relationship between symptoms of anxiety and depression (Tiller, 2012). Having an anxiety disorder may eventually lead to developing depression later in life. Anxiety disorder also can cause an increased co-occurrence with major depressive disorder, post-traumatic stress disorder, panic disorder, and alcohol use disorder (Brauser, 2010). Anxiety disorder is often the primary condition that is usually occurring in childhood or adolescent. Tiller (2012) also suggested that the severity and frequency of anxiety are strongly associated with the consistency of depressive symptoms, and the connection is stable over the years.

Previous research was conducted to determine the link between the level of depression and anxiety, and the level of depression and stress among counselling student in University Malaysia Sarawak (UNIMAS) and they found that both stress and anxiety has a strong positive significant relationship to depression (Madihie & Said, 2015).

MATERIALS AND METHODS

Study design and population

A cross-sectional community-based study design was used to determine depression and its association with nutritional status, stress and anxiety among Malay women in the rural area of Samarahan. The respondents were Malay women who were 18 years old and above, Malaysian citizen and lived in a rural area of Samarahan district. This study excluded women who in antenatal or postnatal period, those who has known case of psychiatric disorders and had been diagnosed to have severe or uncontrolled chronic non-communicable disease with history of admission due to a complication of the illness (such as Cardiovascular disease, Stroke, Chronic Obstructive Pulmonary Disease (COPD), uncontrolled Hypertension, uncontrolled Type II Diabetes,

Cancer), or infectious disease (Hepatitis B, Hepatitis C, HIV, Tuberculosis). The study was carried out using multi-stage random sampling.

Data collection

A total of 502 subjects were included in this study. A self-administered questionnaire was used to assemble the data. Weight and height of participants were used to compute BMI as kg/m². Two instruments were used in this study - the Malay language questionnaires of Depression, Anxiety, Stress Scale (DASS – 21) and Center Epidemiology Studies of Depression (CES-D) scales. In this study, DASS was only considered to measure stress scale and anxiety scale. Depression subscale was not used to measure depression as it was replaced by another tool, CES-D, which was a more feasible instrument and offers sufficient reliability and validity to measure depression as the outcome of this study. A pilot test was performed before the study and CES-D demonstrated satisfactory criterion validities for depression with the desired sensitivity of at least 80%, and the optimal cut-off scores were 16.

RESULTS AND DISCUSSION

The age of Malay women enrolled in this study ranged from 18 years old to 85 years old (mean ±SD = 36.1 ±13.78). The majority of them were single (55.5%, n = 279), attained secondary education (53%, n = 266), and non- employed or homemaker (57.2%, n = 287). The monthly income of the participants was ranged from MYR 100 to MYR 8000 with median was MYR 842.06 (IQR = 600). Sociodemographic characteristics of the respondents were presented in the following Table 1.

Table 1: Sociodemographic characteristic of respondent (n = 502).

Variables	Frequency	%	Mean (SD)	Median (IQR)
Age (years)			36.06 (13.78)	
Marital status				
Single	279	55.5		
Married	188	37.5		
Divorcee/widow	35	7.0		
Educational level				
No formal education	14	2.8		
Primary education	111	22.1		
Secondary education	266	53		
Tertiary education	94	18.7		
Unclassified	17	3.4		
Occupation				
Unemployed/homemaker	287	57.2		
Government	65	13.0		
Private	79	15.7		
Self-employed	71	14.1		
Monthly Income (MYR)				842.06 ¹ (600)

NOTES: SD = Standard Deviation; IQR = interquartile range. ¹The distribution is skewed to the right.

The mean (SD) of body mass index (BMI) was 25.56 kg/m² (5.49) with ranging 14.30 kg/m² to 49 kg/m². Among the respondents showed in Table 2, one-third of Malay women was classified as overweight (32.3%, n = 162) followed by obese type I (27.3%, n = 137).

Table 2: Nutritional status of respondent (n = 502)

Variable	frequency	%	Mean (SD)
BMI (Kg/m ²)			25.56 (5.49)
Underweight	42	8.4	
Normal weight	131	26.0	
Overweight	162	32.3	
Obese I	137	27.3	
Obese II	21	4.2	
Obese III	9	1.8	

NOTES: BMI = Body Mass Index; SD = Standard Deviation

Based on the stress and anxiety severity using DASS-21 scale, the majority of the samples in the stress score were within the normal range (90.8%, n = 456) and the rest of respondents developed stress was 9.2% (n = 46). In the anxiety score test, most of the respondents were having the normal range (62.9%, n = 316) and those who have anxiety was 37.1% (n = 186). (Table 3)

Table 3: Stress and anxiety score of respondents (n = 502)

Categories	Frequency	%	Mean (SD)
Stress (DASS-21)			7.05 (6.27)
Normal (≤ 14)	456	90.8	
Stress (>14)	46	9.2	
Mild (15 – 18)	23	4.6	
Moderate (19 – 25)	17	3.4	
Severe (26 – 33)	5	1.0	
Extreme Severe (≥ 34)	1	0.2	
Anxiety (DASS-21)			5.66 (5.8)
Normal (≤ 7)	316	62.9	
Anxiety (> 7)	186	37.1	
Mild (8 – 9)	39	7.8	
Moderate (10 – 14)	116	23.1	
Severe (15 – 19)	22	4.4	
Extreme Severe (≥ 20)	9	1.8	

NOTES: SD = Standard Deviation

In the Table 4, the prevalence of depression in Malay women in the rural area of Samarahan using CES-D was 18.1%. Based on the Mean (SD) depression score was 12.1 (5.71). Depression score was categorised into no depression 81.9% (n = 411) and depression with 18.1% (n = 91).

Table 4: Prevalence of depression (n = 502)

Variable	Frequency	%	Mean (SD)
Depression (CES-D)			12.10 (5.7)
Normal (<16)	411	81.9	
Depression (≥ 16)	91	18.1	

The following variable was analysed: age group, marital status, level of education, occupation, monthly income group, BMI classification, stress score, and anxiety score. Simple logistic regression (SLR) analysis showed the crude odds of the above factors to predict depression among Malay women in the rural area of Samarahan. - Marital status, occupation, stress, and anxiety were the only retained predictors. The results showed the crude odd ratio of single Malay women having depression is 0.52 (95% CI: 0.32 to 0.83). The crude odds ratio of self-employed women having depression is 1.91 (95% CI: 1.04, 3.53). For those Malay women who have stress, the crude odds ratio of having depression is 13.64 (95% CI: 6.96 to 26.75) and those Malay women who have anxiety, the crude odds ratio of having depression is 6.40 (95% CI: 3.86 to 10.63). Table 5

Table 5. Results of Simple Logistic Regression of depression and its associated factors among Malay women in the rural area if Samarahan (n = 502)

Variables	Crude OR	(95% CI OR)	X ²	P-value
Age				
≤29	1			
30-49	1.48	(0.75, 2.92)	1.27	0.260
≥50	0.98	(0.49, 1.97)	0.003	0.956
Marital Status				
Married	1			
Single	0.52	(0.32, 0.83)	7.40	0.007*
Divorcee/widow	0.79	(0.33, 1.94)	0.26	0.614
Education				
No formal education	1			
Low level education	0.42	(0.39, 2.82)	0.007	1.043
High level of education	0.52	(0.58, 4.89)	0.92	1.685
Occupation				
Unemployed/homemaker	1			
Government	1.31	(0.66, 2.60)	0.60	0.440
Private	1.03	(0.53, 2.02)	0.008	0.927
Self-employed	1.91	(1.04, 3.53)	4.31	0.038*
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Variables	Crude OR	(95% CI OR)	X ²	P-value
Monthly Income (MYR)				
≤999.99	1			
1000 – 1999.99	0.76	(0.43, 1.35)	0.873	0.350
2000 – 2999.99	1.68	(0.74, 3.83)	1.534	0.215
≥ 3000	0.72	(0.29, 1.78)	0.515	0.473
BMI classification				
Normal weight	1			
Underweight	0.62	(0.81, 4.27)	2.136	0.144
Overweight	0.90	(0.59, 2.03)	0.082	0.775
Obesity	0.18	(0.65, 2.19)	0.326	0.568
Stress				
Normal	1			
Stress	13.64	(6.96, 26.75)	57.81	<0.001**
Anxiety				
Normal	1			
Anxiety	6.40	(3.86, 10.63)	51.51	<0.001**

* p-value < 0.05; ** p-value < 0.001

In the final multiple logistic regression model, there were three significant predictors variables: marital status, stress, and anxiety (Table 6). Thus:

1. Single Malay women have 0.58 times of odds of having depression compared to married Malay women.
2. Women with stress, the odds suggest that they are 6.09 times more likely to have depression.
3. Women with anxiety, the odds ratio of having depression are 4.15.

Table 6. Results of Multiple Logistic Regression of depression and its associated factors among Malay women in the rural area if Samarahan (*n* = 502)

Variables	Adj. OR	(95% CI OR)	X ² (<i>df</i>)	P-value
Marital Status				
Married	1.00		6.68 (2)	0.035*
Single	0.58	(0.34, 0.99)	3.99 (1)	0.046*
Divorcee/widow	1.67	(0.62, 4.48)	1.04 (1)	0.308
Stress				
Normal	1.00			
Stress	6.09	(2.93, 12.66)	23.35 (1)	<0.001**
Anxiety				
Normal	1.00			
Anxiety	4.15	(2.33, 7.39)	23.35 (1)	<0.001**

R² = 0.272; * p-value < 0.05; ** p-value < 0.001

The majority characteristic of respondents was single, unemployed or homemaker, and the level of education was only up to secondary school. Most of the respondent's monthly income of around MYR 800. Overall, the rate of depression among Malay women in the rural area of Samarahan was 18.1%. This result differs from the general population based on NHMS report in 2015 as the prevalence of depression among women are 30.7%. The difference could be due to different demographics and different types of measuring instruments. In NHMS, the survey was conducted using the General Health Questionnaire (GHQ) that measures the common mental health problem. It differs from CES-D, which is a suitable screening tool for community samples as the test detects possible cases of depression. This study conducted explicitly to determine among Malay women in the rural area where else in NHMS, the results were described the general population that includes all ethnicity and women who live in the urban area. These could be the limitations of our research. Din and Noor (2010) found that the prevalence of depressive symptoms showed the rate of Malay women lived in the rural area based on CES-D scores ≥ 16 was 30.2%. The result was higher than the current study could be due to the different geographical area. In the previous study, the sample was located in a remote agricultural area about 300 km from the nearest big town. Compare to the current study, the distance of the villages about 40 km from the nearest town and approximately 20 km from the nearest clinic. The previous survey was conducted by face to face interview, where else current study was done as a self-administered survey. It could be a limitation in the study as the participant still may have underreported the information.

The multiple logistic regression was used to identify variables that most related to depression in Malay women in the rural area of Samarahan and marital status, stress score and anxiety score were significantly related to depression. Nevertheless, in this study, the MLR served to explain 27.2% of the variance to determine predictors of depression among Malay women in the rural area of Samarahan.

In this study, the results revealed a positive and significant relationship between marital status and depression, specifically in married women and single women. In marital status, the highest prevalence of depression was married women (23.9%). Our results show that married Malay women in the rural area of Samarahan are more likely to have depression, and we found that married women have six times more having depression compared to other groups. Differ from previous research; they concluded that married person is more likely to have greater happiness than the never-married group and divorced or separated. They claimed that this group more likely to enjoy an intimate and supportive relationship, less likely to suffer loneliness and Luanaigh and Lawlor (2008) once stated that "marriage is somewhat protective against loneliness" (Gutiérrez-Vega, Esparza-Del Villar, Carrillo-Saucedo, & Montañez-Alvarado, 2018). However, other researcher suggested that the protective effect mostly occurred among married man instead of married women (Bulloch, Williams, Lavorato, & Patten, 2017). These group of women undergo multiple major life transitions such as living apart with her own family because of developing new relationships with her spouse, his family members and children. They also have duties in taking care of their in-laws and their children in the same period. Some of the married women need to work and maintaining a household to support her family. Often women who perform multiple simultaneous roles put the needs of others before their own, and this may contribute to potential contributors to severe depression such as increased stress or even result in delayed treatment (Sumra & Schillaci, 2015). Multiple-role women or some called 'superwomen syndrome' could be one of the reasons in an increasing prevalence of depression among married women.

Both our study and previous literature suggest that single women also have related to depression; however, less likely to get depression compared to married women. Single women may experience depression when they have to change or modified gender role, like becoming the family provider to her parents and her siblings. It may due to very minimal social support from the family and the community. One of the previous studies by James Rohrer stated that single women are less likely to receive general health care or health care coverage compared to other vulnerable population. The study also found that single women were more disposed to poor self-assessed health compared to married women (Rohrer, 2008). Lack of self-awareness among single women could strongly influence by attitudes toward mental illness, and this could be due to stigma and lack of

understanding of mental health problem. Single women also more financially depressed than married women. However, in this study, no significant relationship between monthly income and depression ($p = 0.324$). Therefore, no significant impact on depression if financially good or poor income.

The public health and epidemiological kinds of literature state that nutritional status can lead to poor mental health, particularly in women (Fezeu et al., 2015). Drawing from increasing prevalence depression in nationwide, we tentatively hypothesised that nutritional state is likely to predict depression among Malay women in the rural area of Samarahan. However, our multiple regression models unable to justify nutritional status as a significant predictor of depression because there was no significant difference between nutritional status. Therefore, the hypothesis could not be used to explain that nutritional status can cause depression in our sample of Malay women in the rural area of Samarahan.

Different sampling could be one of the reasons for the inconsistency outcome. However, there was one study finding had similar with our report suggested that obesity does not lead to a significant increase of depression rate and this showed that the relationship nutritional status and depression is not a simple and could cause by other factors (Askari et al., 2013). Even though the difference in nutritional status was not significant, underweight women have the highest prevalence of depression (26.2%) compared with other BMI classification although the majority of the respondents were overweight (32.3%) as the mean of BMI among the respondents was 25.56. It may indicate that women with overweight and obese were less depressed compared to underweight women among Malay women in the rural area in Samarahan. There was one literature stated that most of the women treated their anxiety and depression with food and this means that food can be a powerful tool in coping with normal stress (Patterson et al., 2009).

Emotional lability sometimes expresses in a way that is greater than the person's emotion and indulging more high-calorie 'comfort' foods can overcome emotional distress. It could be the culprit in leading to more weight gain than usual. The reason that the prevalence of depression was higher in underweight Malay women in the rural area of Samarahan in this study is unclear. Nutritional deficiencies may lead to changes in the appearance of an individual, and this could cause social isolation, which may increase depression. One study suggested that malnutrition could occur before depression diagnosis and often unrecognised and untreated (Ma et al., 2013). It could lead to cachexia if there were no early detection and treatment and also cause a more severe form of depression.

The previous study showed that chronic stress could aggravate the risk of developing depression (Hildebrandt, 2012). And thus, we hypothesised that stress is positively related to depression among Malay women in the rural area of Samarahan. The prevalence of the stress was 9.2%, and the findings of this study were consistent with what has reported in the previous literature for stress. Past results have proven that there was a significant relationship between stress and depression (Madihie & Said, 2015). It was also clearly demonstrated in Bruno's (2011) study that stated, sustained and chronic stress causes persistent elevation of stress hormone and reduction of serotonin. The 'serotonin hypothesis' proposed that the decrease of serotonin pathway activity act a contributory role in the pathophysiology of depression (Cowen & Browning, 2015). Having difficulty in coping stressful life situation can provoke the risk of developing depression too. Social and environmental factors can play a role in influencing an individual dealing with a stressful life event. A study showed that limited social connectedness could lead to the occurrence of a severe form of stress which amplifies of getting major depression in the future and also contribute to premature mortality (Saeri et al, 2018).

The outcome of our study was consistent with previous literature reports that the rate of anxiety among women was 37.1%, and there was a highly positive significant relationship between anxiety and depression. A depressed woman often experiences multiple episodes of anxiety disorder, and this may lead to an increase in the risk of developing depression. Panic or anxiety disorder is when a person experiences spontaneous and unexpectedly recurrent panic attacks. Having panic disorder can restrict a person's ability to work, maintain relationships with other people or contribution to the community, and this can contribute to depression. Anxiety and depression often go hand in hand as one study said, 85% people who developed severe depression also detected with a generalised anxiety disorder, and 35% with symptoms of panic disorder (Tracy, 2012).

CONCLUSION AND RECOMMENDATION

This cross-sectional study examined the relationship between nutritional status, stress, anxiety and depression. In conclusion, this study found that there were significant positive relationships between stress, anxiety and depression. There was no significant relationship between nutritional status and depression among Malay women in the rural area of Samarahan. Single women had lower risk to have depression compared to married women. The findings from our study have a potential social impact as the results revealed that marital status has a significant association with depression, and this suggests that married women may be a greater risk to develop depression. Based on this study outcome, married Malay women in the rural area of Samarahan may need additional social support from state or community level organisation. Although nutritional status often portrayed as being the contributory factor of developing depression, our study revealed that they are not.

The findings speak to the value of interventions to improve mental health programme at primary and community settings. Assessing depression in among women in the rural area and analysing the risk factors can help design health programmes and services required to promote mental health in community settings, especially in the rural area. Although much has learned about depression and its contributing factors for several years, it is clear that there is no simple answer to questions of what is the causal relationship between depression and its contributing factors. Further research focused explicitly on determining the causal relationship of depression could provide greater insight into this area. Furthermore, these results challenge Public Health services

to generate and expend more studies on the factors contributing mental health problem such as social support group, health care facilities and services in the rural area to intervene and overcome the current increasing global health problem.

Some limitations of this study should be considered. First, cross-sectional study design has difficulty to assess a temporal relationship, which means that we could not conclude the causality to a relationship. Second, this study may not represent the general population because it only studies Malay women who live in a rural area, and there is the possibility that they had different characteristics from the general population. Third, the CES-D scale was used to assess depressive symptoms rather than a diagnostic test. It does not provide a clinically confirmed diagnosis of depression. Fourth, a self-administered questionnaire was used, therefore, some of the respondents may be overestimated or underestimated due to motivations and cultural factors which might lead to recall bias.

For recommendation, this study design can be replicated with a larger sample that includes other ethnics, divisions, as well as urban areas. In the future, conducting study on causal relationship between depression and its contributing factors would be useful. A qualitative study also can be considered for further understanding of contributing factors of depression among Malay women in Sarawak. These study findings actually could be used as baseline data for the health promotion intervention programme in Sarawak.

Now, depression is acknowledged as a major public health problem all over the world and its contribution to suicide is generally increasing in trend. Therefore, this study findings can be used to help in designing health programmes and healthcare services to tackle mental health issues in community settings, particularly in the rural area of Samarahan district for prevention measures, early detection and early intervention. Population interventions which involve the inputs from multiple agencies would also be a benefit for improving the mental health of a significant proportion of population with depression.

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